

**Report to** Norwich Highways Agency committee  
18 July 2013

**Item**

**9**

**Joint Report of** Head of city development services and director of environment,  
transport and development

**Subject** Review of St Augustine's Street Gyratory scheme

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### **Purpose**

The purpose of the report is to update members on the performance of the St Augustine's Street Gyratory scheme which was completed in early 2011.

### **Recommendations**

Members are asked to note the update on the scheme with regards air quality, streetscape/regeneration, traffic issues and accidents.

### **Contact Officers**

Streetscape/regeneration issues: Barry Lloyd, Project Manager – Norfolk County Council (01603 223248)

Transport issues: Bruce Bentley, Principal Transportation Planner – Norwich City Council (01603 212445)

Air quality issues: Mark Leach, Environmental Protection Manager – Norwich City Council (01603 212515)

### **Background Documents**

None

## Report

### Background

1. The funding for the scheme was secured in the 2008/09 financial year. The scheme comprised a traffic management system in the Anglia Square area of Norwich, otherwise known as the St Augustine's Street Gyratory scheme.
2. The £3.585m cost of scheme was mainly from Growth Point and Local Transport Plan allocations with the remainder from highway maintenance budgets and Section 106 funds.
3. The scheme was designed to fulfil a number of objectives, namely to:
  - improve the air quality on St Augustine's Street;
  - contribute to the regeneration of the northern city centre as identified in the Northern City Centre Area Action Plan (NCCAAP);
  - facilitate the redevelopment of Anglia Square by providing a suitable highway link.
4. Construction started in January 2010 with the new gyratory system coming into operation in late November 2010. The scheme was completed in January 2011. A plan showing the scheme is provided in Appendix A.
5. The improvement allowed St Augustine's Street to become one-way northbound with the establishment of a clockwise one-way traffic gyratory scheme based on St Augustine's Street (northbound), Magpie Road (eastbound), and Estelle Street/Edward Street southbound. Construction of a new link road between Edward Street and Pitt Street provided the southbound route for traffic heading towards the inner ring road and the city centre. The scheme included the following specific measures:
  - the construction of the new road linking Edward Street with Pitt Street with a traffic signal junction including pedestrian phases at the western end;
  - modification to the traffic signal controlled junction at St Augustine's Gate, including new pedestrian crossings and separate pedestrian phases at the signals;
  - a new traffic signal junction at Magpie Road / Estelle Street junction (near Heath Road) including pedestrian / cycle phases. The existing 'Toucan' crossing was removed;
  - minor modifications to Magdalen Street / Edward Street signal controlled junction to enable buses to turn left from Magdalen Street into Edward Street;
  - provision of a north/south cycle route between St Crispins and Magpie Road (at Heath Road);
  - landscape measures including a number of street trees;

- streetscape enhancements along St Augustine's Street.

## Air Quality

6. On 1st June 2003, Norwich City Council declared three Air Quality Management Areas (AQMA's) due to exceedance of the annual nitrogen dioxide (NO<sub>2</sub>) objective at Grapes Hill, St Augustine's Street, and the Castle area of Norwich. A further AQMA was declared at Riverside in 2009. More recently a single larger AQMA has been declared across the whole city centre that incorporates all of the previous ones.
7. One of the objectives of the gyratory scheme was to improve the air quality on St Augustine's Street. Air quality issues here were exacerbated by the close proximity of the buildings and the narrow two way road which tended to slowdown the dispersion of traffic pollutants. The scheme improved the situation by reducing the time vehicle spent queuing on the street and minimised the stop-start cycle of traffic along the street. The air quality is measured by determining the amount of NO<sub>2</sub> and the annual mean objective is 40µg/m<sup>3</sup>.
8. Results for the St Augustine's area are now available for 2012, the second full year that the gyratory system has been in operation. The table below details the changes in nitrogen dioxide levels both before and after the opening of the gyratory system in 2011.

