6. Walking and Cycling

6.1 Cycling

The NPA is suitable for cycling trips, as it is relatively compact and flat. Many trips can easily be managed by bike. As well as being comparatively cheap compared to other forms of transport, cycling is beneficial to health, reducing the risk of cardiovascular problems, coronary heart disease and stress, and helps to improve lung function.

The cycle network in the NPA comprises a mix of on-street and off-road facilities. Examples of off-road facilities include the former M&GN (Midlands and Great Northern) and 'Lakenham Way' railway corridors, which have been dedicated for cycle and pedestrian use. The M&GN corridor runs from Barkers Street/St Crispins Road roundabout alongside the River Wensum to Thorpe Marriott and beyond and has been designated as the 'Marriott's Way' bridleway. The 'Lakenham Way' runs adjacent to Hall Road, from the Inner Ring Road at Brazengate to the Outer Ring Road at Mansfield Road. However, it is acknowledged that in places cycle facilities are not joined up and there are many areas with no cycling provision at all, often through difficult junctions.

Public rights of way provide a great opportunity to get around by walking and cycling to access the countryside or simply get from 'A to B'. The network of public rights of way is based largely on historical patterns of use. A plan highlighting the rights of way within the NPA is shown in Figure 6.1.

Levels of walking and cycling (on and off road) across the Inner Ring Road on a weekday in the NPA are monitored on an annual basis using manual counts. Figure 6.2 demonstrates that the level of cycle traffic has increased over the period since 2001 so that approximately 2,100 more cycles crossed the Inner Ring Road in 2008 than in 2001. The proportion of cycles to motor vehicles crossing the Inner Ring Road was 10.2% in 2008, which was the highest recorded over the previous four years.

Figure 6.1: Public Rights of Way in the NPA

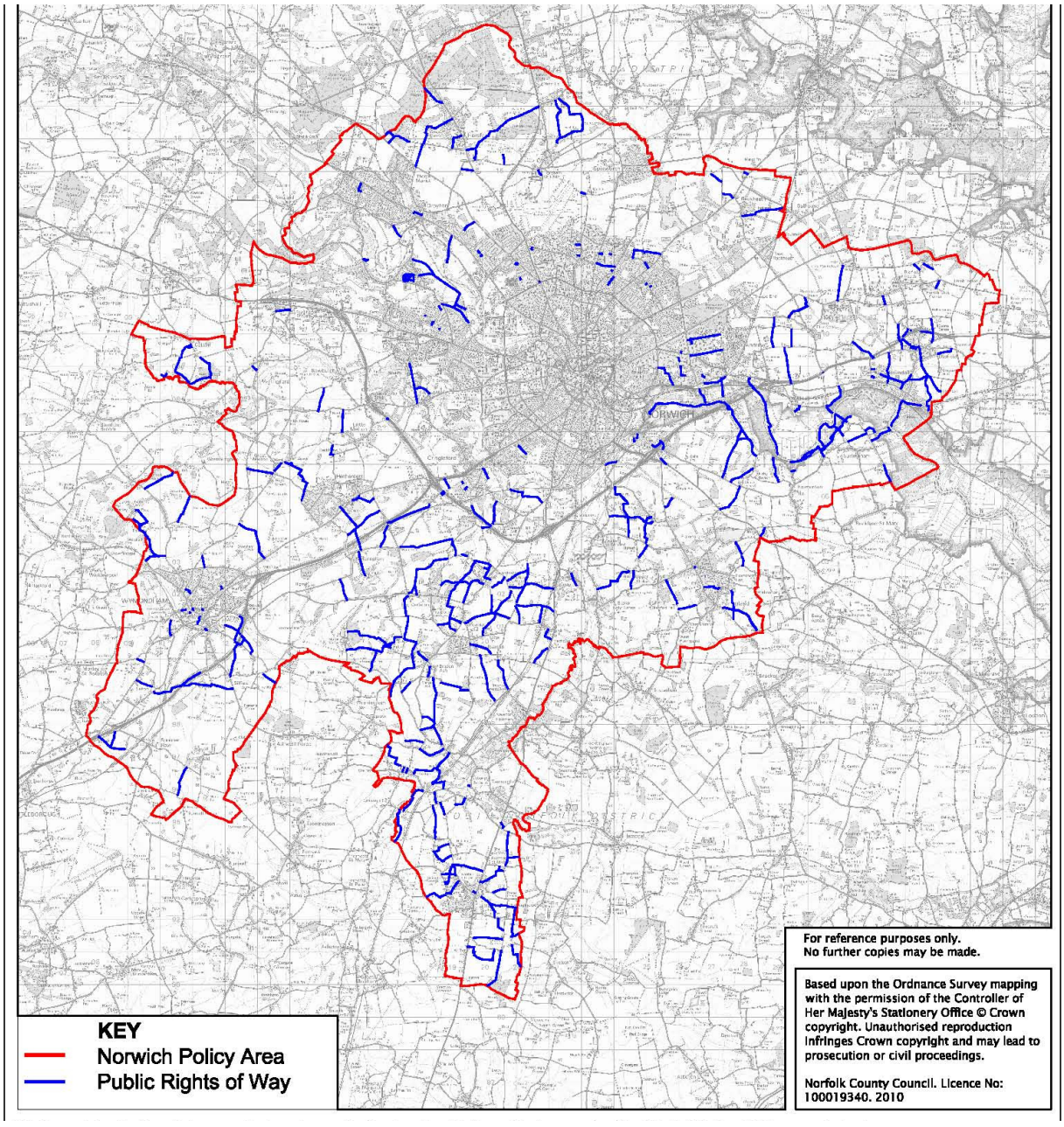
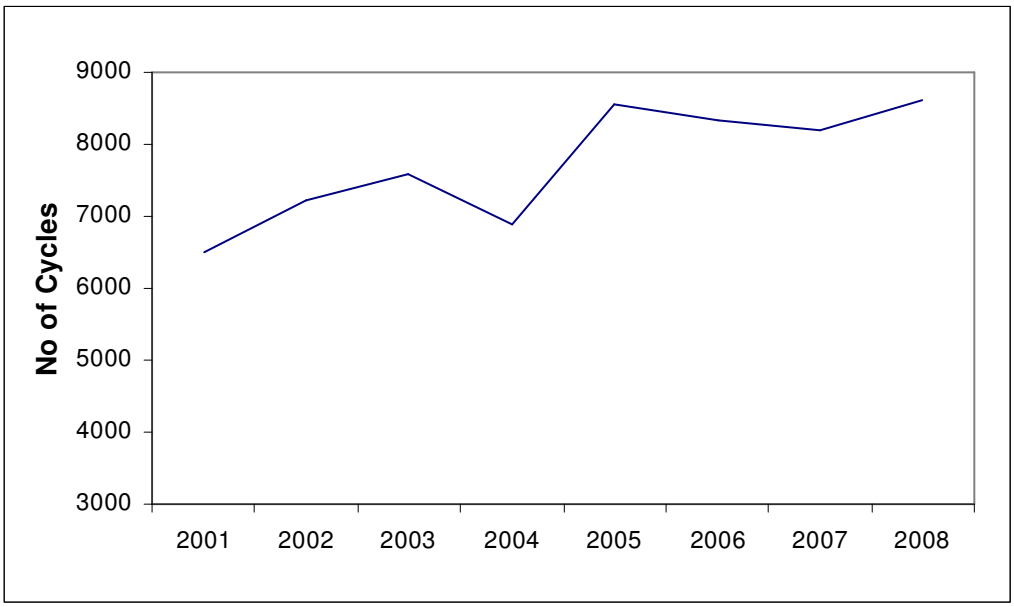


Figure 6.2: Number of Cycles Crossing the Inner Ring Road Cordon



Source: Norfolk Traffic Monitoring 2009 (NCC, 2009, p.18)

In addition to manual counts there are a number of automatic cycle counters located along established cycle paths. The counter 'Marriott's Way' cycle path indicates that over 450 cycles a day use this route in the summer months when usage is at its highest. This path is used by commuter and leisure cyclists and the data indicates cycling levels have risen since 2004. In all, an increase in cycle use of 4-5% per annum is recorded over the period 2004-2008.

Information from 2003/4 indicated that cycling accounted for 11% of journeys to work within the NPA, which was increase from 10% in 2000/1. In terms of journeys to school, the proportion of trips undertaken by cycling has remained constant at 6% in 2000/1 and 2003/4. When considering all journeys undertaken, cycle use has remained constant at 5% during these periods.

An increasing number of traffic signals have having priority for cycle crossing incorporated to enable safe crossing of the road for cyclists. These facilities are often located where designated cycle paths have been developed. Depending on the specific details of the location, the time taken to provide a 'green' to cross the road is dependent on the flow of traffic. During times of heavy traffic flow, the length of time between green crossing phases is likely to be extended. Should traffic flows increase in the future in light of expected growth, priority for cyclists at such crossings could be reduced.

Information on perceived barriers to cycling and walking has been obtained through workplace Travel Plan surveys that have been undertaken throughout Norfolk in 2007 and 2008. These surveys ask staff at a wide range of workplaces about their travel patterns in commuting to work. Figure 6.3 shows the responses relating to cycling.

Figure 6.3: Responses to "Which of the Following would Encourage you to Cycle to Work More?"

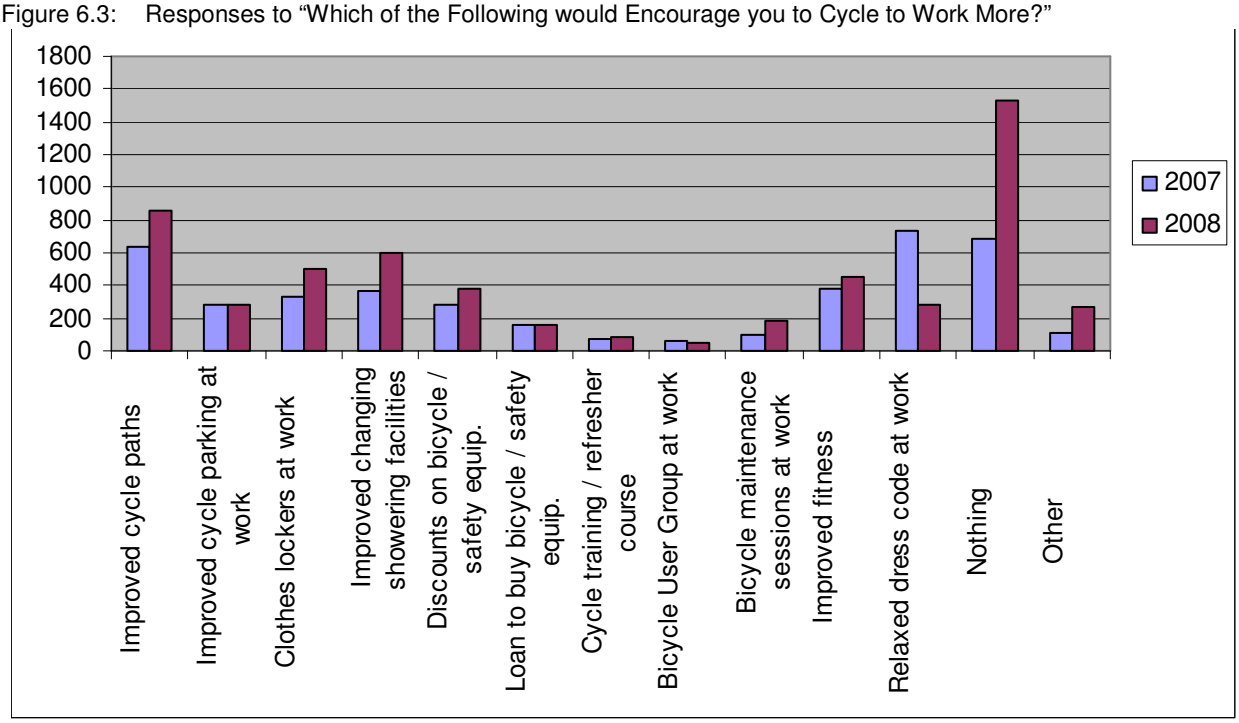


Figure 6.3 shows that for the majority of respondents, nothing would induce them to cycle to work. For those who report that some factor would induce them to cycle more, the need for improved cycle paths was the most reported factor, in both 2007 and 2008, over which NCC can have some influence. All of the remaining factors are identified by a relatively small number of respondents and their implementation is generally outside the scope of NCC's involvement, as they relate to issues such as improved showering, changing facilities and bicycle maintenance classes at work.

Previous consultation work undertaken for NATS has identified wider issues relating to cycling in the NPA and has concluded that:

- cyclists as a whole appear to be less satisfied than any other minority group;
- key issues appear to be fragmentation of the cycle routes, the small number of cycle paths and the 'stop-start' aspect of existing provision that forces them back into the main flow of traffic suddenly and unexpectedly;
- the one-way system in the centre of Norwich results in significant diversion routes for cyclists although there is some provision of cycle routes to reduce travel distances;
- cycle routes and cycle parking are seen as one of the worst features of transport in the area; and
- cyclists rated current facilities very badly in 2000 – over 75% of cyclists rated facilities as average or bad.

In terms of investment in cycling facilities within the NPA, over £1.01million has been spent since 2006/7. In addition to these local authority funded schemes, there are numerous initiatives that have been funded through other mechanisms such as Section 106 agreements linked to new developments. By using population size, it is possible to calculate the average spend per person per year. This works out at £1.27 per head for the NPA area (excluding any funding outside of that provided by a local authority).

Investment in cycle infrastructure varies throughout England and across Europe, and some comparisons are outlined in Table 6.1.

Table 6.1: Comparison of Investment in Cycling

Area	Investment (per person per year)
Amsterdam	£18.86
Exeter	£8.17
York	£3.90
Hull	£1.92
NPA	£1.27
Average LTP capital spend	£1.00

Source: Technical Note: Cycling in the Norwich Area Transport Strategy (NATS) Area (NCC, 2009, p.12)

Evidence from European cities indicates an investment of more than £5 per head per year for an intensive period of 10-15 years has been undertaken.

Over 2,700 children per year received cycle training within the NPA as part of a continuous programme that has been running for the past 30 years.

Staff time is given towards raising awareness and promoting cycling through the Travel Officer team and this is considered an important part of encouraging more cycling within the NPA.

In terms of the accident record for cyclists, the numbers of casualties per 10,000 people have reduced in Norwich. A comparison has been made against the accident record in Exeter and these details are provided in Table 6.2.

Table 6.2: Cycling Casualties per 10,000 Population

	Norwich	Exeter
2005	8.02	5.61
2006	5.94	5.27
2007	6.05	5.29
2008	5.29	4.66

Source: Technical Note: Cycling in the Norwich Area Transport Strategy (NATS) Area (NCC, 2009, p.11)

Accident rates have reduced in both Norwich and Exeter over the same period, although they are reducing at a faster rate in Norwich than in Exeter. However, Norwich has slightly more accidents per capita than Exeter.

6.2 Walking

Most trips involve some walking, although the bulk of the trip may be made by another mode. Walking helps people to access facilities, especially within the city centre, for shorter trips to local services like the corner shop and for those without access to a car, including young people. People who walk are likely to be healthier

In the main retail area of Norwich, much of the network has been pedestrianised, and includes London Street, the first pedestrianised street in the country. Parts of the city centre are pedestrianised during the core retail opening hours but allow vehicular access for parts of the day or for certain classes of vehicle or usage. Pedestrianised streets are classified in three ways;

- No Vehicles – at any time
- No Vehicles – access only
- No Vehicles – at specified times

The majority of these streets are located in the city centre, surrounding the heart of the main retail areas of Gentleman's Walk, Chapelfield Shopping Centre and the Norwich Lanes. Other pedestrian areas include around the café and restaurants in Tombland and at the retail and leisure areas at the Riverside development. The majority of these streets allow access to vehicles at specified times to allow for the loading and unloading of goods.

Counts of the numbers of pedestrian movements are made at points on the Inner Ring Road cordon. However, as there are many other locations across the cordon where pedestrians may walk, this information can only provide an indication of the degree of change in numbers of pedestrians and not provide an indication of overall pedestrian. Table 6.3 shows the results of cordon counts from 2004 to 2008.

Table 6.3: Inner Ring Road Cordon Pedestrian Count Data

12 Hour Pedestrian Counts	2004	2005	2006	2007	2008
Chapelfield Crossing	2391	3313	2863	2640	2684
Grapes Hill Footbridge	2366	2808	2660	2738	2967
Grapes Hill Underpass	834	928	782	854	901
Barn Road & Grapes Hill	2500	3012	2525	2444	2467
St Crispins Road Crossing	775	883	924	977	917
Duke Street	1822	1903	1960	1987	1574
Winterton Lane	1356	1382	1364	1239	1076
Calvert Street	1815	1679	1603	1586	1535
Magdalen Street	7295	7814	7174	7831	7141
Bishopgate	1711	1677	1784	1624	1344
St Stephens Street	10623	10377	11461	9931	11328
Wessex Street		988	1265	1261	1686
Chapelfield Development		515	964	1116	925
Chapelfield Underpass	1068	1067	818	658	700
Total	**34552**	**38342**	**38145**	**36882**	**37242**
		04-05	**05-06**	**06-07**	**07-08**
Growth per Annum		11.0%	-0.5%	-3.3%	1.0%

Table 6.3 indicates that there has been an overall increase rise in the number of pedestrians crossing the cordon since 2004. Part of the reason for this increase was the provision in 2005 of two new crossings associated with the Chapelfield development at Wessex Street and at the Chapelfield development itself. These crossings have been included in the cordon and there is a consequent rise in 2005/06 as the new development came into full use. There was a more moderate 1% rise in pedestrian movements in 2008.

Facilities giving pedestrians priority have been introduced at most traffic signals in the city centre and dedicated pedestrian crossing facilities have been introduced at specific locations. In 2002, 92% of crossings included facilities for disabled people with audible warnings, tactile surfacing and tactile cones. By 2009, 99% of crossings had these facilities, making the pedestrian environment more convenient for all users. The different type of crossing provision within the NPA is outlined in Table 6.4.

