Norwich Area Transportation Strategy Implementation Plan

Report in Response to Inspectors Comments following the Exploratory Meeting

1. Introduction

1.1. This report draws together work on developing the Norwich Area Transportation Strategy Implementation Plan (NATS IP). Its purpose is to assist the Inspectors to draw conclusions from the existing array of NATS evidence.

2. Background

2.1. The vision for NATS is:

> 'To provide the highest possible level of access to and within the strategy area to benefit people's individual needs and enhance the economic health of the strategy area. To ensure that journeys minimise any adverse impact on people and the built and natural environment.'

2.2. NATS for the Greater Norwich area is founded on the principles of enabling growth through the provision of sustainable development and increasing accessibility through widening transport choice. To take forward delivery of this strategy, an Implementation Plan has been developed during 2009/10 that identifies the transport interventions to be provided over the next 15-20 years across Greater Norwich and build upon the projects already delivered. The NATS IP is fundamental to delivering economic growth and meeting key objectives such as those relating to climate change, growth and regeneration, improved accessibility, quality of life and health and improved safety and security.

2.3. Public consultation for the NATS IP was carried out between October and November 2009 in the form of a questionnaire and exhibitions. Information on this is shown in the report **T15** Norwich Area Transportation Strategy; Public Consultation and Engagement Outputs and Analysis; March 2010. Over 1,000 people attended the exhibitions and just over 11,500 responses to the questionnaire were received. There were nearly 23,000 individual comments made during the consultation. Key transport issues raised during the public consultation as needing improvement were congestion, bus services, cycling and parking. There was overall support for the proposed changes in the city centre and the view that Bus Rapid Transit (BRT) proposals would improve travel into Norwich.

2.4. Consultation with businesses and a wide range of other stakeholders was carried out in the form of workshops, individual meetings and a bespoke questionnaire covering specific business-related issues. Over 100 businesses responded to the questionnaire and key transport problems highlighted were delays, unreliable journey times and congestion on the transport network. Details can be found in **T16** NATS Business Questionnaire Results (January 2010). In terms of helping improve business performance, the Northern Distributor Road (NDR) was highlighted as the most important scheme within NATS. Other proposals receiving strong support were BRT and rail and bus service enhancements. Overall, over 80% of businesses agreed that the NATS IP would improve the local and regional economy.

2.5. The NATS IP is well suited to a phased approach to delivery and builds on the significant success of NATS to date.

3. Overview of NATS Implementation Plan

3.1. The key features of the NATS IP are:

- A bus rapid transit (BRT) network;
- Improvements to a core bus network as well as integrated and innovative ticketing and improved travel information;
- City centre improvements, including closing Westlegate to general traffic and creating bus and access only on Chapelfield North, St Stephen's Street, Theatre Street and Red Lion Street and Prince of Wales Road;
- A package of cycling and walking improvements, which include new crossings, increased levels of priority, cycle parking, contra-flow cycle lanes and development of core walking and cycle networks;
- Specific rail service improvements, which include increased levels of service, greater capacity, improved journey times and additional stations;
- Smarter Choices initiatives, like travel planning; and
- The NDR

3.2. The NATS Strategy is set out in the **JCS1** JCS Submission document, page 61 and shows all the key elements.

3.3. Further information on the NATS IP is presented in the**T4** 'JCS Transport Strategy Report, January 2010' and the NATS paper presented at Norfolk County Council Cabinet on 6 April 2010.

4. Recent delivery

4.1. There already exists a comprehensive core bus network across the NATS area, which is provided by a range of different bus operator. The network serves key destinations such as the City Centre, Norwich Research Park, UEA, business parks and the hospital the main radial

routes into Norwich and main settlements within the NATS area. Recent years has seen a steady increase in the number of new routes added to the network on a commercial basis as well as an increase in frequency on existing routes. The NATS projects outlined below have played an important role in facilitating the growth in the bus network and the NATS IP aims to further develop this network.

2.4. Since the start of the current Local Transport Plan in 2006/7, over 225 transport improvement schemes have been completed in the NATS area covering a wide range of modes.

2.5. Recent NATS projects include the following:

- New award-winning bus station (2005) in the city centre catering for 700 bus movements per day
- New bus/rail interchange at Norwich rail station (2006), which has seen an increased frequency of bus use from users
- Commencement of works on the St Augustines Gyratory, which will improve air quality and traffic circulation in this area and support the regeneration of the Anglia Square area. These are due to be completed November 2010
- Completion of extending the existing bus lane on Newmarket Road (May 2010), which is one of the busiest bus corridors in the city (an element of the A11 corridor enhancements)
- Use of Newmarket Road bus lane by HGVs serving a freight consolidation centre at Snetterton
- Preliminary feasibility and design of bus priority measures along Dereham Road and the city centre (Chapelfield North) as well as consideration of restricted traffic flows along Westlegate. These proposals will improve pedestrian and cycle access to the city centre and create a new bus corridor into the city from the west, supporting BRT proposals and providing much needed capacity for buses
- Bus operators signing up to Punctuality Improvement Partnerships (PIPs), which provide a way of working with operators to improve service reliability. Norfolk is a leading authority in the development of PIPs and has more than any other shire County
- Installation of off-bus ticket machines in the city centre, which have aided the reduction in bus boarding times
- Installation of new state-of-the-art electronic bus passenger information screens along Dereham Road, which are some of the first solar powered displays installed in the UK and have been well received by customers
- New pedestrian crossings and cycle priority / parking and routes. Cycle usage of dedicated cycle routes has increased by 4-5% per annum over the period 2004-2008 and cycling accounts for 11% of journeys to work within the Norwich area. There has also been an overall increase in the number of pedestrians crossing an Inner Ring Road cordon since 2004

2.6. To date implementation of NATS has successfully managed travel in the area. We are on-track to meet the Local Transport Plan target for traffic levels in Norwich. Indeed, traffic crossing the inner ring road cordon (ie traffic entering the city centre) has fallen by almost 25% in the last ten years. Bus patronage, including Park & Ride, increased by over 25% between 1997 and 2007 (the last year we monitored numbers of bus passengers crossing the outer ring road cordon). All figures come from **T17** Transport Monitoring Report 2010, published by Norfolk County Council. Norwich remains attractive for investors; the Experian retail ranking consistently places Norwich in the top-ten retail centres nationally.