Historic Annual Mean Concentrations at 50 St Augustine's Street (µg/m <sup>3</sup> )						
2006	2007	2008	2009	2010	2011	2012
50	52.1	50.9	56.2	55	47.5	51.6

9. As can be seen, the air quality has seen recent improvement on St Augustine's Street. NO<sub>2</sub> levels show a reduction over the two years preceding the opening of the scheme, though the objective has not yet been achieved. It was hoped that the significant improvement shown in 2011 would be continued, though annual variation is normal. Air pollution trends are strongly affected by atmospheric conditions such as temperature, pressure, humidity, and by global circulation patterns, and caution needs to be taken over simple year on year comparisons. A truer picture of the ambient pollution levels will be revealed over the longer term. Three additional monitoring points were added at the start of the scheme to gain a broader picture of air quality in the area. Two of these locations were below the annual objective level in 2012, and one was just above at 41 µg/m<sup>3</sup>.
10. Further details relating to air quality monitoring in Norwich can be found on the Norwich City Council website at:

<http://www.norwich.gov.uk/Environment/Pollution/Pages/AirPollutionAndAirQuality.aspx>

## Streetscape/regeneration

11. The conversion of St Augustine's Street to one-way traffic enabled the footways to be widened, particularly at the southern end of the street. Due to the historical nature and importance of the street, high quality materials were

used in the reconstruction work along here, including conservation kerbing, paving flags in the footway, and block work in the carriageway at the raised and flush crossing points.

12. It was necessary to realign the northern section of Edward Street to enable the right turn from Magpie Street. This provided the opportunity to widen the western footway and plant a number of street trees along here.
13. The design for the new link road between Edward Street and Pitt Street was progressed in discussion with the developer of Anglia Square and as well as providing part of the gyratory, the link road will ultimately provide access from the car park on the redeveloped site.
14. The introduction of the gyratory provided the opportunity to enhance the cycle provision in the area. Sections of off-carriageway cycletrack introduced with the scheme included a link on the north side of Magpie Road between Starling Road and Edward Street, a link on the east side of Edward Street and a link on the southern side of the link road (New Botolph Street) that leads onto the new facility on the east side of Pitt Street and down to St Crispins Roundabout.
15. The streetscape enhancements, particularly on St Augustine's Street have undoubtedly improved the setting of the historical street. The wider footways and additional crossing points have made it a more attractive street for shoppers and other pedestrians. In particular, the new crossings at St Augustine's Gate have provided much needed facilities at this busy junction. The widened footway and soft landscaping on Edward Street have provided improvements along here, when compared to the setting prior to the implementation, with the run-down garage blocks near the Magpie Road junction.
16. The crossing points in the blockwork tables at the southern end of St Augustine's Street and the one by the junction with Sussex Street were constructed using concrete blocks on a rigid base. Although they were constructed using appropriate high strength bedding mortars, there have been localised failures that will require remedial repairs. The extent and method of repairs to the blockwork are still to be agreed but it will be important to ensure that the solution minimises future maintenance visits on this busy 'A' class route.
17. The layout of the cycle Advanced Stop Line at the eastern end of Edward Street by the Magdalen Street junction has been raised as a safety issue and it is proposed to modify this to ensure that buses turning left from Magdalen Street do not overrun the ASL.
18. When Anglia Square is eventually redeveloped, the junction of the old section of Botolph Street with the link road will be removed. It was originally thought that the Anglia Square redevelopment would commence shortly after completion of the gyratory scheme but there is currently little news on the timescale for the private development. Due to the length of time that this interim junction will be in place, it is proposed to provide tactile paving for pedestrians crossing the old section of Botolph Street, in order to bring it up to current disability standards in the interim period.

19. An issue has been raised relating to cars exiting the Anglia Square surface car park via the old section of Botolph Street. Some drivers have been reportedly driving over the New Botolph Street splitter island in order to turn right from New Botolph Street into St Augustine's Street. It has been suggested that installation of some bollards within the splitter island would stop this manoeuvre and avoid potential conflict with pedestrians crossing onto this island rather than the controlled crossings to the west. These bollards would be installed for use in the interim period prior to the redevelopment of Anglia Square and before the old section of Botolph Street and the surface car parks are closed.
20. A request has been made by residents for a new zebra crossing on St Augustine's Street, near the junction with Sussex Street. An assessment was carried out in spring 2013 and this showed that in the afternoon / evening peak with a steady stream of vehicles exiting the city pedestrians found it difficult to cross. Using the standard assessment method for all new pedestrian crossing requests, this site qualifies in the top 3 on the list for a low cost crossing such as a zebra. Funding for such a crossing will be needed through the Local Transport Plan budget. This committee agrees its' priorities for new schemes in November each year and it is anticipated that this site will be recommended for inclusion in the 2014/15 programme.