Table 6.4: Pedestrian Crossing Provision

Crossing Type	Existing Provision
Equestrian Crossing	1
Signalised Crossing (not controlled by pedestrians)	10
Pelican Crossing	40
Puffin Crossing	47
Toucan Crossing	28

Source: Norfolk Traffic Monitoring 2009 (NCC, 2009, p.19)

In a similar way to cycles, the time taken to provide a 'green' signal to cross the road can be dependent on the flow of traffic. During times of heavy traffic flow, the length of time between green crossing phases is likely to be extended. Should traffic flows increase in the future in light of expected growth, priority for pedestrians at such crossings could be reduced.

Travel Plan surveys in 2007 and 2008 asked staff at a wide range of workplaces about their travel patterns in commuting to work. Figure 6.4 shows the responses relating to walking.

Figure 6.4: Responses to "Which of the Following would Encourage you to Walk to Work More?"

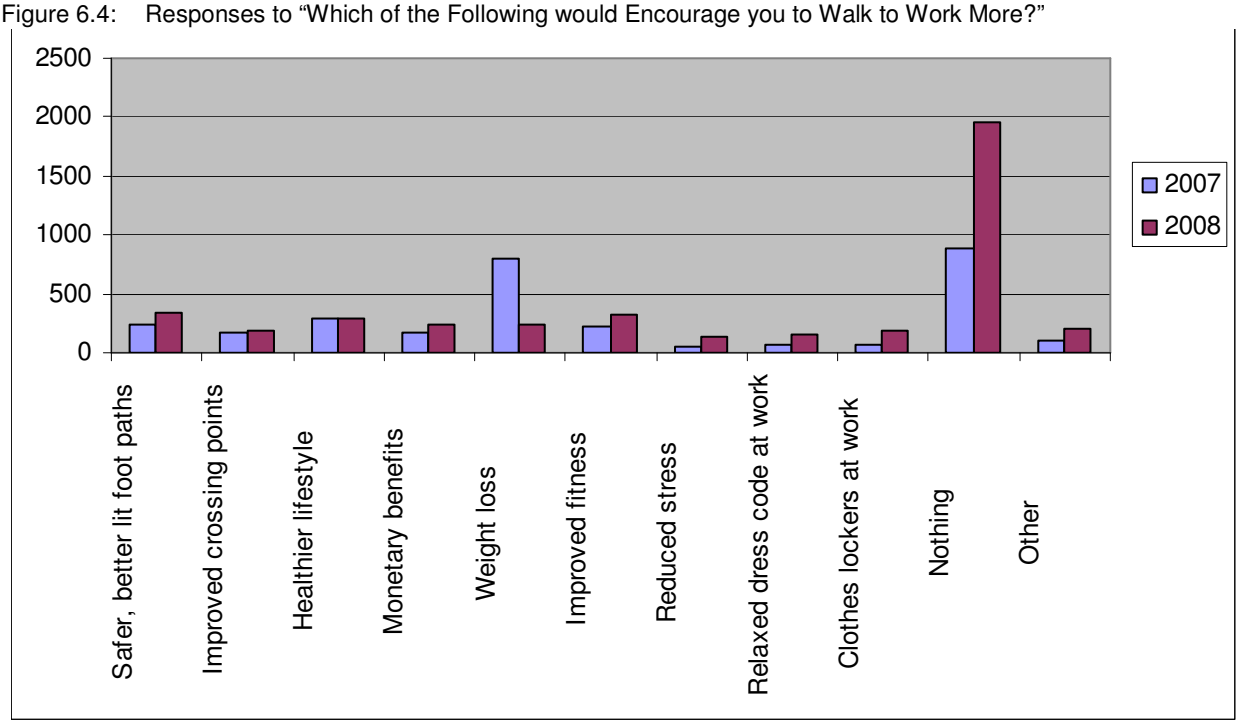


Figure 6.4 shows that in relation to walking, nothing would encourage the majority of respondents to walk to work. However, there are factors that are within the control of NCC to influence, including the provision of safer and better lit footpaths, improved crossing points and the promotion of the health, financial and

emotional benefits of walking. There has been very little change year-on-year in the factors that respondents select as being important.

6.3 Benchmarking for Walking and Cycling

A review of total cycle lanes and allocated cycle ways has been undertaken. The total distance of these facilities has been calculated for Norwich and other similar sized cities. Table 6.5 summarises cycle lane distances for a number of similar sized urban areas to Norwich.

Table 6.5: Distance of Cycle Lanes and Allocated Cycle Ways

Location	Distance (km)
City of Norwich	28.40
Lincoln	62.20
Exeter	33.00
Ipswich	63.60

Source: Local Authority Cycle Route Maps

Table 6.5 shows that Norwich has the least cycleway provision of all the cities compared against although it has the largest proportion of cycling to work mode share of the four cities. This would suggest that the provision of better quality, coherent cycling infrastructure may prove to result in a greater level of its use in the NPA. The above factors, along with the Travel Plan survey results, could indicate that there is latent demand for cycling in the NPA, which could be realised if significant improvements to the cycling network could be implemented.

6.4 Policy

PPG13 Transport states at paragraph 78 that *"Cycling also has potential to substitute for short car trips, particularly those under 5km, and to form part of a longer journey by public transport".*

Paragraph 79 states that *"In preparing their development plans and in determining planning applications, local authorities should:*

- *in conjunction with work on the local transport plan, review existing provision for cyclists in order to identify networks and routes, including those to transport interchanges, along which the needs and safety of cyclists will be given priority, and set out the specific measures which will be taken to support this objective. Generally these routes will use existing highways, but may also include the use of redundant railway lines or space alongside canals and rivers. Linear parks in urban areas may often provide opportunities for cycling routes;*
- *Seek the provision of convenient, safe and secure cycle parking in town centres;*
- *Where appropriate, assist in the completion of the national cycle network, and additional key links to and from the network, as well as promoting local networks".*

Paragraph 80 states that "Local authorities, as part of their local transport plan strategy, should also promote cycling through measures such as:

- *Reducing traffic volumes on particular routes, including where relevant, restricting or diverting heavy goods vehicles;*
- *traffic calming-reducing speeds, particularly in residential areas and close to schools;*

- *reallocation of carriageway, to provide more space for cyclists, such as cycle lanes or bus lanes where cyclists are permitted;*
- *improvement of facilities off the carriageway, such as cycle tracks or paths".*

At paragraph 75, PPG 13 also states that *"Walking is the most important mode of travel at local level and offers the greatest potential to replace short car trips, particularly under 2 kilometres. Walking also forms an often forgotten part of all longer journeys by public transport and car. Local authorities should use their planning and transport powers to give greater priority to walking, as set out in the Government's national guidance 'Encouraging Walking: Advice for Local Authorities' (March 2000). The Guidance on Full Local Transport Plans requires authorities to prepare local walking strategies, the main elements of which should be incorporated in their local transport plan. These strategies will set out how local authorities will improve conditions for pedestrians, and set targets relevant to the aim of encouraging more people to walk."*

In addition to PPG13, the Norwich Local Plans Policy TRA15 aims that the quality of the cycling environment will be enhanced by completion of the strategic cycle network throughout the urban area through area wide strategies, other transport programmes and development proposals.

Further, the Local Transport Plan includes a target to increase cycle use from 2004/03 to 2010/11 LTP Number of cycling trips (annualised index, base year 100) is required to rise to 105 by 2010/11. The reported figure for 2007/08 was 107 meaning that this target is likely to be exceeded in 2010/11.

The exceedances of this target, as well as the presence of a significant cycling network suggest a good degree of policy compliance. However, the fact that the majority of journeys to work are undertaken by car, even though the majority of trips to work in the Norwich area are less than 4 miles in length, suggests that more work may be required to achieve full compliance.

In addition to these Policy documents, the DfT has a hierarchy of provision for cycling, which is underpinned by the policies in place. This detailed in Table 6.6.

Table 6.6: Hierarchy of Provision to Increase Cycling

Consider First ↓ **Consider Last**	Traffic volume reduction
	Traffic speed reduction
	Junction treatment, hazard site treatment, traffic management
	Reallocation of carriageway space
	Cycle tracks away from roads
	Conversion of footways / footpaths to shared use for pedestrians and cyclists

Source: Local Transport Note 2/08 Cycle Infrastructure Design (DfT, 2008, p.10)

This hierarchy clearly places emphasis on the reduction in the volume of traffic as well as its speed as the key means of increasing cycling use. The type of measures with the least weight under the hierarchy are those which remove space from pedestrians in order to provide cycleway/footways which are segregate from the carriageway but which can potentially increase the degree of conflict between vulnerable users.

6.5 Conclusions

- The number of cycles crossing an Inner Ring Road cordon has increased significantly since 2001 and there are approximately 2,100 more cycles crossing the cordon per day in 2008 than in 2001

- The proportion of cycles to motor vehicles crossing the Inner Ring Road cordon was 10.2% in 2008, which was the highest recorded over the previous four years
- Cycle usage of dedicated cycle routes has increased by 4-5% per annum over the period 2004-2008
- Cycling accounted for 11% of journeys to work within the NPA and this is an increasing trend. For journeys to school and for all journeys, cycling accounting for 6% and 5% of journeys respectively
- Priority crossing facilities for cyclists are being installed across the NPA but the priority for cycles can be affected by the weight of traffic with less priority being provided where traffic flows are heaviest. Should traffic flows increase in the future, priority for cycling could be reduced
- Key issues and problems identified during previous consultations and surveys include a lack of continuity of the cycle network, lack of cycle paths, one-way systems restricting movements and a lack of adequate cycle parking facilities
- There is a general view that heavy traffic discourages cycling
- There has been an overall increase in the number of pedestrians crossing an Inner Ring Road cordon since 2004. Whilst some of this can be attributed to the opening of the Chapelfield development, there is still evidence that there is growth of around 1% per annum
- Over 99% of pedestrian crossing facilities have facilities for disabled users. Priority given for pedestrians at signalised crossings can be affected by the weight of traffic with reduced priority being provided where flows are heaviest. Should traffic flows increase in the future, priority for pedestrians at crossings could be reduced
- Key issues and problems identified from previous consultations and surveys include safer and better lit footpaths, improved crossing points and the promotion of the health, financial and emotional benefits of walking

7. Freight

7.1 Current Picture

Freight provides a vital service, allowing businesses to thrive. However, particularly in the city centre, freight operators can experience problems of having to operate within certain time restrictions and urban congestion. Because there is often a lack of dedicated loading areas, freight operators' vehicles can cause problems, including blocking pavements or traffic flows.

There are numerous road freight restrictions in place in the NPA, including the city centre and radial routes. On the radial routes there are weight limits in place on many side streets, such as those leading between Newmarket Road and Unthank Road in order to prevent heavy goods vehicles (HGVs) from running through residential areas.

Within the city centre, the main restrictions are those related to loading in the pedestrianised areas. These restrictions are in place to limit loading to between the hours of 5pm and 10am thereby securing these areas for pedestrian use only during main daylight hours.

Traffic counts on the Outer Ring Road in 2008 indicated that HGVs and light goods vehicles (LGVs) catered for 2% and 11% of total traffic respectively. When compared to 1995 values, HGVs represented a reduction from 4% whilst LGVs represented an increase from 9%.

Traffic counts on the Inner Ring Road in 2008 indicated that HGVs and LGVs catered for 1% and 10% of total traffic respectively. When compared to 1995 values, HGVs represented a reduction from 3% whilst LGVs represented an increase from 9%.

In order to reduce the number of HGVs delivering into the NPA, a Freight Consolidation Centre (FCC) was set up in 2007 as one of a number of measures that were implemented in Norwich as part of the European Union CIVITAS initiative for cleaner and better transport in cities. The FCC currently has a limited number of clients but has had the effect of replacing some large articulated vehicle movements into the city centre with smaller 7.5T rigid vehicle movements. This has provided benefits of reduced fuel consumption and emissions. As more retailers use the FCC, there would be further increases in benefits. In encouraging clients to use the FCC, it has been found that retail businesses are reluctant to change firmly established delivery practices, particularly in the current economic climate. The FCC has recently been rebranded to 'Portal Norwich' and the new branding will be included on vehicle liveries and brochures detailing the general consolidation concept and the benefits available to service users. Portal Norwich is a brand name for the overall concept of freight consolidation in Norwich and there may be future consideration to allow further freight operators to join Portal Norwich.

The provision of urban deliveries into the NPA and its effects on the local road network is an important issue due to the number of commercial deliveries into Norwich, the effect on the local road network and associated environmental considerations.

Information on the existing HGV movements within the NPA has been taken from Automatic Traffic Counts (ATC) and Manual Classified Counts (MCC), as well as origin and destination surveys conducted in October 2006 to build the 2006 NATS highway model. These identify HGV movements on the Inner and Outer Ring Roads, as well as the A47 in the morning and evening peaks and a typical inter-peak hour.

In the AM peak on and within the Inner Ring Road, the highest concentration of HGV movements (up to 50 HGV vehicles) is between Grapes Hill Roundabout and Barrack Street Roundabout. There are limited HGV movements entering the city centre during this time period.

Along and within the Outer Ring Road, the highest number of HGV movements during the AM peak is from the Dereham Road junction to Salhouse Road junction, including the turn along the Drayton High Road (up to 100 HGV vehicles). This is due to the location of the major industrial estates located in Norwich. There is also a high concentration of HGV movements between Newmarket Road junction and Unthank Road junction.

Along the A47 during the morning peak, the route on the A47 between the showground junction and Postwick junction has the highest concentration of HGVs in both directions (up to 200 HGV vehicles). This is due to it being part of the strategic road network, which provides links from Great Yarmouth and to the Midlands and the North. The busiest section is between the junctions of the A11 and A140. The A11, A140 and A146 show high volumes of HGV movements moving northwards to the A47 (up to 200 HGV vehicles).

The AM peak has the largest volume of HGV movements over the three periods analysed. This suggests that the majority of deliveries in Norwich take place around this timescale. In addition, the majority of HGV traffic within the AM peak does not go into the city centre, but uses both the Outer Ring Road and the A47.

During the inter peak period on and within the Inner Ring Road, there is considerably less HGV volume than the morning peak. The highest concentration of HGV traffic is again between Grapes Hill and Barrack Street junction but also up Ketts Hill (up to 50 HGV vehicles). Such concentrations of HGV traffic adversely impact public transport services and the movement of general traffic due to slower movements and higher utilisation of road space. As with the morning peak, there is not a high volume of HGV movement into the city centre. This lower volume of HGV traffic is also apparent along and within the Outer Ring Road. The highest concentration of HGV volume is along the Outer Ring Road from Salhouse Road to the Boundary Junction (up to 100 HGV vehicles.

Along the A47, there is a high volume of HGV traffic during the inter-peak although there is a considerable drop of HGVs using the junctions of the A11, A140 and A146, indicating that there is more through traffic rather than local traffic. Overall, there are considerably fewer HGV movements during the inter peak than in the morning peak with the only noticeable HGV traffic being along the A47 (up to 150 HGV vehicles).

During the evening peak, there are fewer HGV movements along and within the Inner Ring Road than during the inter peak. The main HGV movements on the Inner Ring Road are again from Barrack Street to Grapes Hill (up to 50 HGV vehicles). It also appears that limited number of movements takes place within the city centre with only 50 HGV vehicles within the Castle Meadow area.

Generally there are also fewer HGV movements in the evening peak within the NPA with up to 50 HGVs being recorded on the Outer Ring Road from its junction with Boundary Road to the Dereham Road junction having up to 50 HGV vehicles in both directions. Volumes on the A47 during this period are dramatically reduced and there are little movements along the strategic routes.

The reduced number of HGV movements in the evening peak would suggest that only a small number of deliveries occur during this timescale.

Air freight is referenced in Section 5.0 of this report. Rail freight operations are limited in the NPA.

7.2 Relevant Policy Requirements

NATS includes the following policies relating to freight, both of which have been implemented:

- Policy 26 – "The County Council will work with partners, including Norwich City Council, freight operators and city centre businesses, to establish the requirements of commercial deliveries and work to meet their needs. Consideration will be given to forming a Freight Quality Partnership/Urban Freight Forum".
- Policy 55 – "Work will be undertaken to assess the feasibility of allowing freight vehicles, high occupancy vehicles and motor bikes to use bus lanes".

The freight references that exist within the LTP include:

- Policy 27 – "Freight – we will work with freight associations and operators to mitigate the adverse impacts of freight operators and encourage the use of rail freight".

There are currently no direct freight policies within the East of England Regional Freight Strategy relating to the NPA. The following general recommendations have been made which will affect freight in the NPA:

- Local Authorities, working with the Highways Agency and other partners, should actively consider and support the development of consolidation centres in sectors such as retailing and construction, together with specific measures for the management of lorry traffic in urban areas.
- Local Authorities should recognise the need for secure rest and parking facilities (particularly arising from port closures) in Local Transport Plans, Local Development Plans and in the design of new and improved highways, including maintenance schemes.
- Local Authorities should carefully consider the environmental benefits, costs of HGV restrictions, bans and the additional costs to businesses that may arise in reaching the best decision in a particular area for positive conditions that facilitate freight activity out of hours (e.g. through noise abatement).

The following are key documents published by The Department for Transport (DfT) relating to economic development, future transport infrastructure provision and environmental considerations.

Delivering a Sustainable Transport System November 2008 - This document outlines transport objectives of delivering economic growth while at the same time reducing greenhouse gas emissions. It also outlines the key components of the national infrastructure and discusses the difficulties of planning over the long term. It also describes the investment being undertaken to tackle congestion and crowding on the transport networks.

Delivering a Sustainable Transport System: The Logistics Perspective December 2008 - This document builds on the DfT "Delivering a Sustainable Transport System November 2008" and highlights the issues concerning the movement of freight with Great Britain across modes. It includes the nature and composition of freight flows on the major corridors. It discusses how Government and industry will need to work together to ensure that freight benefits from and contributes to the DfT objectives

Although there is a number of freight policies both at local, regional and a national level, only a number of initiatives have been undertaken in Norfolk. Only parts of the current NATS and Local Transport Plan 2006-11 policies for freight been implemented. Additionally, there have been no proposals at a regional or a national level which have been implemented affecting freight movements within the NPA.