2.7. However, this success has not halted the growth of traffic beyond the outer ring road. Problems of journey reliability continue for bus users and other traffic. The existing transport network will not be able to cope with the growth that has to be planned for in the JCS. The NDR has been demonstrated to be essential in providing the necessary capacity to enable continued improvements for buses, cyclists and pedestrians (**T4** JCS Transport Strategy Report January 2010).

2.8. The report **T17** 'Norfolk Transport Monitoring, 2010' is available on the NCC website so is a public document. This states that in 2008/9, the amount of traffic crossing the Outer Ring Road cordon increased for the first time in 7 years (0.5% increase). Traffic flows crossing the Inner Ring Road cordon reduced by 0.1% in 2008/9, which was the smallest drop since 1998 and shows a sign of traffic reductions levelling out. This indicates impacts of NATS in terms of reducing traffic flows is halting and further intervention is needed. The report shows that cars make up 77% of the proportion of vehicles crossing the inner ring road

2.9. **Table 1** shows how traffic is predicted to grow to 2031, with increases of at least 30% being predicted at all times through the day.

Table 1 - Total trips in the strategic model (passenger car units)

Total trips	**2006 base year**	**2016**	**2016 NATS IP**	**2031**	**2031 NATS IP**
AM peak	64500	73500	73500	86500	86500
Inter peak	44500	51000	51000	60500	60500
PM peak	59500	67000	67000	77500	77500
Increase from 2006					
AM peak		14%	14%	34%	34%
Inter peak		15%	15%	36%	36%
PM peak		13%	13%	30%	30%

3. Future Delivery of Implementation Plan

3.1. Public transport interventions

3.1.1. Information for the delivery of high quality public transport for JCS growth areas is set out in Chapter 5 of the report **T2** 'Greater Norwich Joint Core Strategy, Public Transport Requirements for Growth, Mott MacDonald (November 2008).

3.1.2. This sets out that the starting point for the procurement and delivery of public transport for the major growth locations should be a long term masterplan for the phased development of the public transport network to serve the growth areas. The network must evolve to reflect the phasing of development and the changing needs of residents and businesses. The masterplanning should support the principle of public transport-orientated development and it will be essential to have high quality public transport in place prior to the occupation of the first new houses on each development. Development of services is likely to involve a mix of public and private sector funding and require a partnership approach involving developers and public transport operators.

3.1.3. To fully answer the question of how public transport services would build to serve the level of expected development, it is necessary to have an understanding of the form, internal layout and phasing of developments rather than simply the proposed growth locations and numbers of houses proposed. Development masterplans will help to provide these answers. As sites are brought forward through further DPDs or as planning applications it will be important to ensure the choice of sites and their layout promotes public transport, walking and cycling.

3.1.4. Recent evidence of how bus operators serving the Greater Norwich area have responded to the business opportunities created by new major housing developments demonstrates that operators understand the importance of having services in place at first occupation in order to maximise potential patronage. In the case of the Queens Hills development in Costessey, two operators introduced services on a commercial basis to give a combined frequency of six (6) daytime buses per hour from outset. This has been sustained to today. The site currently has around 700 completions against a forecast final number of dwellings of 2,000.

3.1.5. We are currently developing a public transport implementation plan for the Rackheath low-carbon development to set out costed

proposals for the phased development of public transport in line with housing growth. This is aided by an existing masterplan, which shows the internal layout and relationship with existing transport infrastructure. Demand Responsive Transport (DRT) will be provided in the early stages of development, ensuring sustainable public transport options are available, but this will evolve into conventional bus services as demand grows through increased occupation of dwellings. Improvements for cyclists are also proposed along Salhouse Road to serve the exemplar phase of the low-carbon development. These are being planned in such a way that they can be developed into a high quality cycle "superhighway" to serve the full low-carbon development when it is fully completed. The current challenge is getting the balance right between bus and cycle provision. The measures will not only support development at Rackheath, but are the first part of the package of measures to support the wider Old Catton, Sprowston, Rackheath and Thorpe St Andrew Growth Triangle.

3.1.6. For the full low-carbon development, the following transport measures are ultimately proposed:

- Bus
- Bus Rapid Transit (BRT) on Salhouse Road from development to Norwich city centre
- A bus service operating from the development to Norwich Airport, or, Demand Responsive Transport (DRT)
- Bus priority on Salhouse Road at signalised junction with Outer Ring Road
- Bus only route through Mousehold Heath in Norwich
- Revenue support for buses until northeast Norwich growth area is sufficiently developed for BRT services to be sustainable
- Walking/cycling
- High quality segregated pedestrian and cycle facility along Salhouse Road
- Other pedestrian and cycle facilities to link growth areas to Salhouse Road
- Pedestrian and cycle facilities to link the development with Wroxham to the north
- Rail
- Relocate Salhouse station to within the low-carbon development
- New station/halt to serve Broadland Business Park and existing housing at Dussindale Park

- Double service frequency to half hourly on North Walsham to Norwich railway line to serve the development
- Feasibility into tram-train services to serve the development

3.1.7. To achieve high quality and frequent bus services, that are attractive to the public, it is important that bus service reliability is maintained at a high standard. Without this, services could ultimately end up 'bunching together' along routes, creating lengthy intervals between services and adding to congestion in other areas of the network. Adding extra buses to try and maintain the timetable is unlikely to resolve the underlying issues that cause the congestion problems and lead to increased costs for operators that are not sustainable. This in turn can lead to commercial deregistration. The alternative option of increasing running times would prove unattractive to existing and potential bus users and is more likely to reduce bus patronage. Bus priority measures along corridors will form an important element of delivering reliable services at a high frequency. More information on this is outlined in the sections below looking at different corridors

3.1.8. **Table 2** sets out how Norfolk County Council would see the phasing of public transport requirements for strategic growth locations as they are developed. This assumes existing bus services would be incorporated or extended as part of this growth. However, it may be possible to introduce a turn up and go frequency in advance of the 'triggers' shown based on the reaction of the existing populations in these areas to improved public transport facilities. The thresholds in the table are drawn from Norfolk County Council's knowledge of the local Public Transport market.

3.1.9. **Table 2** reflects the need for attractive service provision from early on in the life of a development to secure travel patterns and the take up of public transport operators. It reflects a need to pump prime services from developer contributions whilst making sure the requirements are viable in terms of short term revenue support funding and commercially viable beyond that. Experience has shown that public transport operators have been prepared to provide services beyond the thresholds shown based on future market potential.