## **Traffic**

21. Prior to scheme construction, traffic surveys were carried out in the area to measure the traffic levels and speeds. The result of the pre scheme survey is included as Appendix B.
22. Post scheme traffic monitoring was carried out in May 2011 and the results are included as Appendix C.
23. Although there have been some anecdotal comments to the contrary, measured traffic speeds within the limits of the scheme show good compliance within the 20mph speed limits on St Augustine's Street and New Botolph Street. The measured speeds are shown on the plan in Appendix C.
24. Prior to the construction of the gyratory scheme, there was some concern that traffic levels would increase on Sussex Street. However, traffic levels for eastbound traffic have shown only a marginal increase.
25. There have been increases of around a fifth in traffic levels on both Patteson Road and Buxton Road. The majority of the increase is in the westbound, due to the fact that some drivers are cutting through from Waterloo Road to Aylsham Road to avoid driving the length of the gyratory scheme. Increases on Eade Road have been marginal, with less than a 5% variation in traffic levels since the scheme was implemented. However, the number of movements in each direction across the three streets is relatively balanced with 1229 eastbound and 1347 westbound movements.
26. These streets are already traffic calmed, and heavily parked. The only additional measures that would truly impact on through movement would be road closures. However, there is no potential to provide any turning facilities to enable this to happen, and even if there were, a significant amount of on-street

parking would be lost to ensure the turning areas remained available for use. Introducing a 'one-way' system would be partially effective if all the streets were to operate in the same direction, probably west-east, but would almost certainly encourage additional movements in this direction; it is also understood that this approach is not favoured by residents. Some residents have suggested creating a mini-gyratory through these side streets although this would increase traffic levels overall as it would be easier to use the streets as a short cut, being assured of no oncoming vehicles. Eade Road would be likely to suffer a substantial increase in movements. Speeds would also be likely to rise.

27. Consequently, it is not possible to recommend any package of mitigation measures that would successfully reduce traffic on these side streets.
28. There has been a 28% increase in the southbound traffic on Starling Road which indicates that some drivers are using Starling Road to access Magpie Road rather than use the Waterloo/Magpie Road junction. However, the number of northbound traffic movements have fallen considerably, and overall traffic levels on Starling Road are now 27% lower than they were before the scheme was implemented.

### Accident Analysis

29. The analysis of both pre and post scheme implementation accident data was carried out as part of a safety audit in June 2012 i.e. the year after scheme opening.
30. Pre scheme accident analysis for the three year period prior to the scheme are shown in Table 1 below and the raw data is included in Figure 1 in Appendix D.

<b>Table1: 3 years before opening period (01/05/08 to 30/04/11) – 9 recorded personal injury accidents</b>
Accident Trend: A consistent trend was apparent overall, with approximately 3 personal injury accidents per year being recorded.
2 serious, 7 slight. Severity Ratio: 0.22 (cf 12% on built up roads – source RCGB 2010)
1 (11%) wet road surface (cf 23% on built up/non-built up roads – source RCGB 2010) 3 (33%) darkness (cf 25% on built up/non-built up roads – source RCGB 2010) 8 (88%) Vulnerable road users: 6 (66%) Cyclist
Other Factors: All the recorded accidents in this period occurred at junctions, and very high proportion consists of vulnerable road users (pedestrians/cyclists/motorcyclists). Of those vulnerable road users, a high proportion were cyclists.

31. It can be seen from the above pre scheme analysis that:
  - Accident numbers were consistent year on year.
  - Severity was high compared to national figures, although the accident rate was low.
  - Accidents were all occurring at junctions within the study area.

- A very high proportion of the accidents were vulnerable road users and the majority were cyclists.

32. Post scheme accident details were analysed to end of April 2012 as part of the safety audit. The findings are shown in Table 2 below.

<b>Table 2: 1 year after opening period (01/05/11 to 30/04/12) – 3 recorded personal injury accidents</b>
1 serious, 2 slight. Severity Ratio: 0.33 (cf 12% on built up roads – source RCGB 2010)
0 wet road surface (cf 23% on built up/non-built up roads – source RCGB 2010)
0 darkness (cf 25% on built up/non-built up roads – source RCGB 2010)
1 (33%) Vulnerable road users: 1 (33%) Motorcyclist
<p>Other Factors:</p> <p>Two of the three recorded accidents involved young drivers below the age of 24.</p> <p>One of the recorded accidents involved a driver performing an illegal U-turn manoeuvre just after the opening of the scheme; this could be discounted from analysis and considered part of the 'bedding in' process.</p> <p>Another accident occurred at the junction of Magpie Road and Magdalen Road, which although considered part of the study area was not physically altered by the scheme.</p>

33. Since the safety audit, there has been one additional (fatal) accident at the junction of Magpie Road/Heath Road, although the cause of this accident was unconnected to the changes introduced by the gyratory scheme. Figure 2, included in Appendix D, shows the raw accident data for accidents in the area up until the beginning of April 2013. With the latest data, it can be seen that there have been four accidents in the two years since the scheme has been completed, compared with nine in the three year period prior to the scheme opening. Note that there have been no further recorded accidents from the beginning of April 2013 until the end of May 2013.