7.3 Conclusions

- Freight consolidation is being used in the NPA to reduce the number of HGV movements into the city centre
- The highest number of HGV movements within the NPA occurs during the morning peak (up to 200 HGV vehicles), indicating most of the deliveries into Norwich occur at that time
- The greatest concentration of HGV movements during the morning peak occurs on the strategic road network around Norwich, predominantly on the A47. The A11, A140, A146 and junctions onto the A47 also have high numbers of HGV movements during this time period.
- The corridor along the Outer Ring Road from Dereham Road to Salhouse Road junction has high numbers of HGV movements during the morning peak, but not the same quantity as the A47. This is due to the number of manufacturing industrial estates located around this area. There is also a high concentration of HGV movements between Newmarket Road junction and Unthank Road junction.
- HGV movements are at their lowest during the PM peak. All the road networks have a limited number of HGV movements occurring at this time, indicating that very few deliveries occur

8. School Travel Plans

8.1 Current Picture

Information for the whole NPA is available for the modal split in journeys to school from 2007/08 to 2008/09 to facilitate comparison of yearly trends. This information is gathered on an annual basis and includes the 88 schools that are located in the NPA and is as detailed in Table 8.1.

Table 8.1: Mode used to Travel to School (NPA)

Mode	Walk	Cycle	Car/Taxi	Car Share	All Bus	Train	Others	Unknown
2007/08	19960	1160	7052	493	2787	131	127	29
% of total	62.9%	3.7%	22.2%	1.6%	8.7%	0.4%	0.4%	<0.1%
2008/2009	14315	1417	8130	566	3458	131	652	0
% of total	49.9%	4.9%	28.4%	2.0%	12.1%	0.4%	2.2%	0.1%

Table 8.1 suggests that there have been changes in mode share between 2007/08 and 2008/09, although there is an increase in pupils travelling by car to school, from 7,052 in 2007/08 to 8,130 in 2008/09. There have been increases in numbers cycling or taking the bus to school, but the greatest increase by over 400% is the use of “other” modes.

It is understood that “other” is often selected for modes such as horse, scooter or skateboard or, if pupils walk to school and leave by car, then “other” is often selected in this situation as well. However, the marked increase in between the two years is erroneous as it has been identified that the reason for this is that at one school, some 560 pupils all chose “other” as their response. This error in the data therefore casts doubt over all of the responses for the Pupil Census data between these two years as it artificially removes 560 responses from the overall dataset, which is sufficient to significantly alter the other results if they were to be reapplied.

School Travel Plans have been analysed for schools that are located within the NPA, in order to identify and common problems and issues as shown in Table 8.2 and Table 8.3.

Table 8.2: School Travel Plans – Summary of Issues

School	Problems
Hellesdon High School, Middletons Lane, NR6 5SB	Public transport over subscribed and late, leading to more pupils driving to school
Thorpe St Andrew School, Laundry Lane, NR7 0XS	High car usage - anti-social behaviour on school buses - lack of management of movements around school entrances - conflict for cyclists with traffic along Laundry Lane
Taverham High School, Beech Avenue, NR8 6HP	Lack of pedestrian crossings - lack of cycle paths - public transport often late
Rackheath Primary School, Willoughby Way, NR13 6SL	Pupils not living within the estate are forced to walk along busy main roads with poorly maintained footpaths or have to cross Salhouse Road at peak times without a pedestrian crossing or crossing patrol
Hethersett High School, Queens Road, NR9 3DB	Access to the rear entrance is through muddy field discouraging its use - the lanes to the school present an issue for walking pupils - there is anti social behaviour on school buses and buses are frequently late
George White Middle School, Crome Road, NR3 4RG	Lack of cycle lanes - unsafe parking on both sides of Mousehold Lane - there is a need to access from the rear of the school - speeds of vehicles on surrounding roads

School	Problems
Lionwood Junior School, Wolfe Road, NR1 4HT	Parking on pavements and on junctions - lack of barriers at school gates
Lionwood Infant School, Telegraph Lane East, NR1 4AN	Lack of path through woods for safe access to school - unsafe parking by parents
Open Academy, Marryat Road, NR7 9DF	High numbers of accidents and near misses to pedestrian pupils - late and overcrowded public transport
Sprowston Community High School, Cannerby Lane, NR7 8NE	Limited access to school via narrow residential street
Sparhawk Infant School, Sparhawk Avenue, NR7 8BU	Parking around the school causing obstruction to neighbours - several incidents of near misses to pedestrian pupils - illegal parking
Sprowston Middle School, Recreation Ground road, NR7 8EW	Congested roads and illegal parking - no manned crossing and no safe cycle routes to the school
Cecil Gowing County First, Falcon Road West, NR7 8NT	Insufficient crossing points - illegal parking and disregard for pedestrians
Heartsease Primary School, Rider Haggard Road, NR7 9UE	No cycle paths in the vicinity of the school - illegal parking on footways and corners - several near misses for pedestrian pupils
Town Close House Prep School, 14 Ipswich Road, NR2 2LR	Routes to school are principal heavily trafficked roads with vehicles travelling at speed - cycle tracks if exist are also bus lanes.
Robert Kett Junior School, Hewitts Lane, Wymondham NR18 0LS	No designated cycle lanes - vehicles mounting pavement when dropping off and picking up - late buses - illegal parking
Recreation Road Infant School, Recreation Road, NR2 3PA	Pavements too narrow - too many cars on Recreation Road - coaches cannot safely use Recreation Road
Earlham High School, Earlham Road, NR7 7NU	Too many vehicles parking outside school - need crossing closer to school
Bignold Primary, Wessex Street, NR2 2SP	Illegal parking, - lighting is poor in some locations
Norwich High School for Girls, Newmarket Road, NR2 2HU	Unsafe crossing points on Newmarket Road - inappropriate parking outside the school - high cost of bus fares - cycle lanes shared with bus lanes
Colmans Infant School, Colman Road, NR4 7AW	Roads around the school blocked due to illegal parking - pupils forced to cycle on pavements
CNS, Eaton Road, NR4 6PP	No designated cycle lanes - speeding vehicles - trains are late - Unthank Road/Christchurch Road unsafe or misused
Wymondham High School, Folly Road, NR18 0QT	Congestion around the school
Kinsale Middle School, Kinsale Avenue, NR6 5SG	Lack of Cycle lanes on Middletons Lane - inconsiderate parents when picking up and dropping off - speed of cars on Hospital Lane
White Woman Lane Middle School, White Woman Lane, NR6 7JA	No crossing patrol on the busier roads and the speed of traffic - cars mounting the pavement to pass each other
Firside Middle School, Middletons Lane, NR6 5NF	Poor visibility on exit from junctions due to illegal parking - traffic speeds alarming on Middletons Lane - danger to pupil cyclists due to illegal parking
Mile Cross Primary School, NR3 2QU	Lack of pedestrian crossing on Half Mile Road

Table 8.3 summarises the most frequent issues that were obtained from the selected school Travel Plans.

Table 8.3: Summary of Key Issues

	Most Frequent Problems out of 26 Schools
Illegal Parking	10
Lack of Pedestrian Crossing	6
Lack of Cycling Facilities	8
Late Public Transport	6

Table 8.3 shows problems and issues taken from the original School Travel Plans submitted to NCC between 2005 and 2007. This is a sample of all of the Plans submitted in the NPA.

It can be seen from the issues on the routes that there are instances of near misses to pedestrian pupils due to excess vehicle speed and lack of visibility. There are ten citations of illegal parking which contributes to these near misses and conflict for cyclists. Six examples show a lack of pedestrian crossing facilities which also exacerbates the situation.

School buses and public transport are often late and this can be attributed to congested routes to the schools in question. There are few designated cycle routes and often cyclists share bus lanes, which deters pupils from using this mode of transport.

8.2 Future Situation

NCC has worked with each of the schools throughout the County to help them produce a School Travel Plan. The aim is for every school and educational facility to keep these plans up to date and continue to encourage the use of more sustainable modes of transport for journeys to school. Planned development will increase demand on existing schools and in turn is likely to exacerbate the identified issues as traffic levels rise.

8.3 Benchmarking

Data relating to the percentage of mode split from other cities' School Travel Plans has been collected and analysed in order to compare the NPA School Travel plan data with them.

Table 8.4 illustrates the percentage of mode split from data relating to Cumbria, Lincolnshire and Derbyshire and is based on data that has been collected from the Pupil Census 2009.

Table 8.4: Comparison of Mode Share for Travel to School in Norfolk with other Counties

County	Car (including vans and taxis)	Car Share	Public Transport	Walking	Cycling	Other	Not supplied / Missing	Total Number of Pupils
Norfolk	27,687	2,368	17,466	39,337	3,643	1,311	1,591	93,403
% of Total	30	3	19	42	4	1	2	100
Cumbria	14,169	1,739	12,128	22,129	465	470	8,404	59,504
% of Total	24	3	20	37	1	1	14	100
Lincolnshire	22,549	1,734	16,302	26,380	3,446	2,147	13,357	85,915
% of Total	26	2	19	31	4	3	15	100
Derbyshire	23,257	2,225	14,681	41,591	747	578	8,158	91,237
% of Total	25	2	16	46	1	1	9	100

Source: Relevant Local Authorities' Travel Plan Teams

Table 8.4 shows that Norfolk's school mode share is comparable to that of the other three counties, with only minor differences in the percentage of trips by car or by walking.

8.4 Policy

- NCC is committed to reduce the number of car journeys to school by 10% between 2005/6 and 2010/11;
- The County Council continues to work with schools in Norfolk to ensure Travel Plans are kept up to date and initiatives and schemes are implemented where required.

8.5 Conclusions

- School buses and transport is often late and this can be attributed to congestion and issues on the network in relation to general traffic;
- Journeys to school by car are increasing and Norfolk has the highest level of use for this mode when compared with its CIPFA Nearest Neighbours. Travelling to school by bus is also increasing and on a par with that of its comparable cities. Unaddressed, this increase in traffic will create more conflict with pupil pedestrians and cyclists,

9. Safety

9.1 Current Picture

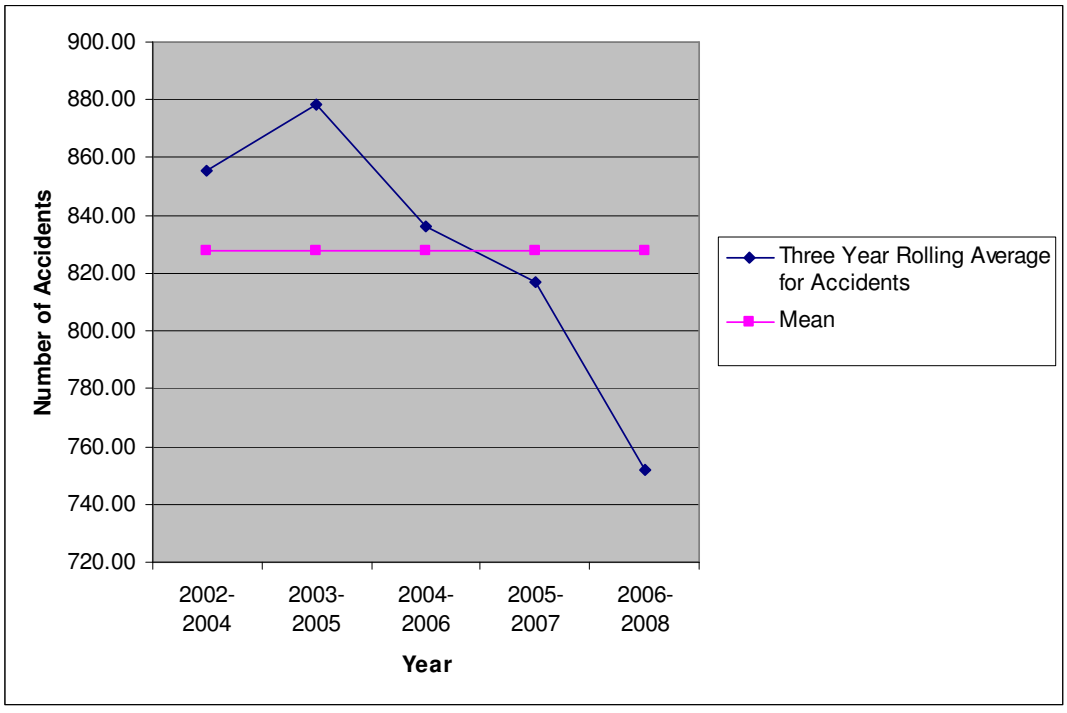
Personal injury accident (PIA) data is recorded by NCC. For the purpose of this report, seven years of accident data from the 1st January 2002 to 31st December 2008 has been obtained for the NPA and is summarised within this section.

A total of 5,709 accidents were recorded within the NPA over the seven year period resulting in 7,432 casualties. Table 9.1 details the accidents by the year that they occurred and by the severity of the accident. Figure 9.1 shows the accidents that have occurred using a three year rolling average and the graph illustrates the downward trend in the number of accidents that have occurred over the seven year period.

Table 9.1: Personal Injury Accidents within the Norwich Policy Area

Year	Slight	Serious	Fatal	Total
2002	671	135	12	818
2003	747	122	9	878
2004	734	129	7	870
2005	772	106	9	887
2006	626	110	16	752
2007	700	100	11	811
2008	596	90	7	693

Figure 9.1: Three Year Rolling Average Accident Graph



Source: Norfolk County Council – Data from Casualty Reduction Team

Both Table 9.1 and Figure 9.1 indicate that there has been a significant reduction in the total number of accidents over the past five years, with total accidents reducing from 818 accidents in 2002 to 693 accidents in 2008 a reduction of approximately 15%. The three year rolling average graph also clearly demonstrates this downward trend.

The biggest actual reduction in the number of accidents by severity is in the number of slight accidents. These reduced significantly by 75 accidents since 2002 (671) to 2008 (596). The number of serious accidents has reduced over the past five years by 45 accidents, equating to a 33.3% reduction. Fatal accidents have remained largely unchanged over the period shown, with the number of fatal accident largely between 7 and 12 accidents per year between 2002 and 2008, despite peaking at 16 fatal accidents in 2006.

The financial cost of road traffic casualties is very high; calculations based on information provided by the Department for Transport indicate that the cost of road crashes in Norfolk in 2004 was in excess of £200 million, based on the costs to the emergency services, health service, loss of income and crash damage.

NCC tackles the issue of casualty reduction by engineering, education, training and publicity. The overall downward trend in the overall number of accidents, as well as the relatively large reduction in accidents involving cyclists as detailed in section 6.1, would suggest that the Council's work alongside other organisations in the area is successful.

9.1.1 Accident Cluster Sites

Accident cluster sites have also been investigated to identify any trends or specific sites for concern. A cluster site is classed by NCC as a location where a minimum of five accidents occur, within a 30m radius of each other, over a period of three years. Accident cluster data has been obtained for the three year period from 01/01/06 to 31/12/08. It covers three areas;

- Norwich City;
- Broadland District; and
- South Norfolk District

For the purpose of this report, the data has been analysed for the area inside the Outer Ring Road cordon (for the Norwich city data) and the area outside the Outer Ring Road cordon (for the Broadland and South Norfolk Districts) as shown in Table 9.2.

Table 9.2: Accident Cluster Data in Norwich Policy Area

Type of Accident	Outside ORR	Inside ORR	Outside ORR	Inside ORR
Failure to give way/comply	72	55	48%	20%
Shunts/Tail End Collisions	39	39	26%	15%
Pedestrian/Cyclists	4	53	2%	20%
Right Turn	15	28	10%	11%
Total inc additional lane change, loss of control & head on	21	91	14%	34%

Source: Norfolk County Council, Casualty Reduction

Table 9.2 shows that the principal cause of accidents within the NPA is failure to give way or comply (127), this can be caused by "flow breakdown" i.e. drivers failing to deal with differing circumstances at various junction layouts along rural or semi-rural routes. However, in urban situations, failure to give way can be

associated with red-light running at signalised junctions, or by misinterpretation of oncoming vehicle speeds or distances at priority junctions. The accident cluster data has been grouped into four categories based on the number of accidents that make up each cluster site. These are illustrated on a plan at Appendix A and Table 9.3 summarises this data

Table 9.3: Summary of Accident Cluster Data

Accidents per Site	Number of Locations	Within IRR
0 – 5	20	-
6 – 10	22	-
11 – 15	-	-
16 +	4	8

The A1067 Fakenham Road is the corridor with the highest number of accidents, in particular at its junction with Boundary Road. Boundary Road is one section of the Outer Ring Road that has been identified as congested in section 3. A total of 55 accidents have occurred on this route at six cluster sites which are all located at junctions with other radial routes, 23 of these accidents were caused by vehicles failing to comply or failing to give way.

Three of the four cluster sites which contain 16 or more accidents are located within the Inner Ring Road, with 18 of these accidents (32%) related to collisions with pedestrians or cyclists.

To summarise from the data provided over the study period the number of accidents occurring within the NPA has declined. Key locations where accidents occur have been analysed and cluster sites which contain a high number of accidents are typically located within the Inner Ring Road and on key radial routes at junctions with the Outer Ring Road in the northern suburbs of Norwich.

9.1.2 Accidents on Minor Roads

This section identifies the number of road traffic accidents that have occurred on a selection of the identified 'rat run' roads from the 1st January 2004 to 31st December 2008. This information has been obtained in order to ascertain the number of accidents on these roads and to identify any trends or common causes of accident.

Table 9.4: Number and Severity of Accidents on Identified Rat Runs

Road Name	Slight	Serious	Fatal
Thorpe Marriott - Drewray Drive	0	0	0
Horsford - Church Street and Drayton Road	2	2	0
Hellesdon - Meadow Way	2	0	0
Hockering to Lenwade - Wood Lane	3	1	0
Old Catton Village - St Faith's Road	10	0	0
Sprowston - Barkers Lane	2	0	0
Sprowston - White Woman Lane	0	1	0
Taverham – Fir Covert Road	2	0	0
Felthorpe – Reepham Road	45	7	2
Horsham St Faith – Spixworth Road	11	1	1
Spixworth – Buxton road	8	2	0
Spixworth - Quaker Lane	3	0	0
Beeston St Andrew – Beeston Lane	0	0	0
Spixworth - Rackheath Lane	1	1	0
Spixworth - Dobbs Lane	0	2	1
Rackheath – Green Lane West and Green Lane East	8	0	0
Great Plumstead – Plumstead Road (4x at Junction with Broad Lane)	5	0	0
Great Plumstead – Low Road	0	0	0
Postwick – Green Lane North	3	0	0
Postwick – Green Lane to the Postwick roundabout	0	0	0
Total (126)	**105**	**17**	**4**

Source: Norfolk County Council Casualty Reduction Team

Table 9.4 shows that a total of 126 accidents have occurred on the identified minor roads over the study period. Of these, 105 (83%) were classified as slight accidents, 17 (14%) were classified as serious accidents and 4 (3%) were fatal accidents which occurred.