Table 2: Public transport requirements for strategic growth locations

Ref No	First dwelling occupied	250 dwellings	500 dwellings	750+ dwellings
A	Developments to be built around core public transport routes			
B	All dwellings within 400m of a fully accessible bus stop			
C	Bus shelters / stops to provide with real time bus departure information			

D	All dwellings to have public transport information (paper and electronic)			
E	Accessible route for buses through site		Site remains accessible for expanded routes through the site	
F	Discounted public transport ticketing provided (developer funded)			
G	Available walk and cycle links to be provided to bus stops and key services			
H	Developer funded subsidised bus service		Commercial bus services	
I	30 mins frequency daytime service (0700-1900)	20 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)	10 mins frequency daytime service (0700-1900)
	No evening service	60 mins frequency evening service	30 mins frequency evening service	30 mins frequency evening service
	60 mins frequency Sunday (0800-1800)	60 mins frequency Sunday (0800-1800)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)
			Small lengths of bus priority lanes	More significant lengths of bus priority lanes
J	Traffic light priority			
K	Possible introduction of demand responsive type services serving other growth locations not in city centre. To be determined on a case-by-case basis			

Notes:

Ref A: The masterplanning should support the principle of Public Transport-Orientated Development and it will be essential to have a high quality public transport in place prior to the occupation of the first new houses on each development

Ref B: Fully accessible bus stops should be located within 400m of all dwellings and new business premises. All new bus shelters and hard standing will be designed to meet the needs of passengers with disabilities or other mobility impairments. All bus stop flags and timetable cases fitted to poles and shelters will be form a limited range of common style and uniform size, and confirm to a standard information format

Ref C: All bus shelters are to be provided with real time bus departure information. Feedback from customers has highlighted the importance they place on this information being available

Ref D: All new dwellings and business premises are to have public transport information available. As a minimum, this should include printed timetable and route information for all available services. It is now possible to have access to electronic passenger information within dwellings and business premises and this should be provided where possible

Ref E: Accessible route for buses through site should be available from first occupation to ensure bus services to operate from the outset within 400m of all dwellings / business premises. As development sites develop and expand, public transport routes should be available from the outset as soon as other areas of the site have occupation

Ref F: Discounted public transport season tickets to be provided from the outset. This could take the form of discounted / complementary tickets for individuals or the residence as a whole a minimum of a 6 month period

Ref G: Available walk and cycle links are to be provided to bus stops and key services, such as schools and health facilities, from time of first occupation. This is important in terms of ensuring bus services can adequately serve the site and encourage public transport usage

Ref H: Some form of revenue subsidy is likely to be needed at the early stage of transport provision until sufficient patronage is built up. It will be the expectation that services can be sustained commercially after around 500 dwellings if not before

Ref I: Minimum levels of service frequency are outlined based on development of the site

Ref J: Traffic light priority is to be rolled out across key transport corridors and has already been introduced along Dereham Road. There are different levels of priority that can be provided and these are assessed on a case-by-case basis and are dependent on traffic flow conditions and bus routing

Ref K: Demand responsive type services offer a degree of flexibility in terms of serving growth locations that may be located outside of the city centre and are not on the transport corridor from the development site to the city centre. The implementation of demand responsive type services would need to be determined on a case-by-case basis

3.1.10. Traffic light priority for buses at junctions along this corridor will need to be introduced over the next few years and will supplement the physical bus priority (bus lanes) and offer further benefits to bus service reliability.

3.1.11. Other supporting elements of a turn-up-and-go service relate to the provision of high quality shelters and information provision, as well as attractive and convenient ticketing options and high quality vehicles. The delivery of information and ticketing can be directly linked to the phasing of development, with these facilities being made available right from the outset. The provision of high quality vehicles is likely to be best dealt with through other mechanisms, such agreements with operators, as demonstrated through the Joint Investment Plan. It is assumed that appropriate masterplanning will ensure developments are designed around public transport and sustainable modes from the outset.

3.2. City Centre

3.2.1. The NATS IP removes a significant amount of through traffic from the city centre. City centre measures implemented by 2016 restricting access to general traffic are forecast to reduce the number of trips passing through the city centre by around 64%. When the remainder of the measures are introduced by 2031, forecasts indicate a reduction of 72%.

Table 3. City centre through trips (within Inner Ring Road)

AADT	2006 base	2016	2016 NATS IP	2031	2031 NATS IP
Total	85500	91500	88000	111000	102500
through trips	12500	7500	4500	10500	3500
% through	15%	8%	5%	10%	3%
through trip reduction from 2006			8000		9000
% change from base			-64%		-72%

AADT = Annual average daily traffic

3.2.2. Do min includes closing Westlegate

3.2.3. 2016 includes

- Pedestrianising Exchange Street
- Chapelfield North two way for buses and closing Little bethel Street

- Bus only on Chapelfield North and Theatre Street
- Bus only on St Stephens Street
- Golden Ball Street and Farmers Avenue two way and bus only on Red Lion Street
- Bus only on All Saints Green

3.2.4. 2031 is as 2016 but also includes bus only on Agricultural Hall Plain which significantly reduces the availability of through traffic routes.

3.2.5. Reducing the number of through traffic routes in the city will significantly improve bus service reliability and provides conditions for much needed capacity for the increased number of buses serving growth areas to use kerb space for picking up and dropping off. Removing through traffic will help buses get on and off bus stops more effectively without being delayed by lengthy queues of buses and cars in the city centre. Feedback from bus operators indicates that additional bus stops will provide greater flexibility in terms of routing of services and will support the provision of new public transport routes into the city. For example, proposals to remove through traffic from Chapelfield North will enable two-way running for buses and will enable services to enter the city via this route and take pressure off bus stops on St Stephens Street, where services will be removed. These changes would also significantly enhance the amenity of the medieval historic core of the city

3.2.6. The above schemes will be subject to consultation being carried out on the individual proposals in line with standard scheme development procedures as they are brought forward.

3.3. A11 Corridor

3.3.1. The A11 corridor encompasses key growth areas at Cringleford, Hethersett and Wymondham and serves existing, established housing areas in these locations as well as the Norwich Research Park and Norfolk & Norwich University Hospital. This corridor is currently well served by public transport (bus and rail) and the scale and location of development takes advantage of this existing provision. There are currently two buses per hour plus extra journeys at peak times direct from Wymondham to Norwich via A11. There are also 3 buses per hour plus extra journeys at peak times from Wymondham to Norwich via Hethersett. Existing reliability of bus services along this corridor is good and is one of the highest compared to other radial routes into Norwich. Bus services along corridors from the south perform the best at 82-86% on time (2006-2009), which compares to corridors from the north performing at 69-73% over this same period. Other

corridors are 73-77% on time. See Section 5 of **T4** 'Baseline Conditions Report, JCS Submission, January 2010.