34. It can be seen from the above post scheme analysis that:

- Proportions of vulnerable users are much lower than before the scheme was implemented.
- Accidents are not grouped at any particular location.
- When full analysis is undertaken, two thirds of the recorded accidents can be attributed to either 'bedding in' of the scheme or occurred at junctions not physically altered by the scheme.

## Conclusions

35. The scheme has generally fulfilled its objectives, has been successful on a number of levels and has generally been well received by stakeholders.

36. Although there is still much room for improvement required to achieve the objective level, on a cautionary basis, the air quality is improved when compared to the pre scheme data. The streetscape changes have provided improvements for all users, particularly for pedestrians with the new crossing provisions; this is particularly noticeable at the St Augustine's Gate junction. The improvements to the built environment and the provision of the soft

landscaping have undoubtedly helped towards the regeneration of this part of the City.

37. The changes to the road network have laid the foundations for the future redevelopment of Anglia Square. The traffic has settled down and there are no major issues with the operation of the gyratory aside from some localised increases on some of the side roads. The post scheme accident figures show that there are no inherent issues with the scheme with regards safety.
38. Regarding the on-carriageway blockwork tables there are issues to consider with this and future schemes, particularly on such a busy route, relating to the cost and frequency of required maintenance and the inevitable disruption to users during their maintenance.

### **Resource Implications**

39. Finance: The minor changes detailed will be paid for by using the residual funds available for the scheme. The costs of repairing blockwork tables within the carriageway will depend on the extent and method of repairs, which is still to be agreed.
40. Staff: None.
41. Property: None.
42. IT: None.

### **Other implications**

43. Legal Implications: None.
44. Human Rights: None.
45. Communications: None.

### **Further references**

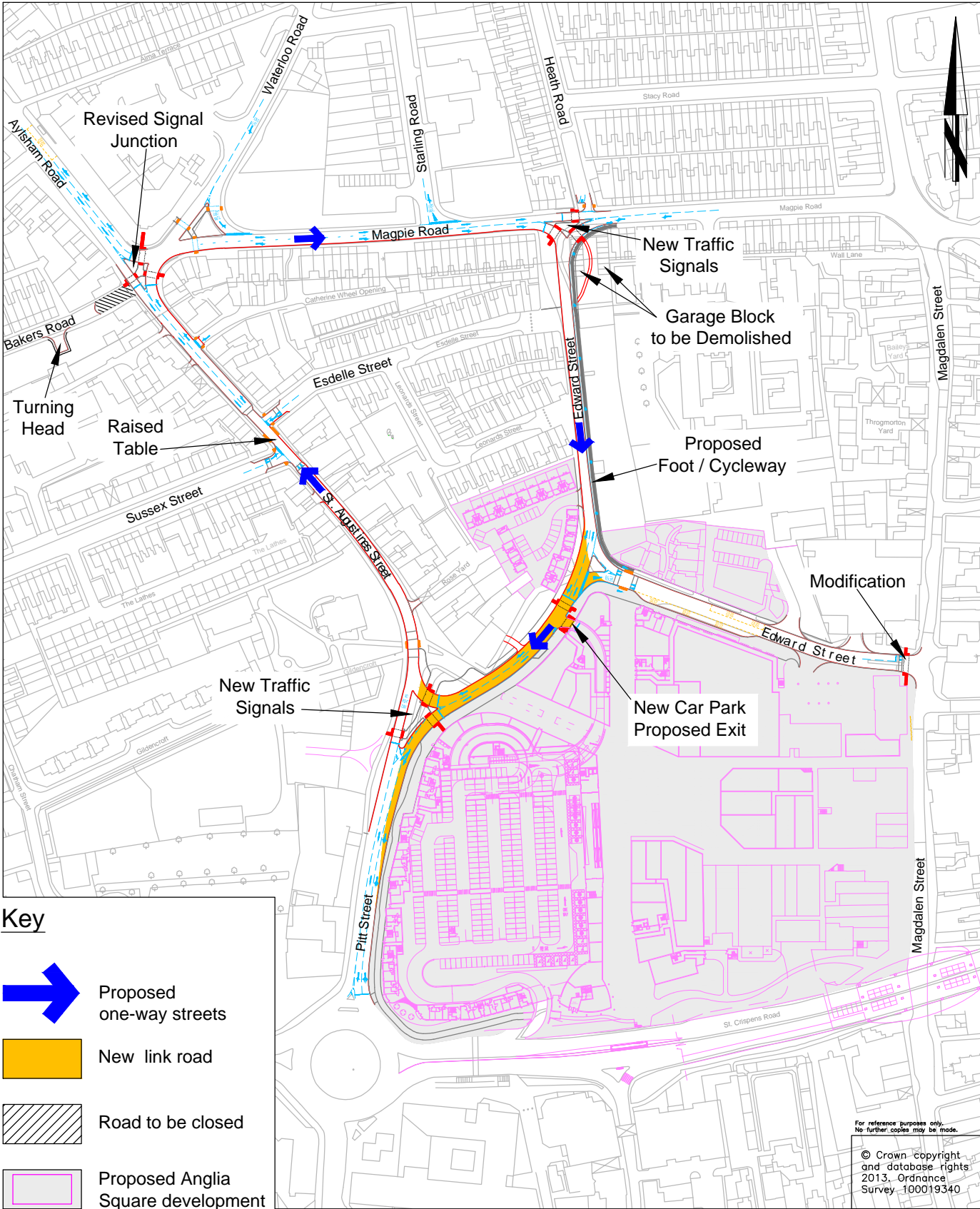
Report to Norwich Highways Agency committee 24 July 2008 on North East Quadrant – Scheme 2 St Augustine's Street Gyratory (Traffic Management Scheme) by the Director of Planning and Transportation and Director of Regeneration and Development