Further analysis of the accident data shows that 10 (30%) of the total accidents recorded involved pedestrians or cyclists, 9 (27%) were due to vehicles failing to give way and failing to stop and a further 7 (21%) were caused by vehicles losing control. Anecdotal evidence suggests that the primary cause of accidents is due to excessive speed and the three categories detailed can be directly linked to this. In

addition, 18 of the accidents (55%) were located at junctions with other roads with the primary cause of the accidents being failure to stop or failure to give way.

9.2 Future Situation

There is no forecasting data available which specifically deals with the accident levels in future years. However, the 2031 model indicates a significant increase in traffic in the future, leading to increased congestion on the highway network. In this situation, where the traffic flows are higher and consequently traffic speeds are lower, it may be expected that there may be an increase in the number of low speed accidents, for example rear shunts at junctions, alongside a corresponding decrease in higher speed accidents. Greater congestion does lead to a change in driver behaviour, particularly on joining a busy route, which can lead to drivers taking greater risks. There may also be more rat running along country lanes and through villages which would increase the potential for accidents.

9.3 Benchmarking Criteria

Casualty rate provides a good indicator of the road condition in any area. For this purpose a comparison of the casualty rate of Norfolk and England has been tabulated to compare the trend in general.

Table 9.5: Casualty Rates in Norfolk, Cumbria, Lincolnshire, Derbyshire and England (per 100 million vehicles kilometres)

	2004	2005	2006	2007	2008	Reduction over Period
KSI Norfolk	7	7	6	6	5	28.6%
Slight Norfolk	39	39	34	35	35	10.2%
All Casualties Norfolk	46	46	40	41	34	26.1%
KSI Cumbria	8	8	6	6	5	28.6%
Slight Cumbria	41	41	38	36	34	17.1%
All Casualties Cumbria	49	49	44	42	39	20.4%
KSI Lincolnshire	9	8	7	7	6	33.3%
Slight Lincolnshire	61	59	52	52	48	21.3%
All Casualties Lincolnshire	70	67	59	59	53	24.3%
KSI Derbyshire	7	6	6	6	6	14.2%
Slight Derbyshire	46	46	43	42	39	15.2%
All Casualties Derbyshire	53	52	49	48	45	15.1%
% KSI England	6.9	6.4	6.3	6	5.5	20.2%
% Slight England	50.6	49	45.8	43.4	40.8	19.4%
% All Casualties England	57.5	55.4	52	49.4	46.3	19.4%

Source: DfT 2009 - Reported Road Casualties English Local Authority Tables 2004 - 2008

Data was collected from the Department for Transport Local Authority Tables for casualty rates per 100 million kilometre miles for Norfolk and England has been presented in

Table 9.5. It can be seen that the casualty rate has consistently fallen year on year in both Norfolk and England. However it can be noted from the table that in case of Norfolk slight injuries casualty decline rate is slower at 10.2% reduction over five years than that of Lincolnshire, Cumbria or England as a whole which has reduced by 19.4% over the same period.

The number of accidents per million vehicle kilometres has also been calculated for the NPA as a whole and this data is shown in Table 9.6.

Table 9.6: Norwich Policy Area Accidents per 100m vehicle km

	2005	2006	2007	2008	Rate of Change
KSI	1.388171	1.454274	1.203081	1.150199	17.14%
Slight	8.659542	7.24493	7.786978	6.742544	22.14%
All Casualties	10.04771	8.699204	8.262922	7.892743	21.45%

Again, this table demonstrates that there has been a decrease year-on-year in the number of accidents on the network, with only 7.89 accidents per 100m vehicle kms being reported across the NPA. This number of accidents in Table 9.6 is much lower than those shown for either Norfolk to the UK in

Table 9.5. This is however, to be expected as the majority of roads in the NPA are urban in nature and accident numbers are typically lower in urban areas than in rural areas. The potential for more traffic on inappropriate roads in rural areas could therefore diminish the improved safety figures in the future. The Rate of Change from 2005 to 2008 also shows that the rate of decrease in all casualties in the NPA is similar to that for England as a whole, although the rate of change for KSIs is significantly below that for both England and Norfolk.

9.4 Policy

PPG 13 paragraph 28 states that *"The physical form and quantities of a place, shape-and are shaped by – the way it is used and the way people and vehicles move through it. New development should help to create places that connect with each other sustainably, providing the right conditions to encourage walking, cycling and the use of public transport. People should come before traffic. Places that work well are designed to be used safely and securely by all in the community, frequently for a wide range of purposes and throughout the day and evening".*

Specific targets relating to road safety are included in the LTP:

- BVPI99a Number of people killed or seriously injured in road traffic accidents is targeted to reduce from 863 which was the 1994-98 average to 425 in 2010. The figure reported in 2007 was of 463 people meaning that it is likely that this target will be achieved.
- BVPI99b Number of children killed or seriously injured in road traffic accidents is set to decrease from 90, the 1994-98 average, to 31 in 2010. Again, it is anticipated that this target will be achieved as the figure of 33 children was reported in 2007.
- The location in Norwich with the highest number of accidents at Boundary Road is also a location of congestion.
- Number of people slightly injured in road traffic accidents is set to fall from 3,134, the 1994/98 average, to 3,000 in 2010. The quantity reported in 2009 was 2,808 which exceeded the 2010 target.
- Number of motorcyclists killed or seriously injured in road traffic accidents is required to fall from 131, the average of 1994-98, to 105 in 2010/11. The figure reported for 2007 was higher than the 1994-98

average at 141 people and there is therefore some possibility that the 2010/11 target will not be achieved.

9.5 Conclusions

It can be seen from the progress against the LTP targets that there is a strong degree of compliance with policy in relation to road safety. There are therefore no issues relating to the implementation of measures to secure greater policy compliance.

Problems identified from the accident data analysis are:

- The number of fatal accidents has not been subject to the same downward trend as accidents overall in the NPA. NCC has worked hard and been very successful in reducing road casualties across the county, implementing highway improvements within the scope allowable within current highway capacity. Potential to further improve these figures, without significant investment, is limited as many of the low cost options have been implemented;
- There is increased potential for rat running on rural roads in the future to avoid congestion on urban roads. This may increase the number of accidents as rural roads tend to be subject to more accidents than urban roads;
- As traffic levels increase in urban areas, there is potential for more accidents, particularly involving vulnerable users, who may also feel a reduced perception of safety; and
- The principal cause of accidents in the NPA is failure to give way, which resulted in 127 accidents in the 3 year period to 31st December 2008. In urban areas this can be due to red-light running at signalised junctions, or by misjudging vehicle speeds and distances at priority junctions. Reductions in urban traffic facilitated by modal shift or traffic dispersement to appropriate routes would alleviate this problem and avoid conflicts with pedestrians and cyclists.

10. Environment

10.1 Environment

10.1.1 Current Situation

10.1.1.1 Noise

Noise pollution from transport is closely linked to traffic flows; therefore roads which experience high traffic flows typically experience increased levels of noise pollution.

Currently Norwich City Council does not formally monitor noise levels from traffic. The Department for Environment, Fisheries and Rural Affairs (DEFRA) is currently in the process of producing noise maps for all major urban areas; however, Norwich has yet to be mapped.

Noise from aircraft taking-off and landing at Norwich International Airport is controlled through an agreement that was made between the Airport, Broadland District Council and NCC in 1998. The agreement controls the hours of operation at the Airport and includes noise attenuation measures which the Airport must implement and adhere to.

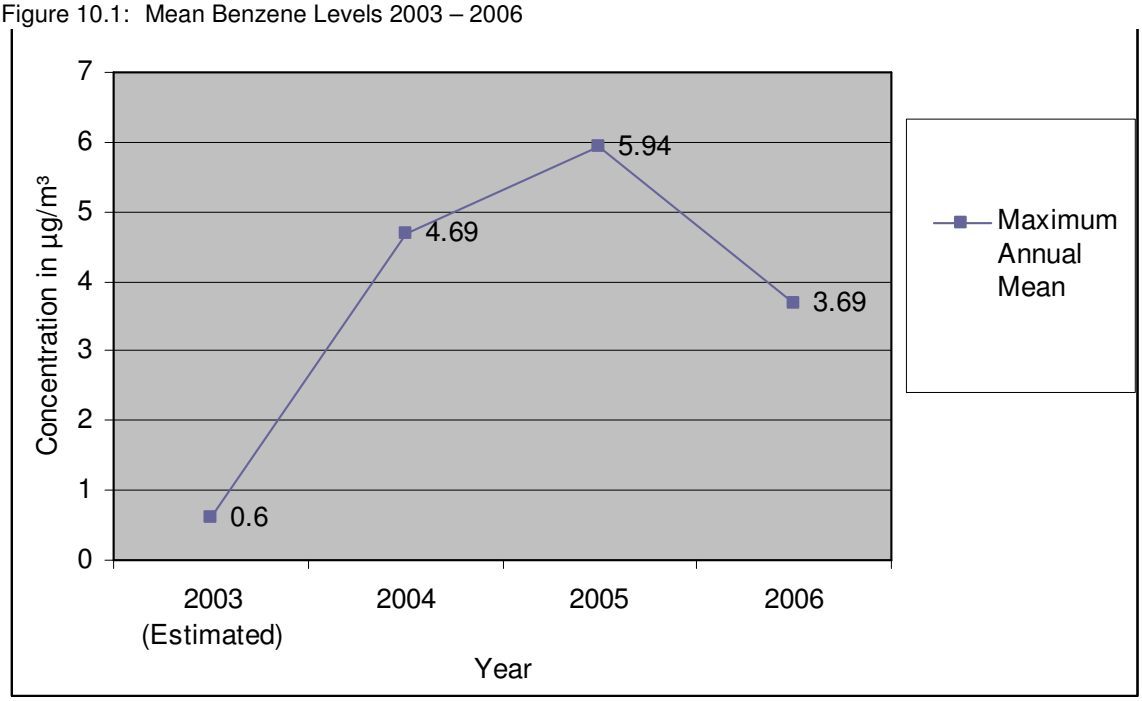
10.1.1.2 Air Quality

In order to achieve the national air quality objectives set for 2005, several reviews and assessments of air quality in Norwich have been carried out over the past few years. These consisted of monitoring the levels of each pollutant in the air at key areas in the city and comparing them with the Air Quality Strategy Objective. The main environmental issues that can be found in the Air Quality Review and Assessment Annual Progress Reports (2004 – 2007) are summarised in this section.

10.1.1.3 Benzene

Benzene levels were measured using diffusion tubes located at three key city centre locations - Unthank Road, Guildhall and St Augustines Street. After measuring monthly averages an annual mean was calculated, as shown in Figure 10.1.

Figure 10.1: Mean Benzene Levels 2003 – 2006



Source: Norwich City Council, Air Quality Review and Assessment Annual Progress Reports (2004 – 2007)

The levels shown in Figure 10.1 do not exceed the national air quality objective level, of 16.25 µg/m³. The high end forecast level of Benzene for 2010 is 0.5 µg/m³; this would indicate a further reduction on existing levels.

10.1.1.4 1, 3-Butadiene

The estimated annual mean level of 1, 3-Butadiene in 2003 was 0.2 µg/m³, which is within the maximum objective level of 0.3 µg/m³. No monitoring of 1, 3-Butadiene levels was undertaken for the following years as the levels were not expected to be close to exceeding the objective.

10.1.1.5 Carbon Monoxide

Carbon Monoxide levels have been measured as an annual mean using a city centre site and as a maximum 8 hour running mean at 4 other city centre locations including at Market Avenue, Norwich Airport and Castle Meadow. The results are presented in Table 10.1 and Table 10.2.

Table 10.1: Annual Recorded Carbon Monoxide Levels

Year	Annual Mean CO Concentration (in mgm³)
2004	0.3
2005	0.3
2006	0.2

Table 10.2: Maximum Recorded Carbon Monoxide Levels 8 Hour Mean

Year	Site	Maximum 8 Hour Running Mean (in mg/m³)
2003	City Centre	2.2
2004	City Centre	3.5
2003-04	Market Avenue	3.4
2004-05	Norwich Airport	3.8
2006	City Centre	1.9
2006	Castle Meadow	2.2

Table 10.1 and Table 10.2 identify a significant decrease in the levels of carbon monoxide that have been recorded in recent years. The recorded levels meet the air quality strategy objective of not exceeding 10 mg/m³ of carbon monoxide in Norwich each year.

10.1.1.6 Lead

Due to the lack of significant industrial sources of lead, emissions of lead can largely be attributed to vehicles in the Norwich area. Monitoring has been carried out in the past, however, due to low levels of lead recorded no further monitoring has been carried out. The forecast annual mean for lead in the Norwich area for 2008 was expected to be 0.25 mg/m³.

10.1.1.7 Fine Particles

Concentration of Fine Particles is measured for several city centre locations; Market Avenue, Castle Meadow, Golding Place and the Airport.

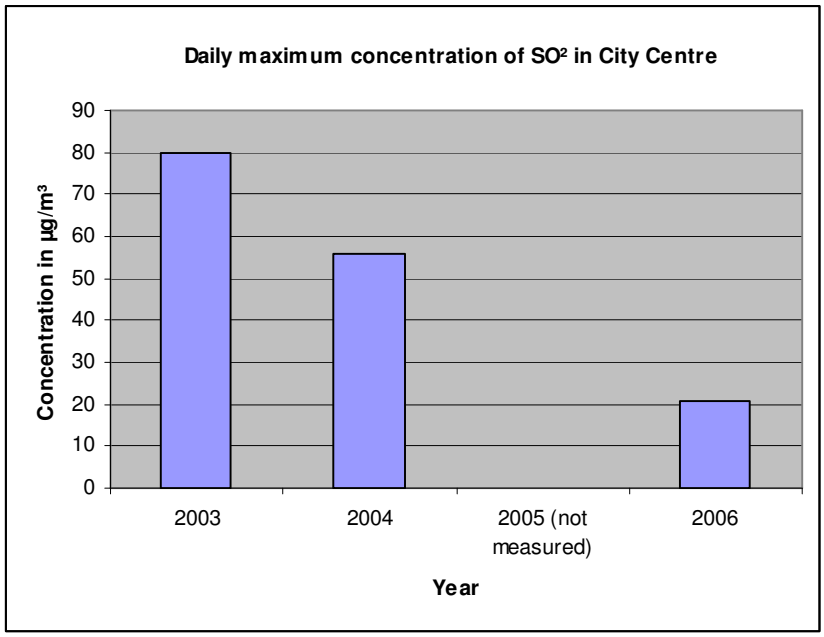
In 2004, the mean PM_{10} concentration of 17 µg/m³ of gravimetric equivalent at Market Avenue was below the annual mean objective of 40 µg/m³. At the airport the mean was measured to be 14 mg/m³, again below the annual mean objective of 40 µg/m³.

In 2006, the mean PM_{10} concentration was measured at 24 µg/m³ of gravimetric equivalent; therefore not exceeding the annual mean objective of 40 µg/m³. The mobile site based at Castle Meadow showed PM_{10} concentrations exceeded the objective value of 50 µg/m³, 6 times in 2006, the objective allows for 35 exceedances. The target for 2010 is for the objective value to not be exceeded on more than 7 days per year. In 2006 concentrations only exceeded the objective value once at fixed sites.

10.1.1.8 Sulphur Dioxide

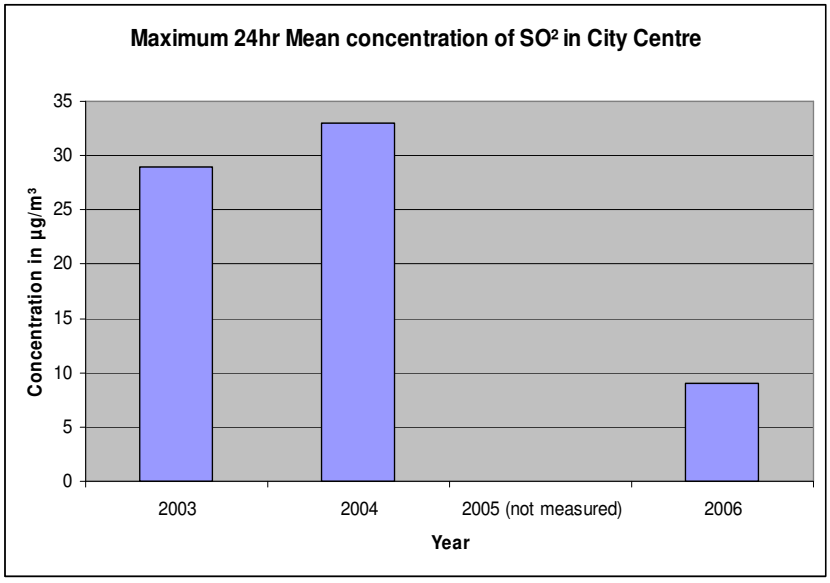
SO^2 levels were recorded at various sites; Castle Meadow, Market Avenue, the Airport and one city centre site. The air quality strategy objectives state that the 24hr mean for sulphur dioxide should not exceed 125 µg/m³. Data recorded in relation to SO^2 is presented in Figure 10.2 and Figure 10.3.