3.3.2. The proposed scale of development along this corridor is outlined in **Appendix A** and growth commences before 2015 and continues to 2025.

3.3.3. The key transport intervention along this corridor related to growth is the future establishment of a BRT service linking Wymondham, Hethersett, Cringleford and the city centre, which will ultimately provide a turn up and go service operating at a minimum of a 10 minute frequency during the day. This is likely to be provided through the enhancement of existing services on this corridor as opposed to simply overlaying new dedicated services for the growth areas on top of existing services. The 'ramping up' of bus service frequency in relation to growth is forecast as outlined in **Appendix B**.

3.3.4. The scale of growth planned on the A11 corridor was identified at the margins of being able to support a turn up and go service. The report did not consider in combination all 3 growth locations on the A11 corridor. Further assessment of the corridor shows that there are about 8,800 existing households at Wymondham and Hethersett (ignoring the potential of Cringleford) plus 2 strategic employment areas at Wymondham and Colney. Adding these 8,800 households to the 4,400 new homes proposed give a total market of about 13,000. 13,000 is well above the 10,000 units that could reasonably be expected to support a viable BRT corridor and only 1,200 above existing household numbers.

3.3.5. To support high frequency services, significant bus priority measures are required. The Newmarket Road corridor already has a high level of bus priority and this has been further enhanced with the completion of the extension of the existing inbound bus lane in May 2010. A map showing the extent of bus priority is outlined in Section 5.1.1.3 of **T4** 'Baseline Conditions Report, January 2010'. However, it should be noted that the extended bus lane referred to above is not shown on this map. A key element of the infrastructure required for support BRT on this corridor is therefore already in place. Several additional locations along Newmarket Road have been identified where small lengths of bus priority / junction modification could be provided along this corridor. Delivery of these will improve the quality of the bus service provided but will not affect the ability of the corridor to support the level of proposed growth.

3.3.6. The Thickthorn roundabout is a key junction along this corridor as it will need to cater for growth not only from development sites within the JCS area but also growth from further a field along the A11 corridor from places like Attleborough and Thetford. The key

issue at the Thickthorn junction for NATS is that the junction can accommodate reliable public transport services and it is likely that there will be an improvement to primarily address Highway Agency concerns.

3.3.7. Other transport interventions proposed for this corridor relate to works at Wymondham rail station to improve accessibility to the station itself. Initial feasibility studies have already been undertaken looking at improved access to the station and outline costs have been derived. These works will require development-led funding to proceed. The county council supports improved accessibility and will pursue this via the appropriate delivery mechanisms in the rail industry.

3.4. Dereham Road linking the city with the Easton/Costessy growth location

3.4.1. The Dereham Road corridor encompasses key growth areas at Easton and serves existing, established housing areas in these locations such as Queens Hills and Lodge Farm. This corridor is currently well served by public transport with 10 buses per hour from Norwich to Costessey or Queens Hills. There are a further 6 buses per hour from Norwich to Bowthorpe on the section of Dereham Road between Grapes Hill and Bowthorpe Road. The scale and location of development takes advantage of this existing provision. Existing reliability of bus services along this corridor is good.

3.4.2. The proposed scale of development along this corridor is outlined in **Appendix A** and growth commences before 2015 and continues to 2025. Whilst the scale of growth is less than that on other corridors, there is significant committed development along this corridor as well as strategic employment at Longwater.

3.4.3. The key transport intervention along this corridor related to growth is the future establishment of a BRT service linking Easton with the city centre, which will ultimately provide a turn up and go service operating at a minimum of a 10 minute frequency during the day. This is likely to be provided through the enhancement of existing services on this corridor as opposed to simply overlaying new dedicated services for the growth areas on top of existing services. The ‘ramping up’ of bus service frequency in relation to growth is forecast as outlined in **Appendix C**.

3.4.4. To date some junction modelling work has been carried out for Longwater interchange to assess solutions to accommodating the significant committed development at Queens Hills and the Longwater industrial area. Further work will be carried out to

investigate solutions to provide priority for public transport either through the junction or on a dedicated BRT bridge over the A47.

3.4.5. To support high frequency services, significant bus priority measures are required. The Dereham Road corridor outside of the outer ring road already has a good level of bus priority compared to corridors from the north and east. A map showing the extent of bus priority is outlined in Section 5.1.1.3 of **T4** 'Baseline Conditions Report, January 2010'. However, there are key areas where bus priority is not provided (eg. Old Palace Road, Outer Ring Road junction and Grapes Hill), which inhibits the ability of the corridor to accommodate frequent services reliably. Areas where bus priority is missing corresponds to areas where bus journey time variability is high (see Section 5.1.1.15 of **T4** 'Baseline Conditions Report, January 2010'). Feasibility work for increased bus priority along this corridor is currently underway.

3.4.6. Other supporting elements of a turn-up-and-go service relate to the provision of high quality shelters and information provision, as well as attractive and convenient ticketing options and high quality vehicles. The delivery of information and ticketing can be directly linked to the phasing of development, with these facilities being made available right from the outset (see **Appendix C**). High quality electronic bus departure displays were installed along the corridor in 2009 and these have been well received by customers. The provision of high quality vehicles is likely to be best dealt with through other mechanisms, such agreements with operators, as demonstrated through the Joint Investment Plan. Appropriate masterplanning will ensure developments are designed around public transport and sustainable modes from the outset

3.5. Old Catton, Sprowston, Rackheath and Thorpe St Andrew Growth Triangle.

3.5.1. The Old Catton, Sprowston, Rackheath and Thorpe St Andrew Growth Triangle covers the area from the airport to Broadland Business Park and encompasses key growth areas at Broadland Business Park, Rackheath and the airport. This area is generally reasonably well served by public transport. Broadland Business Park is currently served by two operators providing 3 buses per hour. Postwick Park & Ride provides 6 buses per hour including a contra-flow service for Aviva staff at Broadland Business Park. There are a further 6 buses per hour serving Dussindale, Rackheath, Salhouse and Wroxham. Wroxham Road is served by 4 buses per hour as far as Sprowston Tesco and there is also a Park & Ride service from Sprowston with 6 buses per hour. Salhouse Road currently has no service but this is the proposed route for a BRT service from the Rackheath low-carbon development site. The routes to the Spixworth/Crostwick area have 3 to 4 buses per hour plus extra journeys at peak times.