<http://www.norwich.gov.uk/CommitteeMeetings/Norwich%20highways%20agency/default.aspx?InstanceID=38>

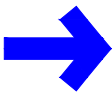
Report to Norwich Highways Agency committee 13 March 2008 on North East Quadrant – Scheme 2 St Augustine's Street Gyratory by the Director of Planning and Transportation and Strategic Director - Regeneration and Development

[http://www.norwich.gov.uk/CommitteeMeetings/Norwich%20highways%20agency/default.aspx?InstanceID=35&Paged=Next&p\\_StartTimeUTC=20070927T090000Z&View=%7b3F5F8060%2d2896%2d4971%2dB5F9%2d328969F477B5%7d](http://www.norwich.gov.uk/CommitteeMeetings/Norwich%20highways%20agency/default.aspx?InstanceID=35&Paged=Next&p_StartTimeUTC=20070927T090000Z&View=%7b3F5F8060%2d2896%2d4971%2dB5F9%2d328969F477B5%7d)





Key



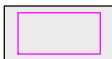
Proposed one-way streets



New link road



Road to be closed



Proposed Anglia Square development



**Norfolk County Council**

working with



DRAWING TITLE

PROPOSALS FOR ST AUGUSTINE'S GYRATORY

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Director of Planning and Transportation  
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REV.	DESCRIPTION	CHECKED	DATE

	INIT.	DATE	DRAWING No. PJ5004-DS-025	
SURVEYED BY	OS	2007	PROJECT TITLE	
DESIGNED BY	BIL	02/08	NORWICH GROWTH POINT	
DRAWN BY	BIL	02/08	ST AUGUSTINE'S GYRATORY	
CHECKED BY	NCS	02/08	SCALE 1:2500	FILE No. PJ5004