Figure 10.2: Daily Sulphur Dioxide Levels Recorded in the City Centre



Source: Norwich City Council, Air Quality Review and Assessment Annual Progress Reports (2004 – 2007)

Figure 10.3: 24 Hour Sulphur Dioxide Levels Recorded in the City Centre



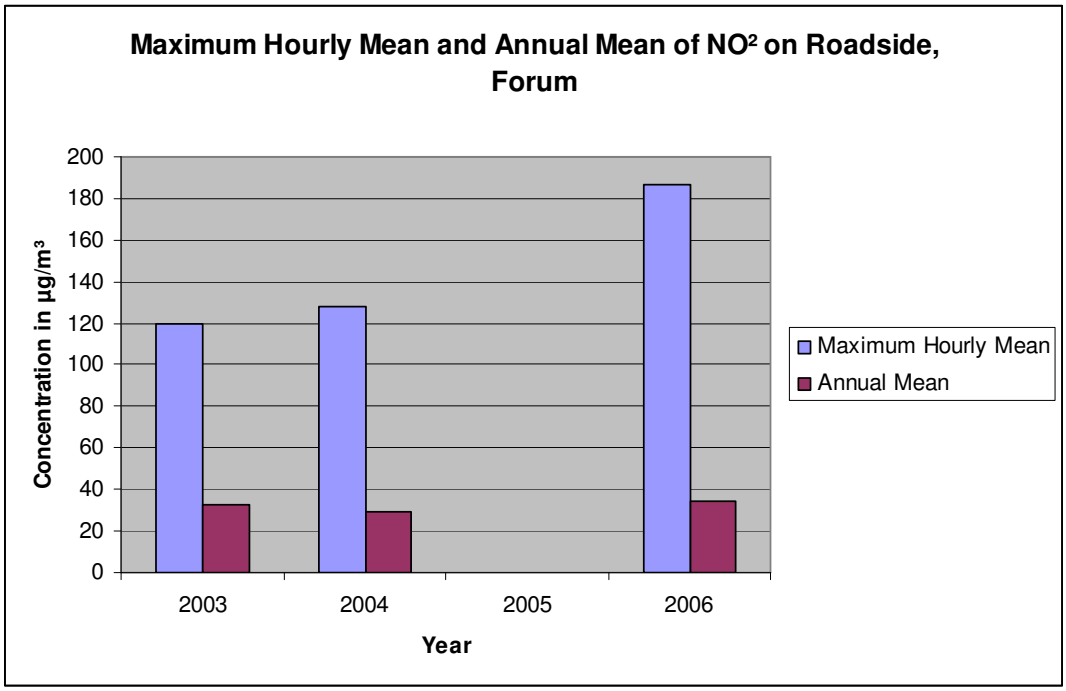
Source: Norwich City Council, Air Quality Review and Assessment Annual Progress Reports (2004 – 2007)

Figure 10.2 and Figure 10.3 indicate that the concentration of Sulphur Dioxide has decreased significantly in recent years and has not exceeded the air quality strategy objective of 125 µg/m³.

10.1.1.9 Nitrogen Dioxide

Nitrogen Dioxide levels have been recorded by Norwich City Council and are presented in Figure 10.4. Data for the city centre area indicates an increase in levels of Nitrogen Dioxide over recent years.

Figure 10.4: Maximum Hourly Mean of Nitrogen Dioxide Levels



Source: Norwich City Council, Air Quality Review and Assessment Annual Progress Reports (2004 – 2007)

The objective states that maximum hourly mean levels should not exceed 200 µg/m³. The maximum annual mean objective is set at 40 µg/m³.

Figure 10.4 demonstrates an increase in hourly and annual mean levels of Nitrogen Dioxide; however levels remain within the maximum objective levels. Data recorded shows that there was only one incidence where the objective was exceeded; this was at Castle Meadow where the maximum hourly mean was recorded at 210 µg/m³ in 2006, however, the objective allows for 18 exceedances per year.

Monitoring of the Air Quality Management Area (AQMA) for Castle Meadow in the centre of Norwich revealed that buses were a key factor affecting air quality. Average Nitrogen Dioxide emissions for Castle Meadow in 2004 showed 53mg/m3, well over the national standard of 40 mg/m3.

10.1.1.10 Air Quality in South Norfolk and Broadland

The Environment Act 1995, Part IV, has placed duty on local authorities to review and assess air quality within their areas periodically. The objective of the assessment and review is to provide continuity to the Local Air Quality Management process by identifying any potential changes in air quality that might occur between the scheduled review and assessments which are due to be undertaken on a tri-annual basis.

South Norfolk District Council undertook the first round of review and assessment, including Stage 1 and 2 reports between 1999 and 2000. The 2006 Updating and Screening Assessment report maintains that the main air quality issues were found to be related to emissions of NO2 and fine particles (PM10) from traffic. There are no significant industrial sources of NO2 in South Norfolk District Council. The predicted concentration of NO2 indicated that the annual average objective was unlikely to be exceeded in 2005. Additionally the EU objectives were unlikely to be exceeded by 2010. The DMRB screening model indicates that the annual mean objective for PM10 will be met in 2005, but that exceedances of the 2010 objective are likely.

The Air Quality Updating and Screening Assessment for Broadland District Council (2006) concluded that the council is not required to carry out a Detailed Assessment and Review for Carbon Monoxide, Benzene, 1,3 Butadiene, lead, Nitrogen Oxide or Sulphur Dioxide. However, the Broadland District Council is required to carry out a Detailed Assessment for PM10 at receptor location in close proximity to single busy junction of the A140/A1042 comprising Cromer Road, Aylsham Road, Boundary Road, Mile Cross Lane and Reepham Road.

10.2 Benchmarking

Data has been obtained for comparable areas and is detailed within this section.

Figure 10.5: PM10 Comparison With Neighbouring Cities

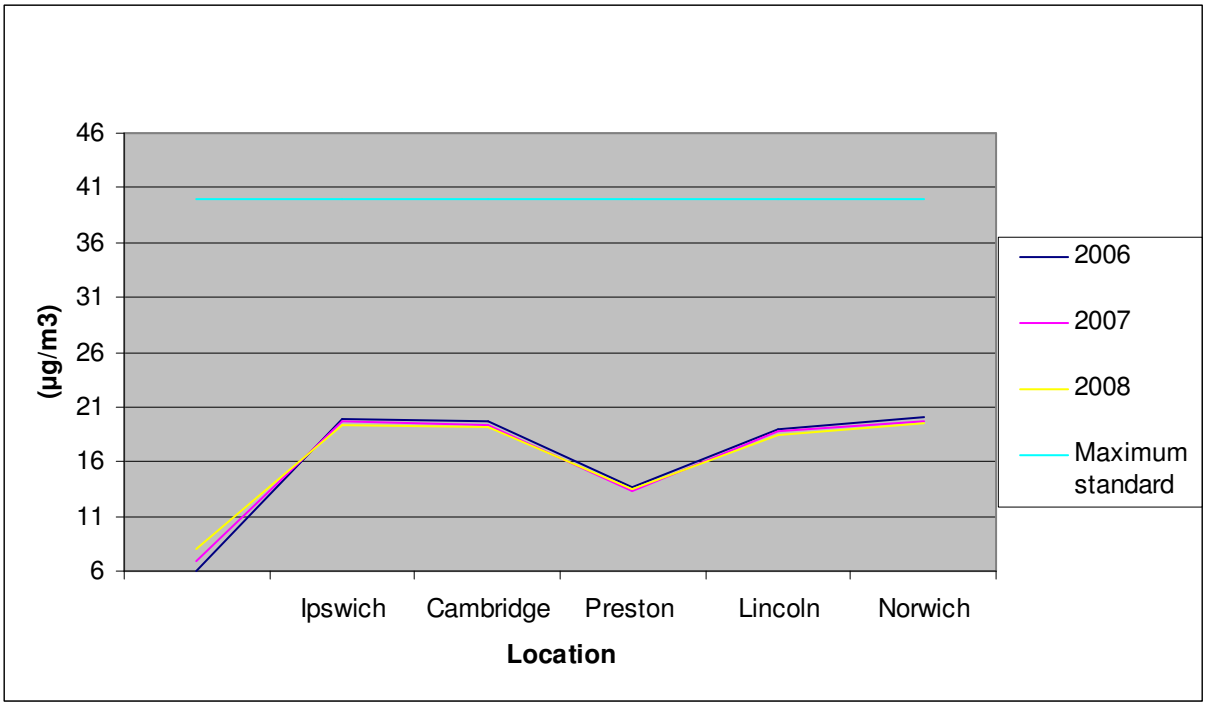
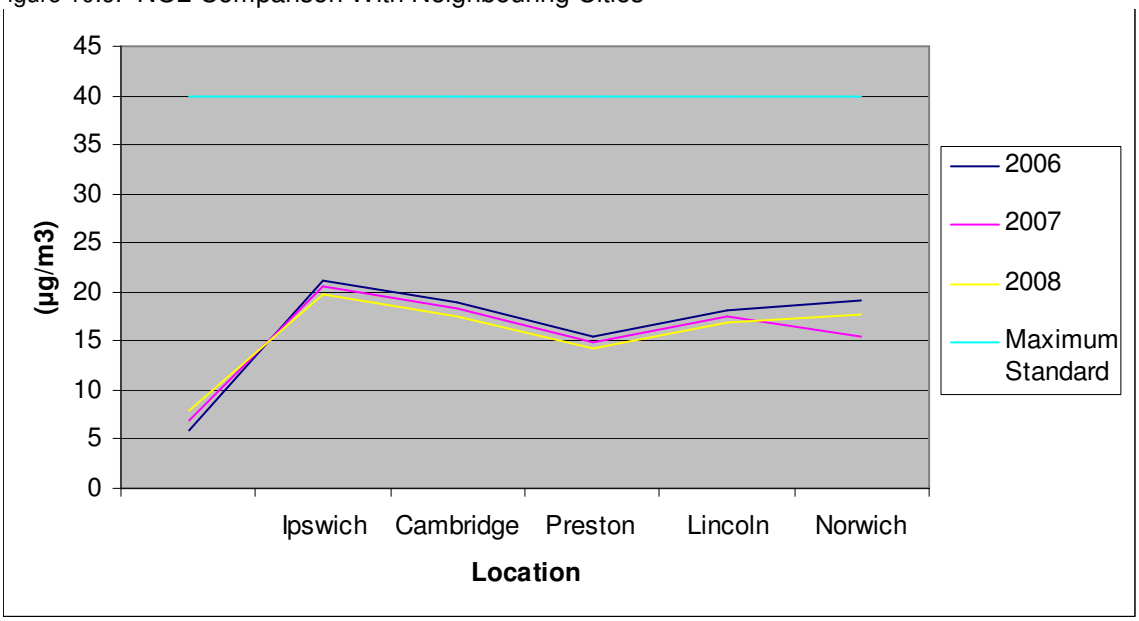


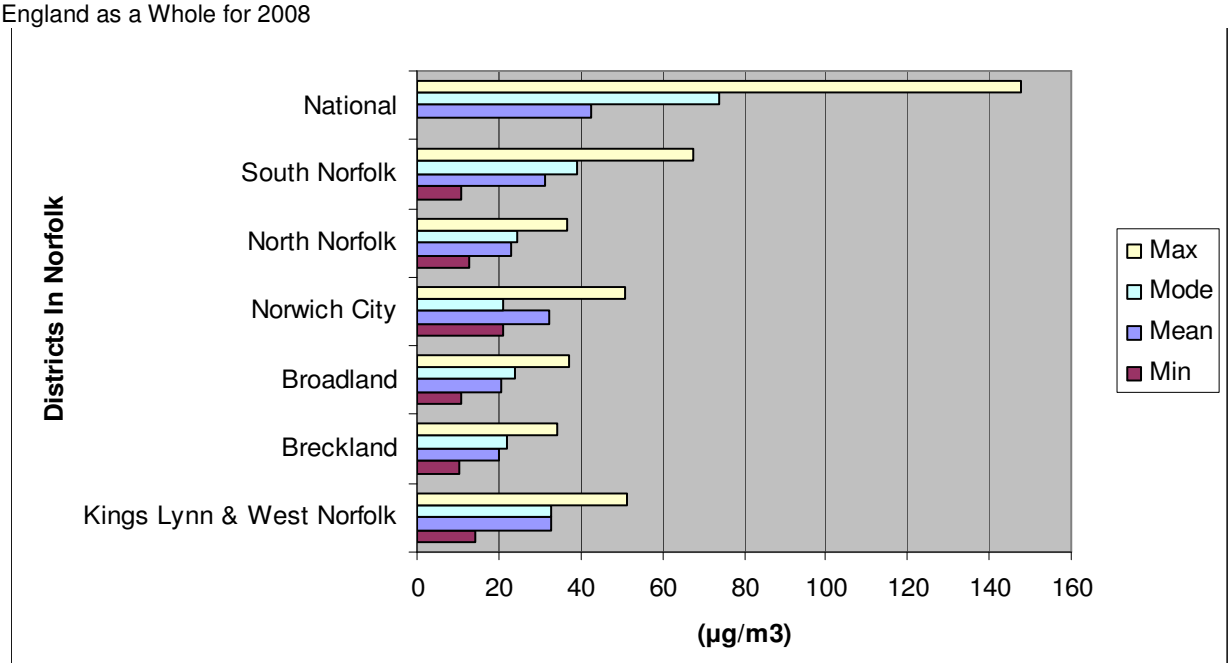
Figure 10.6: NO2 Comparison With Neighbouring Cities



The comparable data indicates that Norwich has approximately the same level of pollutants as the comparable areas.

Data for National levels of NO2 has been obtained and is detailed in Figure 10.7 which also compares it with levels in the other Norfolk districts.

Figure 10.7: Annual Maximum, Mode, Mean and Minimum concentration of NO2 for Norfolk Districts in Comparison to England as a Whole for 2008



Source: Updating and Screening Assessments 2009, Norwich City Council and Norfolk Districts

Figure 10.7 illustrates the annual concentration of NO2 for districts in Norfolk compared to England. The bar chart shows that South Norfolk has the highest concentration as well as fluctuation of NO2 levels compared to Norwich and Broadland. South Norfolk had an average of 31.23 µg/m3 of NO2 compared to 20.58 µg/m3 of Broadland and 32.45 µg/m3 of Norwich City in the year 2008. The national average concentration of NO2 for England for 2008 was 42.37 µg/m3. Hence it can be said that the average NO2 concentration in the NPA is below the national average.

10.3 Natural and Built Environment

The city of Norwich stands on the confluence of three main rivers – the Yare, the Wensum and the Tas. This has contributed to the prosperity of the city from medieval times and has also resulted in the wealth of wildlife and high quality landscapes found within the study area boundaries.

10.3.1 Townscape

Norwich is the historical capital of East Anglia; the centre is of national and international importance, particularly in built environment terms. It is the largest medieval walled city in the country, with over 1,500 listed buildings, including 32 pre-Reformation churches, a Norman castle and two cathedrals. The historic core of Norwich has a pattern of narrow streets within the city walls lined by many notable medieval and Georgian buildings and churches. Some streets are still cobbled. In the eighteenth and nineteenth centuries the city spread beyond the walls chiefly along the main approach roads, paralleled by growth in peripheral villages such as Sprowston, Lakenham and Hellesdon.

In the 1930s Norwich City Council began building large numbers of houses for rent around the northern fringes of the city. This expansion continued, firstly as ribbon development along the main radial routes followed by infill until the present day when the villages of Sprowston, Hellesdon, Drayton, Taverham, Old Catton and Thorpe have grown together to form an urban fringe to the city. To the south, the influence of the River Yare and the unwillingness of the large estates to sell land limited the outward expansion of the urban area with the exception of Cringleford and, to a lesser extent, Trowse. More recently, significant growth has occurred around Poringland and Mulbarton, some 5 miles south east of the city centre.

The study area also includes a number of villages outside the built up area: Brundall in the east, Horsford to the north, Marlingford to the west and Stoke Holy Cross to the south. It also includes the new settlement of Thorpe Marriott, built in the 1980s and 1990s on a green field site, as well as the large extension of the built up area at Dussindale, Thorpe St Andrew. Three further villages, Hethersett, Poringland and Horsford have also undergone major expansion during the late twentieth century.

There are 12 Conservation Areas covering the built up area of Norwich. These include the historic medieval core, Georgian and Victorian settlements, former village centres of Sewell, Catton, Old Lakenham and Hellesdon and the 1930s Mile Cross Estate.

A number of villages within the study area also have churches and buildings of historic interest and 8 have parts of the settlement designated as Conservation Areas. In addition, Venta Roman Town at Caistor and Arminghall Henge are important Scheduled Ancient Monuments. The village of Thorpe End was originally laid out as a garden village.

10.3.2 Land Use

Since the adoption of NATS4 in 2004, the following significant land-use changes have occurred in the Norwich Area;

- A £4.5m Engineering Excellence Centre at Group Lotus, Hethel opened in January 2005. The Centre is part of the internationally recognised and networked Motorsport Valley cluster, supporting the development of new engineering businesses as well as providing high quality specialist training and advice to help keep companies competitive;
- Norwich Research Park - Europe's largest single-site concentration of research and development in the areas of Plants; Microbes; Food; Diet & Health; Environment and Information Systems. The site includes a 50,000 sq. ft Genome Laboratory, which includes the Norwich Bio-Incubator, a £5m state-of-the-art facility offering 12 self-contained units for biotechnology spinout and start-up companies; and
- The Chapelfield Shopping Centre opened on the 21st September 2005 bringing 2,000 retail jobs to the city.

10.3.3 Landscape

The city contains, and is set within, a landscape of significant national and local value, which is also important for informal recreation. Nationally designated areas include the Broads and historic parklands, whilst areas designated in Local Plans include woodland areas and river valleys.

Within the built up area, swathes of countryside run along the floors and wooded slopes of the river valleys. Open spaces such as Mousehold Heath, the Norwich parks, historic parkland at Catton Hall and the Rosary and Earlham cemeteries are also features of significant landscape quality. Smaller pockets of open space, together with the wealth of trees along the city streets form important landscape features within the urban area.

Outside the built up area, the landscape comprises two main topographical types: the river valleys and the plateau lands between. Within these areas the landscape types are:

- River valleys with their pastoral valley floors;
- Woodland and remnant heath;
- Historic Parkland such as Crown Point, Rackheath and Great Melton;
- Undulating farmland; and
- Flooded gravel workings, forming a chain of lakes in the Bawburgh / Costessey area and the 'broad' at Whitlingham.

The Broads Authority area is of national importance and equivalent in status to a National Park. The area follows the broad flood plain of the River Yare, running through the NPA from Brundall in the east to Trowse on the fringe of the built up area. The Broads Area extends along the river as far as New Mills Yard, off King Street in the central part of Norwich.

Within the city area, five public parks, two cemeteries and the Plantation Garden, an Edwardian Garden within an old chalk quarry, are registered on English Heritage's list of nationally important historic landscapes. Another three parklands within the NPA are on the register, including Catton Hall, which is famous as landscape designer Humphrey Repton's first commission.