There is a Park & Ride service at Norwich Airport with 6 buses per hour and there are additional buses on the Cromer Road corridor up to 3 per hour at peak times. The scale and location of development takes advantage of this existing provision, although localised congestion does mean that bus journey times can be unreliable.

3.5.2. Existing reliability of bus services from this area into the city centre is generally the worst when compared to other radial routes. Typically, around 70-75% of bus services from this area into city centre operate on time, compared to 80-85% on corridors from the south and 75-80% from the west.

3.5.3. To support high frequency services of 15 mins or less, significant bus priority measures are required to aid bus service reliability from the north east sector. However, the extent of bus priority is limited (see Section 5.1.1.3 of **T4** 'Baseline Conditions Report, January 2010') when compared to other approaches to the city centre and this generally corresponds with roads affected by high bus journey time variability (see Section 5.1.1.15 of **T4** 'Baseline Conditions Report, January 2010').

3.5.4. The proposed scale of development along this corridor is outlined in **Appendix A** and growth is envisaged to be earlier than other areas due to the Programme of Delivery for Rackheath. There are key future employment areas at the airport, Rackheath and Broadland Business Park.

3.5.5. The key transport interventions serving this area are future BRT services serving the airport employment area, Rackheath and Postwick (Broadland Business Park), which will ultimately provide a turn up and go service operating at a minimum of a 10 minute frequency during the day. In addition, proposals are being established by the low-carbon development promoters for the possible introduction of a tram-train operation on the existing Bittern rail line, but this is a longer term aspiration. The NATS IP focuses on BRT in the shorter term as it provides a more flexible solution that is more deliverable.

3.5.6. Provision of BRT services are likely to be ultimately provided through the enhancement of existing services as opposed to simply overlaying new dedicated services for the growth areas on top of existing services. The 'ramping up' of bus service frequency in relation to growth is forecast as outlined in **Appendix D**.

3.6. Long Stratton

3.6.1. South of Norwich, the A140 is a former trunk road and provides a strategic link between Norwich and Ipswich. It currently passes through the market town of Long Stratton, which has seen recent housing growth. The road is largely single-carriageway and traffic suffers from congestion, particularly through Long Stratton. There is limited bus priority measures provided along the corridor.Long Stratton is currently served by three bus operators providing services into Norwich, the majority of which operate along the A140 from Diss to Norwich via Long Stratton. Services are provided all days of the week (Monday – Sunday). During Monday to Saturday, there are 6 departures during the morning peak (0700-0800) and 3 buses per hour off-peak. Services run until 2230 in the evening. On Sundays and Bank Holidays an hourly service is provided from 0928 to 1628. The corridor benefits from a Park & Ride operation at Harford, which can be accessed from the junction between the A47 and A140. The Park & Ride service provides frequent, non-stop journeys into Norwich city centre six days a week.

3.6.2. A typical journey time is 20-40 minutes (dependent on routing) from Long Stratton to Norwich.

3.6.3. The traffic congestion at Long Stratton on the A140 is a significant bottleneck, having a negative impact on connections between the ring of market towns and Norwich.

3.6.4. To support improved public transport services along this corridor, bus priority measures are required to improve the reliability and journey time of bus services. Traffic light priority for buses is being identified for the approach to the A47 Harford interchange. Further priority measures along the A140 radial route into Norwich with further benefit service reliability. Areas where short lengths of dedicated bus lane can be introduced have been identified, such as on the northbound approach to the A47 junction along the A140, and will aid the performance of the corridor.

3.6.5. In addition to bus priority measures, there are a number of other factors that can be introduced to encourage shift towards more sustainable transport along this corridor. This includes factors such as information provision, improved bus stop infrastructure, new ticketing provision and improved walking and cycling facilities.

3.6.6. **Appendix E** identifies the likely phasing of improvements to support major growth at Long Stratton.

3.6.7. Long Stratton can support a 15 minute service, but in the opinion of Norfolk County Council, there is not certainty that a 10 minute service could be commercially supported throughout the day although the market may respond to deliver a better service

than anticipated. Clearly this means that the level of service that is expected for Long Stratton is less than for the other major growth locations. However a 15 minute service to Norwich throughout the day is a very good service and considered to meet the overall objectives of the JCS of having major growth well served by public transport.

4. Longer term transport issues

4.1. As housing development sites expand to their full allocation, the provision of services will be regularly reviewed where practical by operators to seek to ensure that sufficient services are provided to ensure all areas of the sites are adequately served at the required frequency that will encourage sustained modal share for buses. For example, one single service is unlikely to be sufficient to adequately serve developments that exceed several thousand dwellings but the scale of the growth locations would generate the market to support additional services.

4.2. Continual investment will be required in the public transport network to ensure vehicles and infrastructure is maintained to a high standard to keep pace with new technologies and passenger aspirations.

5. Norwich Northern Distributor Road

5.1. At present there are issues of traffic congestion, delay and residential amenity in the northern parts of Norwich. If these are left unresolved the additional trip making by the JCS proposed level of growth, 7,000 to 10,000 houses, will only exacerbate this situation. Even with sustainable development and a target of 50% fewer motorised trips, the scale of growth is such that conditions will worsen. Therefore, in order to achieve sustainable development at the levels shown in the JCS, traffic must be removed from this network, freeing up space to provide bus priority measures, cycle lanes and improved pedestrian facilities as appropriate. The proposed NDR will allow this to happen (**T4** JCS Transport Strategy Report January 2010)

5.2. Analysis to support the NATS IP shows that the NDR is very effective in dealing with future congestion, including traffic generated from planned growth in the northeast of the Norwich area. When implemented, the NDR will provide relief to key radial routes and therefore additional capacity for the implementation of enhanced priority for buses, cyclists and pedestrians.

5.3. There is an existing housing allocation in Broadland Local Plan at White House Farm in Sprowston which can deliver 1,200 dwellings, in advance of the NDR provided suitable road links between the appropriate radial roads are provided in a similar manner to that

shown in the Local Plan. In addition the Rackheath exemplar of 200 homes can be developed.

5.4. About 600 houses at Brook Farm and a further 1000 houses at Rackheath can be accommodated in advance of the relief provided by the Norwich Northern Distributor Road (NDR). These developments will need the Postwick Hub junction to be built otherwise their impact on the A47 trunk road junction will be unacceptable and likely to generate an Article 14 objection by the Highways Agency.