**Norfolk** County Council

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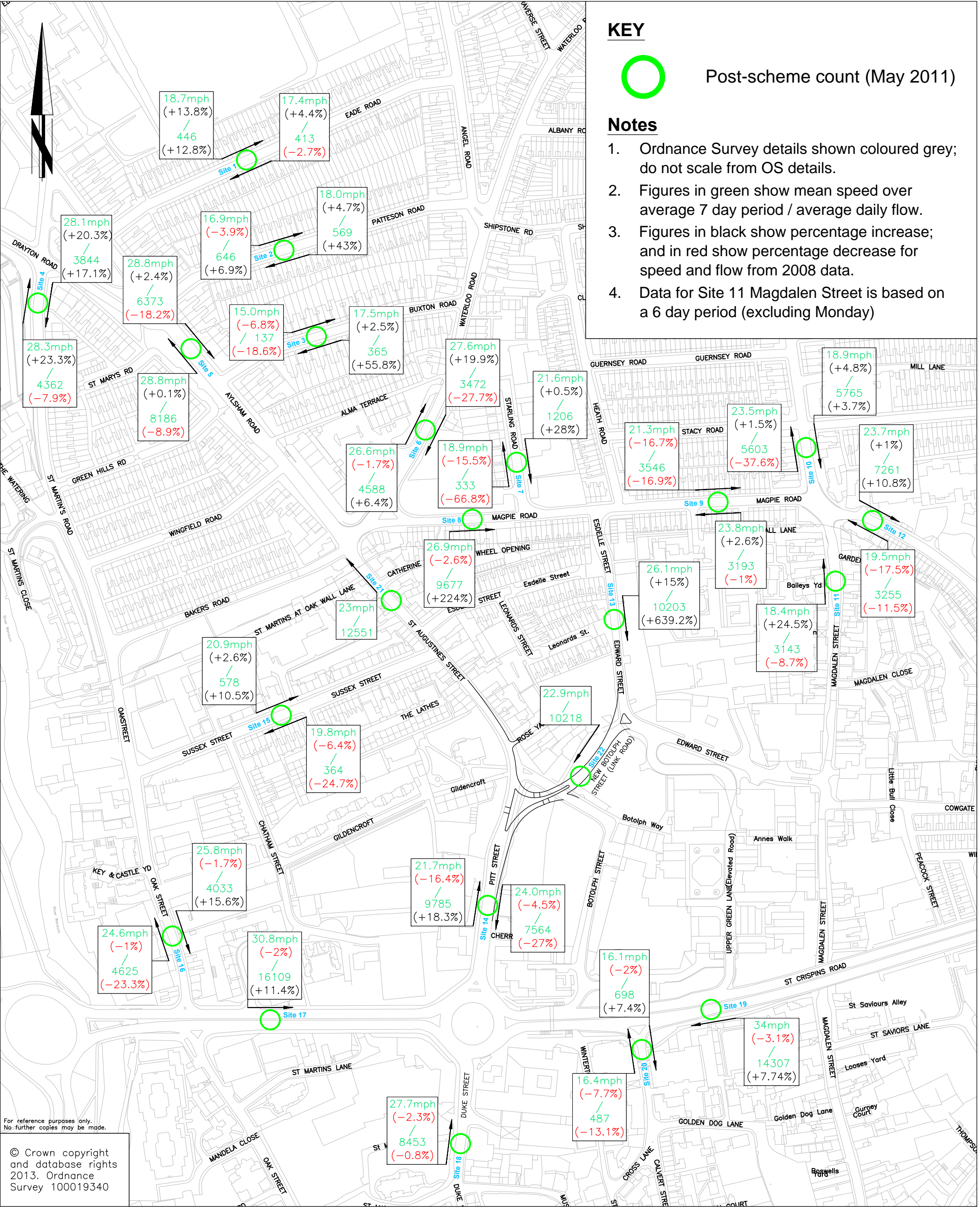
DRAWING TITLE  
PRE SCHEME MONITORING ANALYSIS (APRIL 2008)

Mike Jackson  
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REV.	DESCRIPTION	CHECKED	DATE

	INIT.	DATE	DRAWING No. PJ5004-GP-212
SURVEYED BY	OS	--	PROJECT TITLE NORWICH GROWTH POINT
DESIGNED BY	-	-	ST. AUGUSTINE'S GYRATORY
DRAWN BY	SN	07/11	SCALE
CHECKED BY	BL	07/11	FILE No. PJ5004





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DRAWING TITLE

POST SCHEME MONITORING ANALYSIS (MAY 2011)