10.3.4 Habitats

The study area contains a fine range of habitats of local, national and international importance. Amongst these are five priority habitats: fen, floodplain, grazing marsh, reed bed and heathland, identified through the National and Norfolk Biodiversity Action plan process together with six priority species: otter, water vole, linnet, song thrush, great crested newt and sandy silt puffball.

The River Wensum and associated grazing marsh up stream of Hellesdon, Crostwick Marsh and the Yare and Broads Marsh south of Brundall are all Candidate Special Areas of Conservation and are internationally important for their wildlife. The Yare and Broads Marsh is also designated as a Ramsar site, an internationally important wetland site. There are five nationally important Sites of Special Scientific Interest (SSSI) within the study area including two, Sweetbriar Marshes and St James Pit (geological SSSI) within the Outer Ring Road of the city. Many County Sites of local importance are found within the study area. Many of these are along the river valleys of the Tas, Yare and Wensum, although they include a number of other areas of woodland, heath and common land and former chalk workings.

10.4 Policy

The following policy to be addressed:

- The Sustainable Community Strategy for Norfolk 2003-2023: Ensure that growth goes hand in hand with environmental protection and enhancement;

10.5 Conclusions

Although the NPA is currently achieving some of the relevant air quality objectives, there are AQMAs in Norwich and the potential for more to be established. This would suggest that air quality is a significant issue for the NPA. Noise is also the cause of annoyance within the area. This noise is caused by flights at the airport and by road traffic noise. In order to affect change in noise levels, reductions in traffic levels would be required, particularly In future years where the increase in traffic is likely to cause annoyance to significantly more households.

Removal of traffic from the city of Norwich and the opportunity to provide and promote sustainable modes of transport will have a positive impact on air quality in the area.

11. Consultation and Engagement

11.1 Existing Situation for Consultation and Engagement

11.1.1 Norfolk County Council Consultation and Engagement

NCC regularly involves, consults and engages with local residents, businesses and other organisations as a means of informing people about its activities, but also as a means of ensuring that decisions it takes and the services it provides are responsive to local needs and views.

This section details and analyses the results of a number of consultation and engagement exercises that have taken place in the County, which make specific reference to travel and transportation and also compares results from Norfolk against those of the comparable counties.

11.1.1.1 Norfolk County Council – Annual Customer Satisfaction Survey 2008

NCC annually surveys a representative sample of local residents in Norfolk, using the Postal Address File (PAF). The most recent survey, for which results are available, was undertaken between September and December 2008.

In total 3,600 questionnaires were distributed by post, an additional 300 face to face interviews were conducted with 'hard to reach groups' and 3 focus groups were setup across Norfolk. Residents were asked for their opinion on a wide range of services and issues, over the previous three year period and in total 1,111 of the postal questionnaires were returned (31% response rate).

A key question asked whether residents felt *"things had got better or worse over the last three years?"* For the majority of subjects respondents felt things had remained the same, however, at least two thirds said the level of traffic congestion had got worse, of these 74% were aged 45-64 years old and 89% classified themselves within the ACORN category of 'moderate means', ACORN is a demographic tool used to categorise the population classification categories include;

- Wealthy achievers;
- Urban prosperity;
- Comfortably off;
- Moderate means; and
- Hard pressed

The 'moderate means' category includes, Asian Communities, Post Industrial Families and Blue Collar Roots. These people are typically low income families, young family workers or skilled workers from semi detached and terraced houses.

With reference to public transport, one question asked *"whether residents have seen information provided on local transport services in the last 12 months?"* 50% of respondents answered no, this suggests that more information could be provided to better inform the resident population in order to encourage modal shift from private car use to public transport.

Table 11.1 shows the number of very satisfied or fairly satisfied responses, in relation to overall satisfaction with the local bus service. The results show an increase in the number of positive responses over an 8 year period from 2000 to 2008. Of the 24% of respondents who were fairly dissatisfied or very dissatisfied, 28%

were aged 25-44 years old and 27% had a disability. This suggests that public transport facilities and services need to be improved, in order to accommodate and be more attractive to both residents with a disability and a core working age group of people (25-44 year olds).

Table 11.1: Response rates to the question, *"Overall satisfaction with the local bus service?"*

Year	Percentage Very or Fairly Satisfied
2000	44%
2003	46%
2006	55%
2008	57%

Source: Norfolk County Council – Annual Customer Satisfaction Survey 2008

A secondary question asked for residents' satisfaction with specific aspects of their local bus service, 27% of residents were dissatisfied due to poor punctuality and 24% were dissatisfied with the level of frequency of local bus services which are typically a result of low levels of demand.

As a conclusion to the questionnaire, respondents were invited to make further comments regarding issues raised in the questionnaire. In total, 21% of respondents submitted a comment and of these comments, 2% were related to improving public transport and 1% was associated with installing more traffic calming measures.

In addition to the postal questionnaires, 300 face to face interviews were undertaken with three community groups, between October and November 2008. These groups comprised;

- 100 respondents from EU Accession Countries (mainly Poland);
- 98 respondents from 'visible' Black and Minority Ethic Groups, i.e. traditional minority ethnic groups;
- 103 respondents who speak Portuguese, i.e. Portuguese or Brazilian Nationals.

During the interviews respondents were asked to describe the top five aspects which they felt had got worse over the previous three year period. The top five categories are provided in Table 11.2 and show that traffic congestion is the second highest aspect that Black and Minority Ethnic Groups and Portuguese or Brazilian National felt had got worse, behind job prospects. Traffic congestion was the third highest response from EU Accession Countries.

Table 11.2: Top five aspects which have got worse for each group

EU Accession Countries	Visible Black and Minority Ethnic Groups	Portuguese or Brazilian Nationals
Job Prospects	Job Prospects	Job Prospects
Wage Levels / Cost of Living	Traffic Congestion	Traffic Congestion
Traffic Congestion	Crime	Crime
Crime	Wage Levels / Cost of Living	Wage Levels / Cost of Living
Health Services	Health Services	Pollution

Source: Norfolk County Council – Annual Customer Satisfaction Survey 2008 – Face to Face with BME 2008 Report

11.1.1.2 Citizens Panel Autumn 2009

Norfolk Citizens' Panel is a group of local people who are surveyed several times a year by organisations wanting to hear their views. Over 7,000 Norfolk people sit on the Citizens' Panel, which makes it one of the

largest panels in the country. Nine local organisations including NCC and the six District Councils, work together to run the Panel and use it to help them improve their services.

The results of the Citizens Panel from autumn 2009 have been analysed and show that 50% of the panel disagreed with the statement *"A and B roads are generally free of potholes and bumps"*. This suggests that potholes and bumps in A and B roads are a significant issue for local residents in the county. In terms of other roads 59% disagreed with the statement that these roads were free of potholes and bumps, suggesting that minor roads are more prone to potholes, which could be attributed to the different levels of maintenance that is undertaken between major and minor roads.

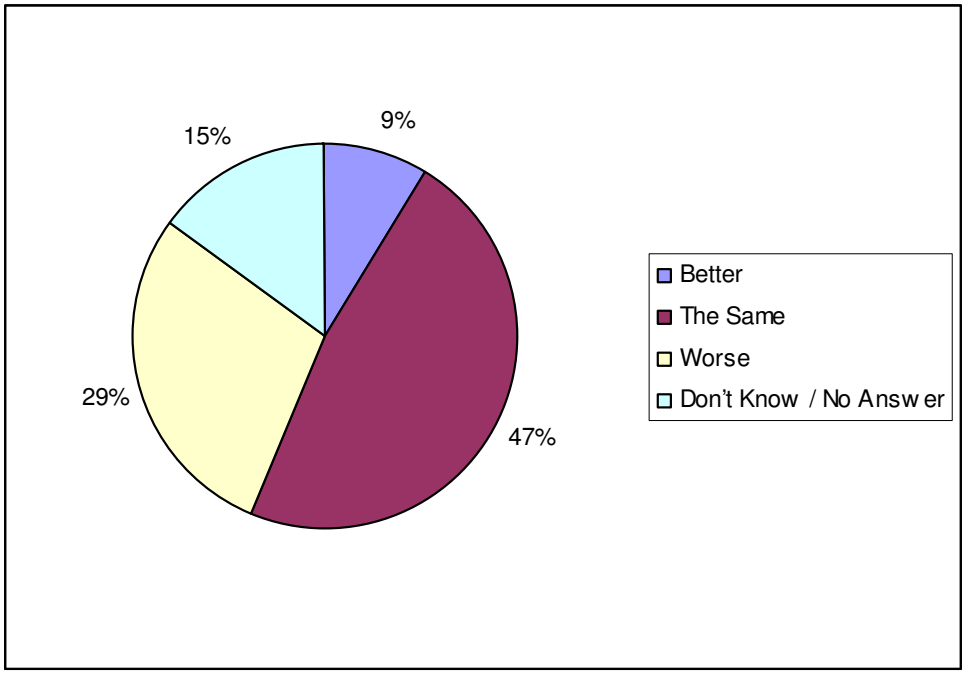
Respondents were also invited to express one change that they would like to see made to improve travel and transport in Norfolk. The highest response (30%) was to enable people to get around Norfolk and access services more easily. This suggests that accessibility and inter-connectivity is a significant issue for Norfolk residents and an area for improvement.

11.1.1.3 Norfolk County Council Tracker Data 2009

NCC regularly surveys a proportion of the local population in order to monitor and evaluate resident's perception on a range of key services and topics. Whilst at the time of writing, the final report has not yet been published, the data has been made available. Covering a wide variety of subjects including pollution, public transport and congestion, the survey assesses the opinion of both Norfolk and Norwich residents over the past 3 year period.

Figure 11.1 shows how Norwich residents think the level of pollution has changed over the last 3 years in their local area. The results suggest that over a quarter felt pollution levels have got worse, with 76% of respondents of the opinion that pollution levels have not improved and 15% unsure or not answering. Only 9% felt the levels had got better over the last 3 years suggesting that more work is required to reduce pollution from transport, through more initiatives such as the Castle Meadow Low Emissions Zone and the Freight Consolidation Centre, or at least to do more to promote the projects that are being implemented to change the situation.

Figure 11.1: Do you think pollution has got better or worse over the last 3 years (Norwich residents)



Source: Norfolk County Council Tracker Data Report

A proportion of Norfolk and Norwich residents were also asked whether they felt the level of traffic congestion had got better or worse in their local area over the last 3 years, in Norwich 65% felt congestion had got worse, compared to 63% of responses for Norfolk as a whole. Of the 65% of Norwich residents who felt that levels of congestion had got worse, 71% were aged between 45 – 64 years of age, with 67% currently in employment and 89% were in the ACORN Category of 'moderate means', which supports the data provided in the Annual Customer Satisfaction Survey 2008.

Only a total of 2% of Norwich residents who took part in the survey felt that the levels of congestion had got better and a total of 29% felt it had stayed the same. The responses to this question suggest that local resident's perception of levels of congestion is becoming more negative and that congestion is becoming a significant issue, particularly for those who live in the Norwich area.

Table 11.3 compares responses between Norfolk and the Norwich residents, when asked whether they felt public transport had got better or worse over the last 3 years.

Table 11.3: Norfolk and Norwich Residents Perception of Public Transport

Rating	Norfolk	Norwich
Better	15%	12%
The Same	44%	46%
Worse	22%	23%
Don't Know / No Answer	19%	19%

Source: Norfolk County Council Tracker Data Report

Table 11.3 shows that more residents from the Norfolk area felt that public transport was better than 3 years ago (15%), compared with Norwich residents (12%). In addition, slightly more Norwich residents in comparison with Norfolk residents felt that public transport had remained the same (46% compared to 44%). Approximately a quarter of Norwich respondents felt that public transport had got worse over the three year period, which suggests that more work needs to be undertaken to improve the attractiveness of public transport in Norwich. This is supported by Table 11.4 which shows how satisfied respondents were in relation to bus punctuality.

Table 11.4: Norfolk and Norwich Residents Satisfaction with Bus Punctuality

Rating	Norfolk	Norwich
Very Satisfied	7%	2%
Fairly Satisfied	31%	36%
Neither	11%	10%
Fairly Dissatisfied	12%	17%
Very Dissatisfied	6%	4%

Table 11.4 shows that 38% of residents of both Norfolk and Norwich are either very satisfied or fairly satisfied with bus punctuality, however, 21% of Norwich residents are either fairly or very dissatisfied with bus punctuality in comparison with 18% for Norfolk residents.

11.1.2 Existing Situation for Enquires and Complaints to Norfolk County Council

In order to obtain a better understanding of the current transport issues in the NPA, records of complaints and feedback from the general public in relation to perceived traffic safety issues have been reviewed in order to identify common themes and potential cluster areas where complaints are prevalent.

Records have been received and interrogated from Norwich City Council (over the past 5 years) and NCC's Public Enquiry Manager (PEM) Database. All transport related enquiries and issues related to the NPA have been extracted and are summarised within this section. Full details of enquiries can be found at Appendix A.

For the purpose of this report the NCC PEM database has been interrogated to analyse issues and concerns relating to Traffic Management enquiries in the Norwich Policy Area, for the period from November 2006 to May 2009. Older data is stored on a different database which is no longer readily available and so NCC's parish records have been searched manually for the years prior to 2006. Records of traffic and transport complaints received by Norwich City Council have been obtained for the past five years and these take the form of individual emails and letters rather than a formal database of enquiries. The themes of enquiries logged by Norwich City Council or in the PEM database are summarised in Table 11.5.

Table 11.5: Summary of Complaints in the Norwich Policy Area by Issue

Reported Issues	Norwich City Council	Norfolk County Council	Combined Complaints
Speed	41	42	83
Carriageway Markings	4	7	11
Buses	1	0	1
HGV	1	14	15
Parking	4	10	14
Traffic lights	1	7	8
Congestion	1	14	15
Rat-running	4	1	5
Safety	0	40	40
Other	0	11	11
Total	57	146	203

Table 11.5 shows that a combined total of 163 complaints were received in relation to traffic issues within the Norwich Policy Area for the periods detailed. The six most reported issues are categorised as;

- Speed (83 complaints);
- Safety (40 complaints);
- HGV (15 complaints);
- Parking (14 complaints);
- Congestion (15 complaints); and
- Carriageway Markings (11 complaints)

A plan showing the location of the most reported issues is included at Appendix C. The plan illustrates the location of each enquiry by theme and helps to identify locations where themes are clustered or more prevalent. Carriageway marking issues have not been included on the plan as these are predominantly related to routine maintenance issues, rather than being indicative of a wider problem on the network generally.

11.1.2.1 Speed Complaints

The highest combined complaint category is speed, of which 41% (83) complaints were received by both NCC and Norwich City Council. Safety related issues represented 20% (40) of the total complaints received by NCC. Of the complaints received by Norwich City Council and NCC, the majority of speed complaints relate to built up urban areas, this suggests that more people in the Norwich and Norfolk built up areas are affected by the perception of speeding vehicles. This is supported by the demographic data in Section 3 which demonstrates that more people in the NPA walk or cycle, due to their proximity to services and employment, as shown in the distance and mode used by Norwich residents to travel to work.

Of the combined speed related complaints, 34 relate to speed issues within the Outer Ring Road cordon. A large cluster of complaints are also from people located in residential areas of the northern suburbs of Norwich, in particular the area between the A140 Aylsham Road and the A1151 Sprowston Road (12). These complaints are clustered in residential areas within the vicinity of the southern section of the Outer Ring Road. More complaints relating to speed are typically anticipated from residential areas, given concerns regarding traffic and proximity to vulnerable users.

11.1.2.2 Safety Complaints

The category with the second highest number of complaints to NCC was safety. A total of 42 complaints have been recorded by NCC, with the main concerns relating to the safety of property and the safety of school children crossing busy roads. A total of 18 complaints are in relation to safety issues in the northern suburbs of Norwich. Areas with clusters of complaints relating to safety include Costessey (3), Taverham (3) and Hellesdon (4).

11.1.2.3 HGV Complaints

A total of 15 complaints (7% of total) were received relating to the levels of HGV traffic. Eleven of these complaints were received from people concerned about the levels of HGV traffic in residential areas. Ten of the complaints are regarding category 'B' or 'C' roads, with two or more complaints received in Taverham (2), Hethersett (2) and in the northern suburbs of Norwich (5). Three complaints relate to the minor roads that are detailed in Section 4.2.5; St Faith's Road in Old Catton, Church Street in Horsford and Green Lane West in Rackheath. The complaints on these roads relate to cement lorries eroding the banks (St Faith's Road), a request for weight restrictions to protect Grade 2 buildings on Church Street and a complaint that weight restrictions are not observed on Green Lane West.

11.1.2.4 Parking Complaints

Complaints relating to parking totalled 14 (7% of total), with complaints received predominantly from residents regarding vehicles parking too close to junctions, reducing visibility and increasing the likelihood of accidents. Eight of the complaints are related to inappropriate parking on minor residential streets, with the majority (8) located within the north eastern and northern suburbs of Norwich. Much of these areas are now covered by a controlled parking zone which requires residents to have a parking permit.

11.1.2.5 Congestion Complaints

A further 15 complaints (7% of total) have been received relating to congestion issues. The majority of complaints are in relation to the levels of traffic on or in the vicinity of the main radial routes surrounding the Outer Ring Road. Some 9 of the 15 complaints relate to the north eastern and northern suburbs of Norwich. Only one congestion related complaint was received by Norwich City Council. This difference between the data collected from both authorities is to be expected as the road users most affected by congestion are those commuters who travel into Norwich from the wider Norfolk area. These people will be subject to far greater levels of delay to their whole journey than would the residents within Norwich itself, as they will incur delay not only within the city but also on the radial routes extending into the city, in particular at locations close to their junctions with the Outer Ring Road. In addition, Norwich City Council residents are less likely to take a motorised form of transport to work and therefore will not be directly delayed. Given these factors, it is unsurprising that the complaints regarding congestion should be received from residents outside of Norwich.

11.1.3 Norwich Area Transportation Strategy Consultations

A number of consultation exercises have been undertaken since NATS was first adopted, with the most recent consultation taking place in October 2009. Data has also been obtained from the previous consultation that was undertaken in September 2003.