5.5. The **Table 4** shows that on the radial routes in the northern suburbs the traffic flows change with the introduction of the NATS IP. At locations outside of the built up area, just south of the NDR the flows increase but at locations inside the built up area, closer to the Outer Ring Road, the flows decrease. This is because rather than passing through the built up area, traffic is using the NDR instead. The effect of this is that the residents living directly on these routes will have a better quality of life. In addition, the freed up road space will give opportunity for the introduction of Bus Rapid Transit (BRT), improved public transport and other measures to encourage sustainable transport by improving cycling and walking facilities. Although there will be flow increases on radial routes outside of the existing built up area due to traffic accessing the NDR, new housing growth along these roads can take account of this in terms of careful design to protect residential amenity.

Table 4- Flows on Radial route to the North of Norwich

AADT	**2006 base year**	**2016**	**2016 NATS IP**	**2031**	**2031 NATS IP**
A140 outside built up area	22000	24500	26500	28000	31000
A140 inside built up area	19000	19000	17500	20500	19000
B1150 outside built up area	*9900*	*11000*	*7900*	*12000*	*9800*
B1150 inside built up area	*13000*	*13000*	*10500*	*14000*	*11000*
A1151 outside built up area	13000	11500	17000	16000	19000
A1151 inside built up area	12500	19500	17000	21000	18500
Salhouse Road outside built up area	6300	8000	8900	9200	12900

Salhouse Road inside built up area	7800	11500	9500	14500	12000
Plumstead Road outside built up area	5500	7100	15000	8100	17500
Plumstead Road inside built up area	11000	14500	12500	14000	13000

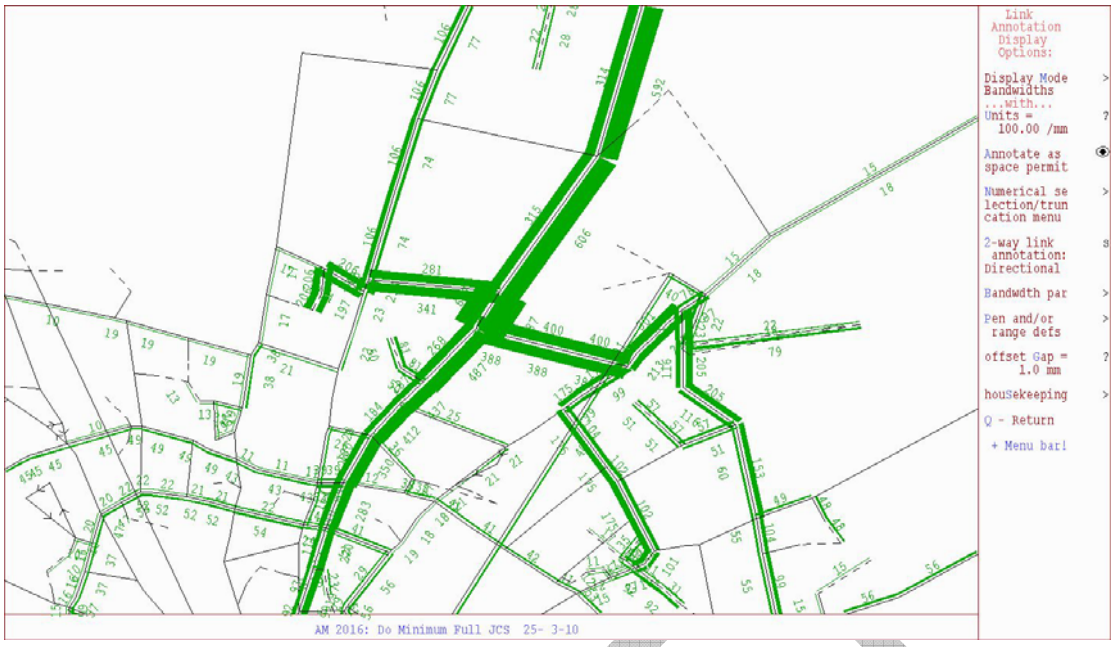
AADT = Annual average daily traffic

5.6. In the northern suburbs of Norwich, beyond the outer ring road, there is a series of residential roads such as, Lodge Lane, White Woman Lane, Barkers Lane, Church Lane, Blue Boar Lane, and Woodside Road that are used as an informal outer outer ring road. In places these roads do not join up at the radial routes, which mean the trips travel a short distance on the radial route to get to the next section of the informal ring road.

5.7. This creates additional traffic on the radial roads and more vehicle conflict at the junctions. With the NATS Implementation Plan, traffic is significantly reduced on the roads that make up this informal outer outer ring road. The outcome of this will be fewer delays on radial routes for buses caused by cars using alternative informal ring-road type trips.

5.8. An example is the movement from White Woman Lane to Barkers Lane which uses North Walsham Road. The extract from the NATS model shows the routes taken by vehicles between White Woman Lane and Barkers Lane and clearly demonstrates an orbital movement.

Figure 1 Model analysis of flows on North Walsham Road



6. Walking, cycling, and smarter choices

6.1. Nearly 50% of people who responded to the NATS IP consultation (See **T15**) stated that reduced traffic flows in the city centre would encourage them to walk more. In addition, over 20% said that more pedestrian crossings would have the same effect. As well as reducing traffic flows and providing the opportunity for more pedestrian crossings, proposals for the city centre will also enable increased levels of priority to be given to pedestrians at signalised junctions. This will significantly improve the ability to navigate the city by foot. Works will continue to develop a comprehensive walking network across the NATS area and the consultation indicated that clear and up-to-date maps showing walking routes should be provided. There are opportunities to deliver public realm improvements in areas such as Tombland, St Stephens Street, Magdalen Street, Prince of Wales Road, Queens Road and St Benedicts Street as part of delivering the city centre proposals. Phasing of schemes such as this will be dependent on the delivery of funding and complementary works.

6.2. There was strong feedback from the public consultation that the cycle network in Norwich needs to be better connected and joined together. The NATS IP provides a significant opportunity to achieve this. The most important issues raised through the public consultation related to more off-road cycle routes (22% of people stated this), more dedicated on-road facilities (17% of people stated this), secure cycle parking (13% of people stated this), reduced traffic flows in the city centre (11% of people stated this) and contra-flow cycle lanes (6% of people stated this). Over 55% of people agreed with the locations of the proposed locations of core cycle routes. (Section 5.7, **T15** Norwich Area Transportation Strategy, Public Consultation and Engagement

Outputs and Analysis, March 2010.) The consultation also provided a significant amount of information about other locations within the NATS area where new cycle routes and facilities should be provided. All of these will be used to develop the Implementation Plan. There are opportunities to provide complementary benefits to cycling as part of delivery of BRT and city centre proposals. Reduced traffic flows in the city centre and along some key routes will create the conditions for increased cycle use. Reduced traffic flows through busy junctions, such as in the city centre and on the ring roads, will enable increased levels of priority to be given to cycle crossings. A key part of the proposals is to develop a core network of cycle routes along less-trafficked roads linking strategic employment locations and the city centre with existing and future housing locations.