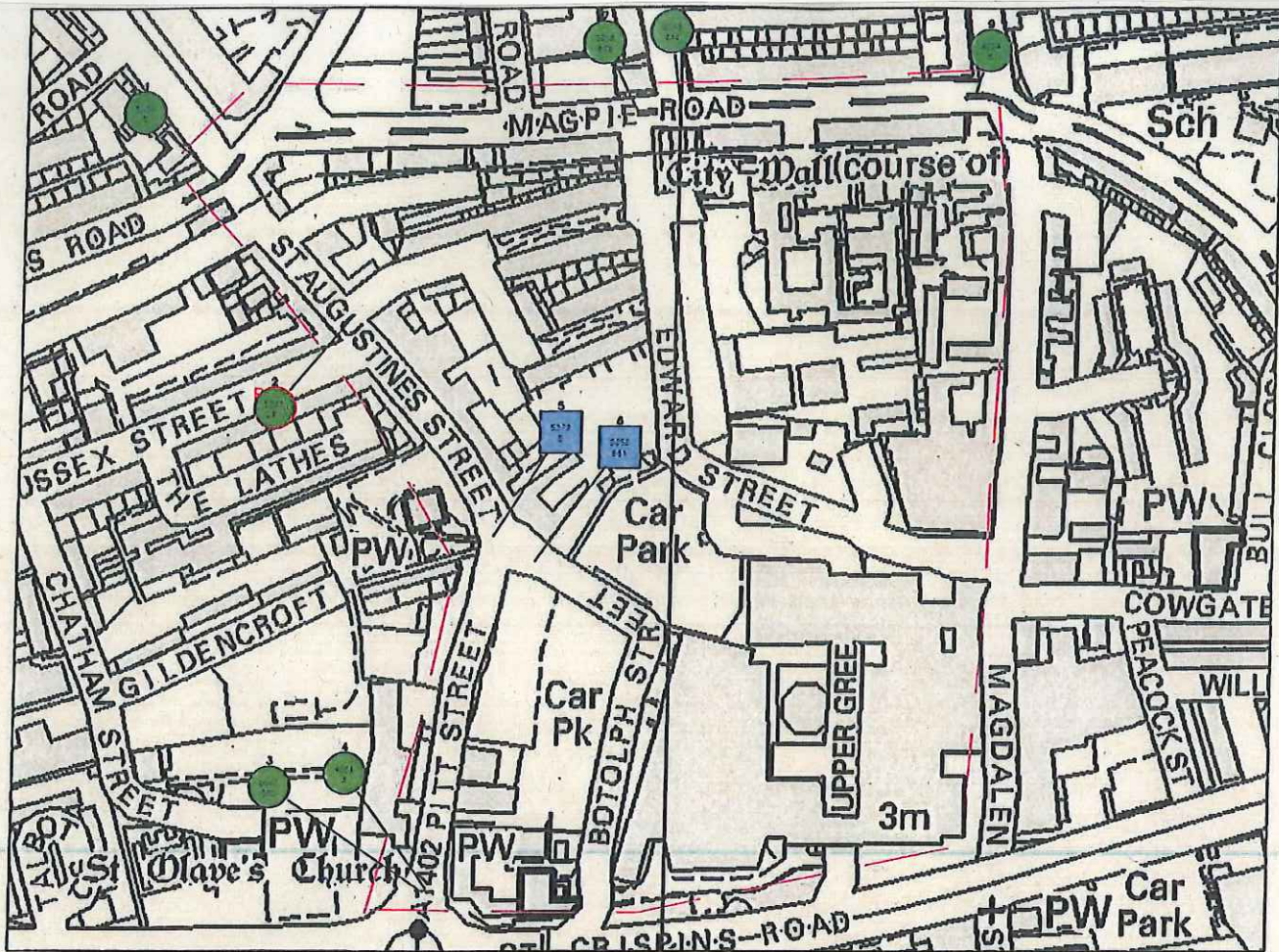
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REV.	DESCRIPTION	CHECKED	DATE

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DESIGNED BY	-	-	ST. AUGUSTINE'S GYRATORY	
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CHECKED BY	BL	07/11	NTS	PJ5004