11.1.3.1 Public Consultation on Norwich Area Transportation Strategy Sept 2003

The 'Norwich Area Transportation Strategy: Public Consultation Analysis' (May 2004) highlights the findings from the consultation carried out in September 2003. Approximately 143,000 information brochures and questionnaires were distributed to residents and stakeholders around Norwich, highlighting the preferred strategy for the NATS. The questionnaire and related information was also available for viewing and completion on the Internet. A number of exhibitions and public meetings were held. The consultation had a high response rate of 15%of postal questionnaires in addition to 343 online responses.

The responses indicated a high degree of support for proposed strategy measures, such as improving traffic flow and improving passenger transport. Other proposals, such as introducing access restrictions and stopping traffic driving through the city centre, received a much more mixed reaction. There was a high degree of opposition to the suggestion of both road user charging and workplace parking charging.

The transport improvement measures were prioritised as walking, cycling, public transport, taxis, essential motor vehicles and non-essential vehicles. A large majority of 90.8% of the respondents supported or strongly supported improving traffic flow on the main road network. A strong majority of 91.3% of the respondents supported or strongly supported improving bus, rail and other passenger transport services and 66.4% supported proposed Park & Ride site at Drayton or Taverham.

In relation to the question about measures to reduce through traffic around the north of Norwich, 39.4% of the respondents supported or strongly supported the measures compared to 39.6% of the respondents who were in opposition. A total of 54.5% of the respondents expressed support for access restriction on residential side streets, but 30.9% were opposed or strongly opposed to this idea. The opinion showed that 65.3% of the total respondents supported or strongly supported the idea of small-scale traffic measures in the city centre. The same consultation also illustrated that over half the respondents, 52.2% were in favour of stopping traffic driving straight through the city centre, but 38.7% opposed or strongly opposed this measure with 9.1% of the respondents holding no view or not answering the question.

11.1.4 Public Consultation on Norwich Area Transportation Strategy Oct/Nov 2009

Consultation on an Implementation Plan for NATS was undertaken in October 2009. A questionnaire with related information was distributed to all residents in the NATS area and available for viewing and completion on the Internet. A number of exhibitions and public meetings were also held and a separate questionnaire was distributed to 105 businesses in the NATS area. At the time of writing, analysis of the responses is incomplete and therefore this section provides an indicative overview based on the analysis that has been undertaken to date.

Responses to date indicate that the private car is used for all or most respondents' journeys, but that bus services are also a popular mode for all or most journeys in the area. Question 2 asks participants to indicate which one transport issue in Norwich they felt needed to be improved the most, with 7 potential options provided, to date congestion, bus services and cycling facilities are frequent responses.

The public were also asked to rate measures that they felt would encourage them to cycle more (based on a total of 9 possible options), with initial analysis indicating that more off road and on-road cycle routes are common responses. This would suggest that cyclists feel more protection is required to segregate them from other road users and that existing cycle lane provision should be improved and expanded. This is in line with the results of previous consultation exercises as detailed in section 6.1.

When asked what would encourage increased walking trips, a prevalent response to date is reduced traffic flows in the City Centre which implies that the current levels of traffic in the City Centre are high and are having a negative impact on the number of people walking and using other sustainable means of transport.

Fourteen potential improvements to bus services were also provided and respondents were asked to indicate their top 3 priorities. The improved frequency of buses and improving punctuality are common responses in the questionnaires that have been analysed to date. Typically both of these improvements require a reduction in traffic flows to allow for buses to keep to their timetable and free flowing, whilst other supporting measures such as bus priority signals and bus lanes can also help with achieving these objectives.

In relation to improving traffic flows, question 14 ask how important 3 proposals would be to improve traffic flows in and around Norwich. A common response relates to junction improvements, which suggests that the public strongly perceive junctions in the areas as being congested.

A further questionnaire was sent to 105 businesses in November 2009, a wide variety of businesses were included, with the majority of businesses employing between one and five people in total. Responses to the business consultation are also still been analysed and interpreted and therefore only an indicative overview based on the analysis that has been undertaken to date is provided.

When asked the main weakness of their current location, to date accessibility by road is emerging as a significant issue along with poor public transport links. Transport can have major implications on businesses as it affects access to workplaces by staff, the importing and exporting of goods and how easily customers can access the business (if appropriate). Several businesses that were consulted have stated that they are considering relocating their business and a significant proportion of these have indicated that transport is a major influence.

Question 23 of the business questionnaire focuses on potential interventions and perceived impacts on improving business performance. Interventions, which to date are highly regarded include rail service improvements, bus infrastructure improvements and new traffic technology.

As a conclusion to the questionnaire respondents were invited to make further comments regarding issues raised in the questionnaire. Comments received to date include a desire for areas to be pedestrianised as soon as possible, a lack of city centre parking spaces currently leading to congestion, a lack of direct public transport links from the rail station to the airport and there is felt to be a need for greater accommodation and improved access for disabled people using public transport.

11.2 Future Situation

It is not possible to robustly forecast the likely complaints or feedback that may be received in future years. However, the fundamental increase in background traffic will increase the potential for complaints to be received, particularly relating to congestion. As more of the routes leading to, and within, Norwich become more trafficked, feedback relating to speed may diminish in numbers and comments relating to HGVs and congestion may increase.

In addition, as demonstrated in section 9, the quality of the highways infrastructure has deteriorated in 2008/09 and if this situation continues, the number of complaints relating to the infrastructure may also increase.

11.3 Benchmarking

Data has been obtained from the National Highways and Transport (NHT) Public Satisfaction Survey 2009 for the three comparator counties, NCC did not participate in this survey, however, it is useful to compare data that has been obtained in other surveys for Norfolk with the comparable counties, the East of England and the UK.

The NHT Network was created to allow its members to measure and compare their performance and to share best practice on any aspect of Highway and Transport Service. The NHT survey is based on 7 benchmarking indicators including;

- General – Overall Satisfaction Indicator
- Accessibility;
- Public Transport;
- Walking / Cycling;
- Tackling Congestion;
- Road Safety; and
- Highway Maintenance / Enforcement

Key Benchmark Indicator (KBI) 06 is shown in Table 11.6 and analyses the public's overall satisfaction with local bus services and KBI 08 satisfaction with public transport information.

Table 11.6: Key Benchmark Indicator 06 and 08

Area	Overall satisfaction with public transport (Score out of 100)	Satisfaction with public transport information (Score out of 100)
Norfolk (Annual Customer Satisfaction Survey 2008)	57%	53%
Lincolnshire	55.76	40.90
Cumbria	55.10	47.11
Derbyshire	61.08	50.03

Source: http://nhtsurvey.econtrack.co.uk/Default.aspx and Norfolk County Council's Annual Customer Satisfaction Survey 2008

Table 11.6 shows that Norfolk is theoretically ranked second highest in terms of overall satisfaction with public transport services behind Derbyshire (61.08). In terms of ranking against other NHT authorities in relation to overall satisfaction with local bus services, Derbyshire is ranked highest at 31 out of 76, followed by Lincolnshire at 56 and Cumbria at 57.

In relation to public transport information Norfolk is the highest with 53% followed by Derbyshire 50.03, Cumbria 47.11 and Lincolnshire 40.90. However, based on Norfolk's Annual Customer Satisfaction Survey 2008, 50% of respondents had not seen information provided on local transport services in the last 12 months which suggests this is an area that still needs to be improved.

KBI 17 details overall satisfaction with traffic levels and congestion, both Cumbria and Lincolnshire are within the top 5 County Councils in terms of satisfaction (based on NHT survey), with 78.38 and 76.89 satisfaction rates out of a 100, Derbyshire County Council has a satisfaction rate of 48.07. Based on NCCs Annual Customer Satisfaction Survey at least two thirds said the level of traffic congestion had got worse which would suggest that congestion is more of an issue in Norfolk than in the comparable counties which have satisfaction levels of either 48% or above.

As shown in Table 11.7 KBI 23 analyses the publics overall satisfaction with the Condition of Highways i.e. roads and pavements.

Table 11.7: KBI 23 – Overall satisfaction with the Condition of Highways

Area	Satisfaction (Score out of 100)
Lincolnshire	45.00
Cumbria	36.31
Derbyshire	44.55

Source: http://nhtsurvey.econtrack.co.uk/Default.aspx

All of the comparable counties are between the fairly dissatisfied and neither/nor categories. In Norfolk, results from the Citizens Panel in autumn 2009 show that 50% of residents disagreed with the statement that A and B roads are generally free of potholes and bumps, this rose to 59% for other roads. Based on this evidence it would appear that Norfolk is at a similar level to its comparable counties and that more work is needed to improve road surfaces and reduce the levels of potholes, in particular on minor roads.

11.4 Policy

The main policy requirements which are indirectly linked to this issue are targets in the LTP:

- BVPI 104 Bus satisfaction (Percentage of all users satisfied with the local bus service) is required to rise from 46% in 2003/04 to 62% in 2010/11. The figure for 2007/08 was 56% indicating that there is some improvement to be made on this target.

11.5 Conclusions

Problems and issues identified through public feedback include the following:

- Two thirds of the respondents to the 2008 Annual Customer Satisfaction Survey identified congestion as having worsened in the previous 3 years, and 65% of respondents to the NCC Tracker Data 2009 also stated that congestion had got worse over the previous 3 years. These responses suggest that local residents' perception is that congestion is worsening and that it is a significant issue.
- Half of respondents to the same survey reported that they had not seen information provided on public transport in the previous 12 months, suggesting that promotional measures are not being completely successful;
- Although the proportion of respondents to the Annual Customer Satisfaction stating that they are satisfied or fairly satisfied with local bus services, there was still a 24% response rate for fairly or very dissatisfied with the services;
- When invited to express one change that they would make to improve travel and transport in Norfolk, 30% of people in the Citizens Panel Autumn 2009 surveys responded that they would like improvements to enable people to travel around Norfolk and access services more easily.
- A significant number of complaints from the public recorded by NCC and Norwich City Council, have been received relating to vehicle speed;
- The area between the A140 Aylsham Road and the A1153 Sprowston Road has been identified as a cluster area for complaints relating to speed;
- Public complaints relating to safety are clustered predominantly in the northern suburbs;
- Indicative results from the public consultation for NATS in 2009 identifies congestion, bus services and cycling facilities as the transport issue most cited as requiring improvements in the area;
- In terms of improvements to cycling infrastructure, initial analysis of the NATS consultation indicates that more on- and off-street cycle routes are commonly identified by respondents as being required;

- The public consultation has also found a high rate of response relating to a reduction in traffic flows in the city centre in order to encourage increased walking trips. This would suggest that current traffic levels in the city are high and are having a negative effect on the number of people travelling by sustainable modes of transport.
- Early results from the NATS business consultation carried out in autumn 2009 show that accessibility by road is a significant issue along with poor public transport links.
- Several businesses that were consulted have stated that they are considering relocating their business because of transport issues.
- Comments received to date from the public consultation include a desire for areas to be pedestrianised as soon as possible, a lack of city centre parking spaces, and a lack of direct public transport links from the railway station to the airport.

Overall, the results from a range of consultation exercises have identified a number of key issues perceived by the public in Norwich and Norfolk. It is clear that there is a perception that levels of congestion are high in Norwich. This appears to be corroborated by the findings relating to public transport use also as approximately 25% of respondents have indicated a level of dissatisfaction with service punctuality or frequency. As demonstrated in section 5, poor performance in relation to punctuality is correlated with the absence of bus priority measures on the network.

Although it is not stated explicitly in any of the consultation responses analysed, there is an implication that although the network is congested, levels of dissatisfaction with the public transport, cycling and walking infrastructure is also high. This could mean that car use will continue to be dominant in the area until such a time that travel by sustainable modes of transport becomes more attractive.

12. Summary of Baseline Conditions

12.1 Problems Identified

The following issues have been identified and compiled from the preceding sections of this report.

12.1.1 Conclusions from Section 2: Overview and Context

- The NPA is facing significant levels of growth in housing and commercial and employment development which could result in the population growing by 26% from 280,000 today to 360,000 in 2031, a higher rate than is anticipated in cities comparable to Norwich;
- There has historically been a steady rate of population increase in the NPA meaning that the effects of accelerated population growth have not been experienced;
- Although a large area of Norwich can be reached within a 30 minute walking or cycling journey from the city centre, and 66% of Norwich residents in 2001 worked within 4km of their home, there is a high level of dependence on the private car for both journeys to work (60% of mode share) and for all journeys (65%) ;
- The Travel Plan Survey conducted in 2008 has identified that for those people who do not drive to work, the reliability of their chosen mode of transport was one of the principal reasons for choosing to travel in that way;
- Travel demand into Norwich has historically been high, with over 53,000 people travelling into Norwich to work from outside the District in 2001. This level of travel demand is set to increase significantly with the growth that is required under the RSS.

12.1.2 Conclusions from Section 3: Highway Network

- The NPA has a low standard of highways routes with few sections of modern dual carriageway.
- Norwich has a dense network of urban roads with frequent signalised junctions and pedestrian crossings. Most of these signalised junctions have been introduced within the historic street pattern to preserve the character of the city, which has however, limited traffic capacity.
- The County Council has been concerned about congestion in Norwich for many years and since 1989 has used SCOOT to provide the optimal network conditions within the constraints of the cities highway network.
- Real time systems to improve the performance of public transport have been used by the County Council since the late 1990s.
- Real time 'Intelligent Transport Systems' are being used to provide better information to promote modal choice within the Greater Norwich area.
- Evidence of little change in circulatory flows on sections of both Outer and Inner Ring Roads is an indicator of congested operation of these roads throughout the peak period.
- The presence of congested operation on the highway network has also been evidenced through looking at the 2004 AM peak delay. The greatest delays on the network are evident on the north and northeast sections of the Outer Ring Road and orbital routes running parallel beyond the Outer Ring Road. This information also illustrates the free-flowing nature of the A47 Southern Bypass. In addition, all of the northern radial routes were subject to high levels of delay, even extending to the north of the Outer Ring.
- In the future, the anticipated residential and commercial growth in the NPA will result in the average speed across the whole network being reduced as a result of a greater volume of traffic and a consequent increase in overall delay;
- This growth is also forecast to create a 50% increase in PCU kilometres on the network;

- There is an increase forecast in the average trip length from 17km in 2006 to 18km in the 2016 AM peak and 19km in the 2031 AM peak and 20km in the 2031 PM peak. This latter increase is equivalent to a 14% increase in average trip length over the period;
- Anticipated growth in the NPA is forecast to increase the overall number of trips on the network by 34% from 64,480 trips in the AM peak in 2006 to 86,346 in 2031;
- This forecast increase in trips, as well as the reassignment of traffic from congested junctions to those operating within capacity, result s in a change in the numbers of junctions operating with a V/C over 90% in the future. This has been shown as likely to increase from 9 in the 2006 AM peak, to 16 in 2016 and 28 in 2031;
- The combination of higher traffic levels and the consequent increase in congested working will lead to increased delay for all vehicles on the network, borne out by an increase in journey time on southbound radial routes. The A1067 Drayton Road to the A146 via the city centre takes some 32 minutes in the 2006 AM peak but is set to increase to 39 minutes in the 2031 AM peak, equating to an increase of 20%.

The problems with "Other Roads" are:

- Some roads have a higher than typical peak hour traffic as a proportion of the 12 hour total, suggesting their use as rat runs in peak periods;
- There is some evidence of rat running on roads to the north of the city, in particular on Barkers Lane in Sprowston, which has had two-way traffic flows of 1,428 vehicles recorded in the PM peak and with total peak hour traffic equating to 30% of its 12 hour total, as well as several locations in the west of the city;
- Investigation of small capital works implemented in the area has identified road or personal safety, improving infrastructure and improving accessibility as the principal reasons for these schemes.

12.1.3 Conclusions from Section 4: Private Car

- Public car parks in the city centre are collectively operating close to or at capacity during the week as well as at the weekend;
- During peak periods traffic circulates on the network looking for car parking spaces and with queuing back onto the highway, resulting in congestion in the areas. This has resulted in a need for the appointment of marshals to direct traffic in the city during particularly busy periods;
- With the growth agenda for the NPA there may be pressure to provide further car parks in Norwich to relieve any oversubscription of the existing facilities that may take place, however this is inconsistent with a range of NATS objectives;
- It is evident that the potential effect of the increasing popularity of Norwich as a regional shopping destination in combination with a growth agenda, will be to further increase pressure on parking provision in the city. Norwich City Council has stated that there is no intention to provide additional car parking in the city. Therefore in order to maintain strong policy compliance in relation to current levels of car parking provision in Norwich, it may well be necessary to consider other counteracting measures that can be implemented over the long term.