6.3. Smarter Travel Choices play an important role in supporting modal shift from car to more sustainable modes and this will be further developed as part of the NATS Implementation Plan. All schools within the NATS area have travel plans and these are proving successful in encouraging use of sustainable modes for journeys to school. Whilst there are a relatively small number of businesses with travel plans, the Implementation Plan aims to significantly increase this, with attention being focussed on the largest employers in the area. We are working with stakeholders on establishing area-wide travel plans, which provide economies of scale and a collective working towards a common goal. There are clear linkages between Smarter Travel Choices and the other initiatives promoted in NATS.

7. Conclusions

7.1. Planning for public transport requirements of growth cannot be undertaken in detail until specific site allocations are known as this will fundamentally influence what transport provision can be provided. However, by concentrating development in larger sites rather than distributed across a large number of smaller sites, more comprehensive public transport and sustainable modes networks can be delivered. Bus operators are able to better incorporate development sites within existing networks on a commercial basis. Disaggregate and dispersed sites leads to the risk of infrastructure requirements for buses, walking and cycling not being delivered in a co-ordinated fashion creating broken networks that do not encourage their use.

7.2. A corridor approach is being used to make best use of the transport network within a transport corridor, which involves local authorities and transport operators working together to improve the mode share of bus from new developments. There is a history of successful partnership working by local authorities and public transport operators in the NATS area to deliver public transport improvements, which dates back to the development of Park & Ride and the award winning Western Corridor

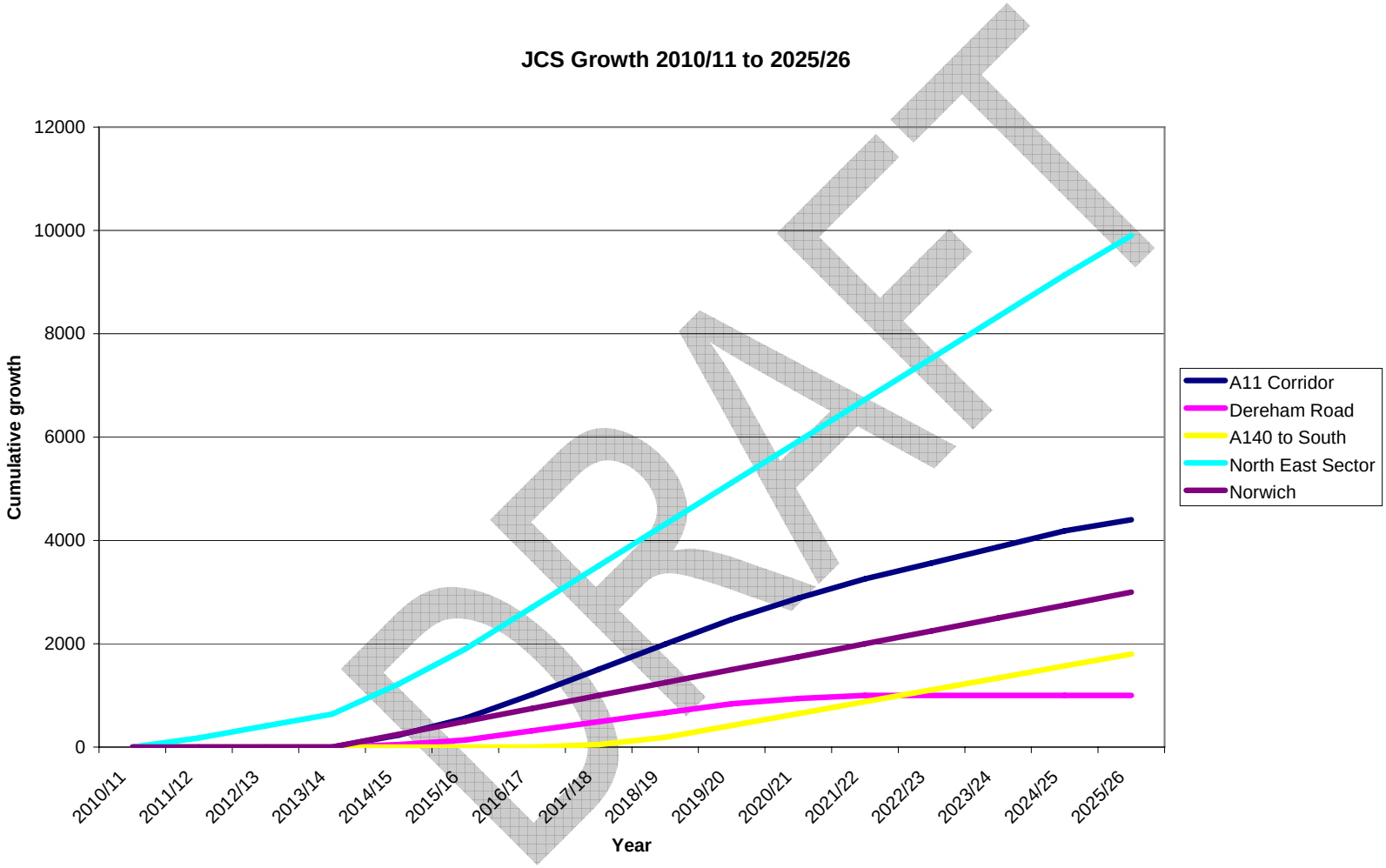
Quality Bus Partnership project in the late 1990s. This partnership approach has been formalised through the current Joint Investment Plan for bus services in Greater Norwich, which is a voluntary partnership between Norfolk County Council, First East England Ltd and Norwich City Council. Commitments are in place for bus priority, infrastructure improvements, traffic management, punctuality monitoring and new buses. The model of public sector investment in public transport infrastructure facilitating private sector investment in service delivery and enhancement is thus well established in the NATS area. A similar model can be applied where new public transport infrastructure is provided or funded by developers.

7.3. The proposed service model is to secure developer and public sector funding for new public transport infrastructure that will enable operators to invest in new vehicles and service enhancements.