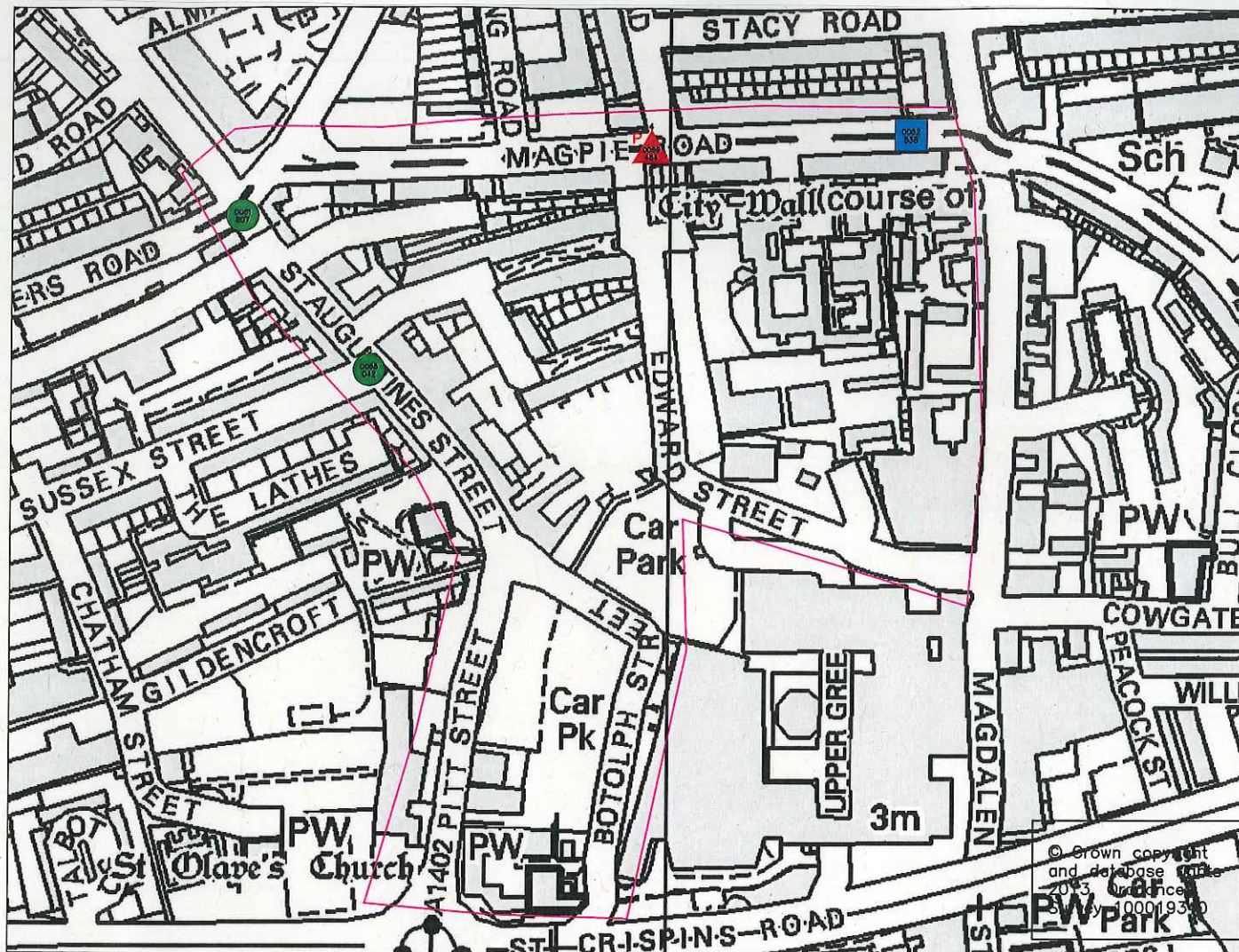
Figure 1: Pre Scheme Implementation Accident Details



Reference Number	1	2	3	4	5	6	7	8	9
Date / Day	5360	5247	0057	4961	5279	0056	0058	0058	4754
Month	6	7	085	3	6	981	863	444	5
Year	Mo21	Th02	Tu22	We03	Th23	Tu22	Su07	We06	Su06
Time	Sep	Jul	Jun	Dec	Jul	Jun	Nov	Oct	Jul
Severity	2009	2009	2010	2008	2009	2010	2010	2010	2008
Dark / Lit	1920	1555	1030	0700	0925	0925	1216	0610	1827
Weather Conditions	SI	SI	SI	SI	Se	Se	SI	SI	SI
Road Surface									
Special Conditions									
Carriageway Hazards									
Vehicle Manoeuvres									
Vehicle	1	5	e						
Vehicle	2	6	t						
Vehicle	3	7	c						
Vehicle	4	8							
Casualty /age									
Failed to Give-Way									
Signal Ignored									
Loss of Control									
Hit Object IN C'way									
Hit Object OFF C'way									
Vehicle Left C'way									
Breath Test									
Contributory Factors	1/2								
	3/4								
* possible, ** very likely	5/6								
School No./Ref.									
User fields:	1								
	2								
	3								
	4								



Figure 2: Post Scheme Implementation Accident Details



Reference Number	1	2	3	4
Date / Day	0061	0062	0065	0069
Month	807	538	042	484
Year	Wed 06	Fri 02	Mon 19	Thu 14
Time	Jul	Sep	Mar	Feb
Severity	2011	2011	2012	2013
Dark / Lit	1900	1700	1010	2019
Weather Conditions	SI	Se	SI	Fa
Road Surface				
Special Conditions				
Carriageway Hazards				
Vehicle Manoeuvres				
Vehicle 1	23	2019	3032	2046
Vehicle 2				
Vehicle 3				
Vehicle 4				
Casualty /age				
Failed to Give-Way				
Signal Ignored				
Loss of Control				
Hit Object IN C'way				
Hit Object OFF C'way				
Vehicle Left C'way				
Breath Test				
Contributory Factors	1/2	1/2	1/2	1/2
	403 305	701 701	302 405	602 409
			406 602	410 803
				806 804
* possible, ** very likely	5/6	5/6	5/6	5/6
School No./Ref.				
User fields:	67	26	26	89
1				
2				
3				
4				