12.1.4 Conclusions from Section 5: Public Transport

- Bus passenger numbers in Norwich and Norfolk are rising, which is bucking the national trend in many areas where patronage is falling. The introduction of the concessionary travel scheme has played a role in this, reflecting the high proportion of people of pensionable age in Norfolk
- Substantial work is being undertaken in partnership with transport operators to improve the quality and reliability of bus service through initiatives such as the Joint Investment Plan and Punctuality Improvement Partnerships. Whilst these initiatives have brought improvements, scope for further benefits is likely to reduce as the transport network becomes increasingly congested from future growth

- Bus service performance in terms of on-time departures from origin and intermediate bus stops has increased over the period 2006-2009, with performance being significantly better at origin stops compared to intermediate stops. However, these improvements are showing signs of levelling off and on-time performance at intermediate stops remains below 80% for all operators combined
- Bus performance is generally higher during the off-peak when levels of transport are lower. This shows how bus performance varies with traffic levels and suggests improvements in bus service could be delivered through reduced traffic flows
- Roads affected by low average bus speeds coincide with those with high journey time reliability. In general, these roads are radial routes from the north and bus services along these corridors perform worse than those along corridors from other directions. 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
- Increased levels of congestion and journey time variability has resulted in bus operators regularly reviewing their services and increasing journey time. Most recent changes were in December 2009, which resulted in increased journey times of 2-3 minutes and in some cases a reduction in frequency from 15 to 20 minutes. Increased congestion in the future is likely to lead to further increases in journey time, which is likely to hinder modal shift to buses
- Park & Ride services are currently operating below capacity and usage varies between sites. Recent falls in Park & Ride use since 2007 correlate with a general economic decline in the UK
- All Park & Ride routes are affected by links that experience high bus journey time variability, with sites in the north at Airport and Sprowston particularly affected. Proposed future growth and increased congestion will have a detrimental impact on the performance of Park & Ride bus services and the ability of customers to access the site. The attractiveness of Park & Ride will be diminished
- Community transport provides an invaluable service in the NPA by providing flexible transport options for those not able to access conventional transport. However, these services are subject to the same congestion and journey time variability as conventional transport. Demand for these services is currently increasing and forecast growth will increase pressure on these services
- Coach services play an important role in terms of bringing visitors to Norwich and providing access to longer distance destinations and key airports. Inadequate facilities for drop-off and pick-up as well as coach parking have been identified as a problem
- Rail services play an important role in local, regional and longer distance travel and use of rail is increasing, particularly on the local rail network where successful Community Rail Partnerships exist. High passenger loadings and some overcrowding occurs at present and this is likely to worsen with forecast growth along key corridors, such as the A11 corridor and to route to Rackheath
- The main line to London suffers from unreliability, aging rolling stock and slow journey times when compared to other main line routes in the country
- To accommodate new growth, additional services and stations would be required along with associated new rail infrastructure
- Norwich International Airport (NIA) serves a large catchment area and plays an important role in the local and regional economy. It is designated as being regionally significant in the East of England Plan in terms of relieving other airports in the region.
- Whilst passenger numbers at NIA have declined in recent years, of which the downturn in the economy is a factor, new passenger routes are planned for 2010, which should see passengers increase. Passenger throughput by 2013 is estimated to be above 900,000 per annum
- Significant employment is provided at the airport itself and in surrounding business areas. However, strategic access to the airport is poor and future development of the airport site for employment and freight / passenger use will lead to increased congestion on the surrounding highway

Taxis provide an important service within the NPA and provide flexible and accessible transport. However, these services are subject to congestion and journey time variability as conventional transport

12.1.5 Conclusions from Section 6: Walking and Cycling

- The number of cycles crossing an Inner Ring Road cordon has increased significantly since 2001 and there are approximately 2,100 more cycles crossing the cordon per day in 2008 than in 2001
- The proportion of cycles to motor vehicles crossing the Inner Ring Road cordon was 10.2% in 2008, which was the highest recorded over the previous four years
- Cycle usage of dedicated cycle routes has increased by 4-5% per annum over the period 2004-2008
- Cycling accounted for 11% of journeys to work within the NPA and this is an increasing trend. For journeys to school and for all journeys, cycling accounting for 6% and 5% of journeys respectively
- Priority crossing facilities for cyclists are being installed across the NPA but the priority for cycles can be affected by the weight of traffic with less priority being provided where traffic flows are heaviest. Should traffic flows increase in the future, priority for cycling could be reduced
- Key issues and problems identified during previous consultations and surveys include a lack of continuity of the cycle network, lack of cycle paths, one-way systems restricting movements and a lack of adequate cycle parking facilities
- There is a general view that heavy traffic discourages cycling
- There has been an overall increase in the number of pedestrians crossing an Inner Ring Road cordon since 2004. Whilst some of this can be attributed to the opening of the Chapelfield development, there is still evidence that there is growth of around 1% per annum
- Over 99% of pedestrian crossing facilities have facilities for disabled users. Priority given for pedestrians at signalised crossings can be affected by the weight of traffic with reduced priority being provided where flows are heaviest. Should traffic flows increase in the future, priority for pedestrians at crossings could be reduced
- Key issues and problems identified from previous consultations and surveys include safer and better lit footpaths, improved crossing points and the promotion of the health, financial and emotional benefits of walking

12.1.6 Conclusions from Section 7: Freight

- Freight consolidation is being used in the NPA to reduce the number of HGV movements into the city centre
- The highest number of HGV movements within the NPA occurs during the morning peak (up to 200 HGV vehicles), indicating most of the deliveries into Norwich occur at that time
- The greatest concentration of HGV movements during the morning peak occurs on the strategic road network around Norwich, predominantly on the A47. The A11, A140, A146 and junctions onto the A47 also have high numbers of HGV movements during this time period.
- The corridor along the Outer Ring Road from Dereham Road to Salhouse Road junction has high numbers of HGV movements during the morning peak, but not the same quantity as the A47. This is due to the number of manufacturing industrial estates located around this area. There is also a high concentration of HGV movements between Newmarket Road junction and Unthank Road junction.
- HGV movements are at their lowest during the PM peak. All the road networks have a limited number of HGV movements occurring at this time, indicating that very few deliveries occur

12.1.7 Conclusions from Section 8: School Travel Plans

- From investigating issues on routes to school that have been reported to NCC, there are instances of near misses to pedestrian pupils due to excess vehicle speed and lack of visibility;
- There have been ten reports of illegal parking on routes to school which contribute to these near misses and conflict for cyclists.

- A lack of pedestrian crossing facilities close to schools has also been identified as a common problem;
- School buses and public transport are reported to often be late which can be attributed to congested routes to the schools in question; and
- There are few designated cycle routes and often cyclists share bus lanes, which deters pupils from using this mode of transport.

12.1.8 Conclusions from Section 9: Safety

It can be seen from the progress against the LTP targets that there is a strong degree of compliance with policy in relation to road safety. There are therefore no issues relating to the implementation of measures to secure greater policy compliance.

Problems identified from the accident data analysis are:

- The number of fatal accidents has not been subject to the same downward trend as accidents overall in the NPA. NCC has worked hard and been very successful in reducing road casualties across the county, implementing highway improvements within the scope allowable within current highway capacity. Potential to further improve these figures, without significant investment, is limited as many of the low cost options have been implemented;
- There is increased potential for rat running on rural roads in the future to avoid congestion on urban roads. This may increase the number of accidents as rural roads tend to be subject to more accidents than urban roads;
- As traffic levels increase in urban areas, there is potential for more accidents, particularly involving vulnerable users, who may also feel a reduced perception of safety; and
- The principal cause of accidents in the NPA is failure to give way, which resulted in 127 accidents in the 3 year period to 31st December 2008. In urban areas this can be due to red-light running at signalised junctions, or by misjudging vehicle speeds and distances at priority junctions. Reductions in urban traffic facilitated by modal shift or traffic dispersement to appropriate routes would alleviate this problem and avoid conflicts with pedestrians and cyclists.

12.1.9 Conclusions from Section 10: Environment

- The Norwich Policy Area is currently achieving some of the relevant air quality objectives, although AQMAs continue to be present with potential for further sites to be established. Noise caused by flights at the airport and by road traffic has been identified as a source of annoyance.

12.1.10 Conclusions from Section 11: Consultation and Engagement

Problems and issues identified through public feedback include the following:

- Two thirds of the respondents to the 2008 Annual Customer Satisfaction Survey identified congestion as having worsened in the previous 3 years, and 65% of respondents to the NCC Tracker Data 2009 also stated that congestion had got worse over the previous 3 years. These responses suggest that local residents' perception is that congestion is worsening and that it is a significant issue.
- Half of respondents to the same survey reported that they had not seen information provided on public transport in the previous 12 months, suggesting that promotional measures are not being completely successful;
- Although the proportion of respondents to the Annual Customer Satisfaction stating that they are satisfied or fairly satisfied with local bus services, there was still a 24% response rate for fairly or very dissatisfied with the services;

- When invited to express one change that they would make to improve travel and transport in Norfolk, 30% of people in the Citizens Panel Autumn 2009 surveys responded that they would like improvements to enable people to travel around Norfolk and access services more easily.
- A significant number of complaints from the public recorded by NCC and Norwich City Council, have been received relating to vehicle speed;
- The area between the A140 Aylsham Road and the A1153 Sprowston Road has been identified as a cluster area for complaints relating to speed;
- Public complaints relating to safety are clustered predominantly in the northern suburbs;
- Indicative results from the public consultation for NATS in 2009 identifies congestion, bus services and cycling facilities as the transport issue most cited as requiring improvements in the area;
- In terms of improvements to cycling infrastructure, initial analysis of the NATS consultation indicates that more on- and off-street cycle routes are commonly identified by respondents as being required;
- The public consultation has also found a high rate of response relating to a reduction in traffic flows in the city centre in order to encourage increased walking trips. This would suggest that current traffic levels in the city are high and are having a negative effect on the number of people travelling by sustainable modes of transport.
- Early results from the NATS business consultation carried out in autumn 2009 show that accessibility by road is a significant issue along with poor public transport links.
- Several businesses that were consulted have stated that they are considering relocating their business because of transport issues.
- Comments received to date from the public consultation include a desire for areas to be pedestrianised as soon as possible, a lack of city centre parking spaces, and a lack of direct public transport links from the railway station to the airport.

Overall, the results from a range of consultation exercises have identified a number of key issues perceived by the public in Norwich and Norfolk. It is clear that there is a perception that levels of congestion are high in Norwich. This appears to be corroborated by the findings relating to public transport use also as approximately 25% of respondents have indicated a level of dissatisfaction with service punctuality or frequency. As demonstrated in section 5, poor performance in relation to punctuality is correlated with the absence of bus priority measures on the network.

Although it is not stated explicitly in any of the consultation responses analysed, there is an implication that although the network is congested, levels of dissatisfaction with the public transport, cycling and walking infrastructure is also high. This could mean that car use will continue to be dominant in the area until such a time that travel by sustainable modes of transport becomes more attractive.

12.2 Discussion

This report has taken information from a range of sources including information that is contained in existing reports, data from the 1991 and 2001 censuses, personal injury accident data and information obtained from site visits and discussions held with NCC, Broadland District Council, South Norfolk District Council and Norwich City Council.

Norwich has an extensive catchment area in Norfolk and north-east Suffolk. As a regional capital, the city fulfils an important function in the County providing for a range of services as well as being the administrative and operational headquarters for a number of commercial and other organisations. The population of the Norwich Policy Area is approximately 280,000, and is forecast to increase to 360,000 by 2031 as a result of the growth required to be accommodated, as set out in the East of England Plan.

An overview of the characteristics of the Norwich Policy Area demonstrates that Norwich serves a large rural hinterland and exerts a powerful strategic, economic, social and cultural influence over the surrounding market towns and villages and is one of the largest urban areas in the East of England. It is an important focus in the Eastern region for a range of services, housing and the employment centre for the region. Norwich also contains a wide variety of environmental and historical sites of interest which include the most complete medieval street pattern in England with a number of preserved streets and cobbled lanes and more medieval churches than any other city in Western Europe.

Norwich's role as an economic centre for the region has led to its being identified in the RSS as a location for significant growth in housing and commercial and employment development to 2031. This will see the population increase by 29% in the Norwich Policy Area, and will also necessarily lead to a significant increase in the level of travel demand in to Norwich by commuters and shoppers.

However, until recently Norwich has been subject to a steady rate of population growth, meaning that the city has not had to cope with accelerated rates of population growth of the order that are anticipated in the mid-term. There is therefore an implicit question to be asked as to whether Norwich has the capacity in its transport infrastructure to accommodate the anticipated levels of growth.

The existing highway network in the area comprises primary strategic roads which link the NPA with other large regional centres including Cambridge, London, the Midlands and the North. Radial routes emanate from Norwich to surrounding towns and villages including Aylsham, North Walsham, and Wroxham and are predominantly A roads, with some B and C class roads. The main routes that span across these radial routes are the Norwich Outer Ring Road, which forms an orbital route through the main suburban areas around Norwich and the Inner Ring Road which is fully within the main built up area of the city. Other links between the radials include minor residential streets within the city and Outer Ring Road and more rural roads when further from the city beyond the Outer Ring Road.

It has been demonstrated that although the traffic flows crossing both the Inner and Outer Ring Roads have reduced since 1999, traffic flows circulating the city on these roads have not reduced. Several links on these roads are operating at capacity.

The situation in the future, specifically in 2016 and 2031, has been examined using the NATS model and this degree of change which is likely to be brought about by the growth in housing and commercial and employment development has been quantified. It has been clearly shown that the growth will result in an increase in traffic volumes, an increase in average trip length and a decrease in average speed across the network. These factors are indicative of a resultant increase in delay to vehicular traffic across the network, as demonstrated by the fact that the probable number of junctions that will be operating with a V/C (Volume/Capacity) greater than 90% will increase from 9 in 2006 to 28 in 2031.

In relation to the private car, it has been shown that the NPA is subject to moderately lower levels of car ownership than England or its comparable cities. Nevertheless, car use is the dominant mode of transport and the figures relating to car parking use in the city reflect this. The data that has been collected in relation to car park use indicates that the peak traffic is being spread outside of the typical peak hour periods, so that some facilities have peak arrivals period which extends towards 10.00am. It is likely that unless mode shift is achieved in a substantial way, removing a large proportion of vehicle movements from the network, car parks will become oversubscribed in the future.

The situation for public transport has also been investigated. The majority of bus services in the Norwich Policy Area run on radial routes from Norwich, out to the surrounding suburbs, towns and villages. It has

been found that although patronage has risen since 2005/06, in line with the introduction of free concessionary fares, the overall level of service on some routes has been cut since 1999 as a direct result of increasing levels of congestion. The requirement to maximise bus reliability has led to operators increasing their journey times and reducing their frequency so that the buses that do run are more likely to run on time. Further evidence of the impact of traffic levels on the network impacting on bus operation is the increase in journey time variability on routes without bus priority measures in place. In general bus service performance was found to be higher on southern radial routes than on those from the north.

A key aspect of public transport and car parking provision for the Norwich Policy Area is Park & Ride. There are currently six Park & Ride sites located around Norwich, providing slightly less than 5,000 spaces and a bus frequency of approximately every 8-10 minutes between 0700 and 1900 Monday to Saturday. Historically these have been a popular facility but the onset of the recession in 2007 has been a factor in a recent fall in the numbers of people using these sites. However, it is considered imperative that the Park & Ride services are not only maintained but also developed. With this in place the Park & Ride will continue to have a significant role in facilitating mode shift away from the private car for journeys into Norwich.

Data on cycling and walking in the NPA has also been obtained and this has demonstrated that use of both modes has increased in recent years. However, it has also been identified that there are significant issues with the cycling network in Norwich and that the provision of a coherent cycling network based around hard infrastructure would be the measure most sought by both cyclists, and people who do not currently cycle but who could be encouraged to. However, DfT guidance documents clearly state that traffic volume reduction should be the first aspect to be considered when seeking to provide cycling infrastructure. In the case of Norwich, this would probably require the removal of significant levels of traffic on some routes to provide adequate cycle paths and cycle lanes.

Freight is also affected by, and is a contributing factor to, congestion in Norwich, as it has been shown that the locations which are subject to the greatest level of HGV movements in the peak hours are also those which have been subject to the least fluctuation in traffic flows over recent years, and which therefore indicate congested operation.

Further work is required in order to reduce the number of people killed or seriously injured in accidents in order to meet the target for the County of 425 by 2010/11 from the current level of 463 (2007/08). Personal Injury Accident data demonstrates that the incidence of accidents is in decline in the Norwich Policy Area as a whole, with a 15% reduction from 818 accidents in 2002 to 693 in 2008. NCC tackles the issue of casualty reduction by engineering, education, training and publicity. The overall downward trend in the number of accidents would suggest that the Council's work alongside other organisations in the area is successful.

Environmental effects have also been considered, and the Local Transport Plan Delivery Report 2007/08 indicates that the target to reduce carbon dioxide emissions from road transport in Norfolk has currently not met the 2007/08 target of a 4% reduction from the 2004 baseline level (only 2%). Additional monitoring of air quality and noise pollution that has been used in this report generally indicates a reduction in all pollutants for the periods shown and that the levels of pollutants are within objective levels that have been set by national government.

Currently for traffic not wishing to access Norwich, the east/west movement is catered for by the A47 trunk road bypass to the south of the Outer Ring Road. However, the north/south movement is not specifically catered for, therefore traffic from the north and west has to use either radial routes or minor rural roads to access the trunk road network to the east and west of Norwich or stay on principal roads and use the Outer

Ring Road or pass through the city centre to access the trunk road bypass to the south. The lack of accommodation for the north/south movement also contributes to pockets of congestion that are experienced at peak times on the Outer and Inner Ring Roads and has wider implications on other aspects of the transport network as shown in data that has been examined for bus journey time reliability and average journey times.

12.3 Conclusion

Norwich's Inner and Outer Ring Roads are already congested and have been operating with congestion in the peak hours for several years. This report has demonstrated the success of previous NATS strategies, and shown that the Norwich Policy Area has achieved some successes, for example, NCC is on target to meet 16 out of the 18 targets that are set out in Norfolk's Second Local Transport Plan. Additional achievements to date include significantly reducing the level of accidents by 15% from 818 accidents in 2002 to 693 in 2008, increasing levels of public transport usage and achieving a steady reduction in all levels of pollutants.

However the success to date, whilst representing clear evidence of NCC's commitment to promoting and delivering sustainable transport measures, has been achieved in the absence of accelerated population growth, such as that anticipated for the NPA up to 2031. Overall, travel demand is currently very high into the NPA, with over 53,000 people travelling into Norwich from other districts. This level of travel demand is set to rise significantly with the provision of 35,000 new jobs and 33,000 new homes by 2031. How this larger populous chooses to travel into Norwich and around the NPA will depend on personal choice and the choice available.

Bus frequencies have already been reduced, and journey times extended, on several routes in order to provide services that are more reliable, and there is limited carriageway space available to provide the bus priority measures that have been shown to assist in making bus journey times less variable. Mode shift towards rail can only be achieved by significant infrastructure works to accommodate new services. In addition, cyclists and potential cyclists in and around Norwich have specified the lack of a coherent cycling network as a principal difficulty or barrier to cycling in the area.

Provision for HGVs and freight will need to be improved, as these vehicles are already experiencing delay caused by congestion at key junctions on freight routes through Norwich. It is clear from the traffic forecasts for 2031 that some junctions on the A47 to the south of the city, as well as on radial routes to the west, north and east are likely to operate over capacity. This indicates that the connections to the A47 will need to be strengthened in future to prevent these junctions becoming congested, but also to keep traffic within the city moving.

Overall the picture is one of a dense network of urban roads with frequent signalised junctions and pedestrian crossings, introduced within the historic street pattern with limited traffic capacity. Despite successes from Park & Ride and other measures that have been implemented over recent years, the network remains congested and will get worse in the future.

Appendices

Appendix A. Accident Data

Appendix B. Public Complaint Data

Appendix C. Complaint Locations