7.4. There is an intrinsic link between traffic conditions and the ability to deliver significant improvements to public transport. NATS has elements to enhance public transport but also includes the NDR that as a major road scheme allows for interventions to be put in place to enhance public transport provision.

7.5. The phased approach to the introduction of public transport services and supporting infrastructure is shown. High quality services can be delivered to all growth locations and the suggested phasing balances the need to pump prime service provision in the early stages of development, building to high quality viable service provision longer term.

Appendix A: JCS Growth forecasts by area



Appendix B A11 Corridor Phasing Table

First dwelling occupied	250 dwellings occupied	500 dwellings occupied	750+ dwellings occupied
Developments to be built around core public transport and walking / cycling routes			
All dwellings within 400m of a fully accessible bus stop			
Bus shelters / stops within development sites to provide with real time bus departure information			
All dwellings to have public transport information (paper and electronic)			
High quality, accessible vehicles to be used for bus service provision			
Accessible route for buses through site		Site remains accessible for expanded routes through the site	
Discounted public transport ticketing provided (developer funded). New ticketing solutions moving purchase off-bus			
Available walk and cycle links to be provided to bus stops and key services (eg. schools, health facilities) where applicable			
Developer funded subsidised bus service		Commercial bus services	
30 mins frequency daytime service (0700-1900)	20 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)	10 mins frequency daytime service (0700-1900)
No evening service	60 mins frequency evening service	30 mins frequency evening service	30 mins frequency evening service
60 mins frequency Sunday (0800-1800)	60 mins frequency Sunday (0800-1800)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)
		Short lengths of bus priority lane along Newmarket Road	
High level traffic light priority at key signalised junctions along route			
Possible introduction of demand responsive type services serving other growth locations not in city centre. To be determined on a case-by-case basis			
			Access improvements to Wymondham rail station
			Increased rail service frequency on Norwich-Cambridge rail line

Green denotes dependent on Thickthorn roundabout improvements and bus priority measures through the junction.
No interventions fully dependent on delivery of the NDR

Appendix C Dereham Road Corridor Phasing Table

First dwelling occupied	250 dwellings occupied	500 dwellings occupied	750+ dwellings occupied
Developments to be built around core public transport and walking / cycling routes			
All dwellings within 400m of a fully accessible bus stop			
Bus shelters / stops within development sites to provide with real time bus departure information			
All dwellings to have public transport information (paper and electronic)			
High quality, accessible vehicles to be used for bus service provision			
Accessible route for buses through site		Site remains accessible for expanded routes through the site	
Discounted public transport ticketing provided (developer funded). New ticketing solutions moving purchase off-bus			
Available walk and cycle links to be provided to bus stops and key services (eg. schools, health facilities) where applicable			
Developer funded subsidised bus service		Commercial bus services	
30 mins frequency daytime service (0700-1900)	20 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)	10 mins frequency daytime service (0700-1900)
No evening service	60 mins frequency evening service	30 mins frequency evening service	30 mins frequency evening service
60 mins frequency Sunday (0800-1800)	60 mins frequency Sunday (0800-1800)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)
Short lengths of bus priority lane along Dereham Road			
Possible introduction of demand responsive type services serving other growth locations not in city centre. To be determined on a case-by-case basis			
			Improvements to Longwater junction

No interventions fully dependent on the NDR

Appendix D North East Sector Phasing Table

First dwelling occupied	250 dwellings occupied	500 dwellings occupied	750+ dwellings occupied
Developments to be built around core public transport and walking / cycling routes			
All dwellings within 400m of a fully accessible bus stop			
Bus shelters / stops within development sites to provide with real time bus departure information			
All dwellings to have public transport information (paper and electronic)			
High quality, accessible vehicles to be used for bus service provision			
Accessible route for buses through site		Site remains accessible for expanded routes through the site	
Discounted public transport ticketing provided (developer funded). New ticketing solutions moving purchase off-bus			
Available walk and cycle links to be provided to bus stops and key services (eg. schools, health facilities) where applicable			
Developer funded subsidised bus service		Commercial bus services	
30 mins frequency daytime service (0700-1900)	20 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)	10 mins frequency daytime service (0700-1900)
No evening service	60 mins frequency evening service	30 mins frequency evening service	30 mins frequency evening service
60 mins frequency Sunday (0800-1800)	60 mins frequency Sunday (0800-1800)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)
		Small lengths of bus priority lanes	More significant lengths of bus priority lanes
		Bus only road along Gurney Road	
Low level traffic light priority for buses		High level traffic light priority for buses	
		Bus priority approaches to key junctions	
Possible introduction of demand responsive type services serving other growth locations not in city centre. To be determined on a case-by-case basis			

First dwelling occupied	250 dwellings occupied	500 dwellings occupied	750+ dwellings occupied
			Increased rail service frequency on Norwich to Sheringham line – possible introduction of tram-train
			New rail station at Rackheath and at other locations along Bittern line

Blue represents dependence on NDR for delivery

Appendix E Long Stratton Phasing Table

First dwelling occupied	250 dwellings occupied	500 dwellings occupied	750+ dwellings occupied
Developments to be built around core public transport and walking / cycling routes			
All dwellings within 400m of a fully accessible bus stop			
Bus shelters / stops within development sites to provide with real time bus departure information			
All dwellings to have public transport information (paper and electronic)			
High quality, accessible vehicles to be used for bus service provision			
Accessible route for buses through site		Site remains accessible for expanded routes through the site	
Discounted public transport ticketing provided (developer funded). New ticketing solutions moving purchase off-bus			
Available walk and cycle links to be provided to bus stops and key services (eg. schools, health facilities) where applicable			
Developer funded subsidised bus service		Commercial bus services	
30 mins frequency daytime service (0700-1900)	20 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)	15 mins frequency daytime service (0700-1900)
No evening service	60 mins frequency evening service	30 mins frequency evening service	30 mins frequency evening service
60 mins frequency Sunday (0800-1800)	60 mins frequency Sunday (0800-1800)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)	30 mins frequency Sunday (0800-1800) 60 mins frequency Sunday (evening)
		Small lengths of bus priority lanes	More significant lengths of bus priority lanes
		Bus priority approaches to key junctions	
Low level traffic light priority for buses		High level traffic light priority for buses	
Possible introduction of demand responsive type services serving other growth locations not in city centre. To be determined on a case-by-case basis			

Grey represents service level dependent on priority measures being put in place, such as the approach to the A47 southern bypass and junctions within Norwich, such as at Newmarket Road / Ipswich Road junction.