

STRATA HOMES

PROPOSED RESIDENTIAL DEVELOPMENT

LAND AT BURNTWOOD ROAD, GRIMETHORPE

TRANSPORT ASSESSMENT

MT/NWK/VRG/848/HOC

NOVEMBER 2009

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1 INTRODUCTION

- 1.1 Morgan Tucker has been commissioned by Strata Homes to produce a transport assessment in support of a planning application for a proposed residential development at land at Burntwood Road, Grimethorpe.
- 1.2 The format and layout of this report take account of the latest transport assessment guidance, as issued by the Department for Transport in March 2007.

2 EXISTING SITE INFORMATION

2.1 Introduction

- 2.1.1 In order to assess the impact of the residential development proposal to be constructed at Burntwood Road, Grimethorpe, on the transport network surrounding the site, it has been necessary to establish the existing site conditions.

2.2 Site Location

- 2.2.1 A location plan (drawing number **JN848-NWK-001**) confirming the position of the development site within the context of the surrounding area is included in **Appendix A**.
- 2.2.2 The village of Grimethorpe is situated in part of the metropolitan borough of Barnsley in South Yorkshire. The village is located to the east of Barnsley and the south of Hemsworth. The A6195 passes the village to the west, linking the village with the A628 to the north and the A635 to the south, connecting the village to other villages in the locality. The nearest large town is Barnsley to the west, approximately 10 kilometres away. In 2001, the village has a population of approximately 1,800 inhabitants.
- 2.2.3 Grimethorpe is known for its past as a mining village, and for its brass band, the Grimethorpe Colliery Band. In 1981, 44% of Grimethorpe workers were miners working in the two pits Grimethorpe and Ferrymoor. Grimethorpe colliery closed in May 1993. Many of the houses from its coal-mining days have now been demolished, and several regeneration projects have caused fortunes to improve in recent years.

2.3 Existing Land Uses in the vicinity of the Development Site

- 2.3.1 The development site is situated on an area of land to the east of the boundary of the village of Grimethorpe, with Burntwood Road to the north, Ladywood Road to the east, Nancy Road to the south and Cemetery Road to

the west. Nancy Crescent and Road, and the area to the west of Cemetery Road are residential areas. **Plate 1** below highlights the proposed development in context.



Plate 1 – Proposed Development Context

2.4 Existing use of the Development Site

2.4.1 The site is currently vacant, but was previously used for residential purposes.

Plate 2 refers:



Plate 2 – Development Site and Existing Access

2.5 Air Quality

2.5.1 Under the Environment Act 1995, local authorities are responsible for ensuring that air quality standards are not exceeded within their area after 2005. The National Air Quality Strategy sets standards for the eight main air pollutants and objectives for the UK.

2.5.2 Managing local air quality requires local authorities to identify and take action to tackle any local air quality problems from these pollutants. If conclusions point to objectives being exceeded, an Air Quality Management Area (AQMA) must be declared covering the area affected. Action plans must then be drawn up, involving the many different stakeholders, setting out how further objectives are to be achieved.

2.5.3 This development site is not in an Air Quality Management Area.

2.6 Abnormal Usage

2.6.1 At the present time no abnormal loads visit the site and this situation is unlikely to alter as a result of the development.

3 BASELINE TRANSPORT DATA

3.1 Introduction

3.1.1 This chapter firstly describes the character of the surrounding highway network and provides information on recent injury collisions recorded in the vicinity of the development site and baseline 2009 traffic flows from critical junctions in the town within the scope of the assessment.

3.2 Highway Network

3.2.1 The proposed development site is situated to the south of Burntwood Road, to the west of Ladywood Road, to the north of Nancy Road and the east of Cemetery Road.

3.2.2 Burntwood Road is a cul-de-sac, which connects Cemetery Road to the existing development site access and Ladywood Road residential areas and agricultural land to the east of Grimethorpe. The carriageway is approximately 7.4 metres wide and it is traffic calmed through the use of a single speed hump adjacent to the existing development site access. It has a 30mph speed limit and footways of approximately 1.3-1.7 metres in width on both sides of the road, with regularly spaced street lighting columns. **Plate 3** refers:



Plate 3 – Burntwood Road (west)

- 3.2.3 Nancy Road connects to the development site through Nancy Crescent. The carriageway is approximately 8 metres wide and subject to a 30mph speed limit. It has footways of approximately 1.4 – 1.6 metres in width on both sides of the road, with regularly spaced street lighting columns. **Plate 4** refers:



Plate 4 – Junction of Nancy Road and Nancy Crescent

- 3.2.4 Cemetery Road provides a main north-south link in Grimethorpe between residential estates to the south and the High Street. The carriageway is approximately 7.6 metres wide and subject to between 20 and 30 mph speed limit (dependent on whether in the 20 mph safety zone surrounding the school). It has footways of approximately 1.3 metres in width on both sides of the road, with regularly spaced street lighting columns. **Plate 5** refers:



Plate 5 – Cemetery Road (north towards Burntwood Road traffic signal junction)

3.3 Personal Injury Collision Statistics (PICS)

3.3.1 In order to confirm the safety record on the road network within the area of influence of the proposed development site, the personal injury collision statistics for the five year period from January 2004 to September 2009 have been obtained from Barnsley Metropolitan Borough Council.

3.3.2 Analysis of the collision statistics confirms that since January 2004, there have been a total of 3 collisions within the search area which encompasses the area surrounding the development site, to ensure that highway safety is not negatively affected by the newly generated trips. **Tables 1** and **2** refer:

Category	Number of Collisions between January 2004 – September 2009
Slight	3
Serious	0
Fatal	0

Table 1 - Collision Category

Location	Number of Collisions
Coronation Avenue	1
Cemetery Road / Raymond Avenue	1
Cemetery Road / Acorn Way	1

Table 2 – Location of Collisions

3.3.3 **Tables 1 and 2** above demonstrate that there have been few collisions in the last 5 years. Closer inspection of the interpreted listings reveals that the majority of collisions have occurred as a result of pedestrian and cyclist error. For example in more detail:

- B-00973-06 Coronation Avenue – vehicle 1 travelling in the direction of Cemetery Road when a child cyclist pulled out in front of vehicle 1. Vehicle 1 clipped the wheel of the bicycle and the child fell.
- B-00438-08 Cemetery Road / Raymond Avenue – Vehicle 1 a bus set off from the traffic lights when a child on the bus fell and banged his head.
- B-00373-09 Cemetery Road / Acorn Way – Vehicle 1 on Cemetery Road turning right into Acorn Way with a green light, but as the vehicle turned a pedestrian ran into the side of the vehicle.

3.3.4 Based on the information identified in the collision analysis, it is considered likely that the development proposals will not result in a statistically significant increase in the frequency or severity of collisions in the area surrounding the development site. The full listings from both authorities are contained in **Appendix B**.

3.4 Base Traffic Flows

3.4.1 In order to establish the 2009 base traffic flows at the junction of Burntwood Road / Cemetery Road / Acorn Way and the development site access junction, a classified traffic survey was undertaken on Thursday 1st October in

the PM peak (4:00 - 5:30) and Friday 2nd October in the AM peak (7:30 – 9:00). The data is contained in **Appendix C**.

- 3.4.2 The resulting 2009 peak hour base flows for the local road network are illustrated on the summary distribution diagram on drawing number **JN848-NWK-002** contained in **Appendix C**.

3.5 Existing Trip Generation

- 3.5.1 The site is currently vacant, but was previously used for residential purposes.

4 SUSTAINABLE TRANSPORT MODES AND ACCESSIBILITY

4.1 Introduction

- 4.1.1 This chapter discuss in detail access to the development by sustainable modes of travel and how this could be improved through the use of a Travel Plan.

4.2 Pedestrian and Cycling Facilities

- 4.2.1 Walking and cycling have significant roles to play in delivering a more sustainable transport system. Nearly a quarter of all car driver trips are less than 2 miles and 56 per cent are less than 5 miles (DfT, 2008). For some of these journeys, walking and cycling can be a real alternative. Not only does this help reduce congestion and pollution, but it can also improve our health and wellbeing and reduce obesity.
- 4.2.2 PPG13 (paragraph 75) identifies walking as being “the most important mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under 2 kilometres.”
- 4.2.3 The Institution of Highways and Transportation (IHT) publication ‘Guidelines for providing for journeys on foot’ (2000) provides guidance on how to encourage pedestrian travel. Within paragraph 3.3.1 it identifies the following factors as being the main influence on acceptable walking distances: -
- An individual’s fitness and physical ability
 - Encumbrances, e.g. shopping pushchair
 - Availability, cost and convenience
 - Time savings
 - Journey purpose
 - Personal Motivation
 - General deterrents to walking

- 4.2.4 The Guidelines also note that walking accounts for over a quarter of all journeys and four-fifths of journeys less than one mile, (1.6 kilometres). Furthermore, walking is also an essential part of much car and almost all public transport travel, as bus stops are usually accessed on foot. The promotion of sustainable, integrated transport therefore involves providing good pedestrian links to public transport facilities. A drawing is contained in **Appendix D (JN848-NWK-004)** which demonstrates the area accessible within a comfortable 2 kilometre walk distance of the site.
- 4.2.5 A footpath is provided of approximately 1.3-1.7 metres in width on both sides of Burntwood Road, providing a safe pedestrian connection to bus stops on Cemetery Road, local shops and connecting up to the High Street to the north. **Plate 6** refers:



Plate 6 – Typical footway on Burntwood Road

- 4.2.6 Furthermore, within 190 metres to the east of the development site, Burntwood Road provides access to leisure routes, a public footpath and Bridleway. **Plate 7** refers:



Plate 7 – Public Footpath / Bridleway accessible from Burntwood Road

- 4.2.7 A footpath is provided of approximately 1.4-1.6 metres in width on both sides of Nancy Crescent and Nancy Road, providing a safe pedestrian connection to the primary school to the south the development site.
- 4.2.8 The existing development site access also provides for pedestrians with footways approximately 1 metre wide on both sides on the road and street lighting on one side along its length.
- 4.2.9 PPG13 (paragraph 78) identifies cycling as having “the potential to substitute for short car trips, particularly those under 5km, and to form part of a longer journey by public transport.” A drawing is contained in **Appendix D (JN848-NWK-005)** which demonstrates the area accessible within a comfortable 5 kilometre cycle distance of the site.
- 4.2.10 Barnsley Metropolitan Borough Council is keen to promote cycling, and has published a series of cycle guides for the area; however, there is not one available for Grimethorpe at present. **Plate 8** refers:

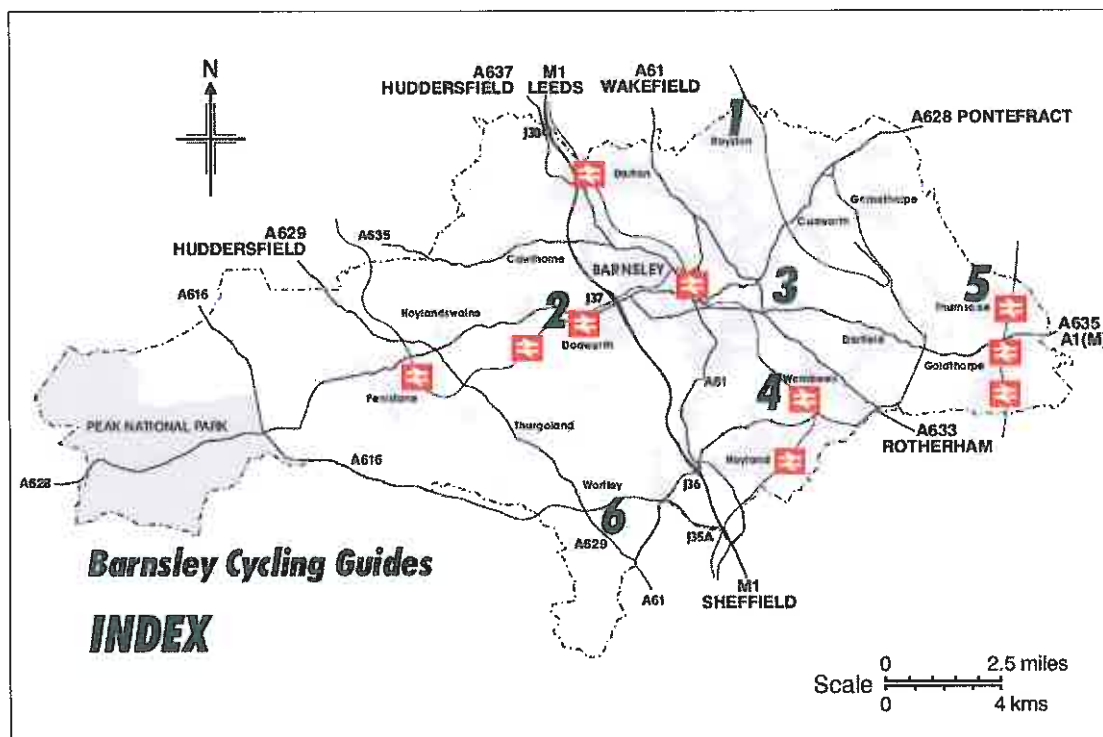


Plate 8 – Barnsley Cycle Network

4.2.11 Grimethorpe's road network is conducive to this with a network of quiet residential roads. The area would benefit from pedestrian/cycle signage to encourage the use of these sustainable modes of travel.

4.2.12 It is proposed that the development will provide cycle parking to meet local standards.

4.3 Passenger Transport Facilities - Bus

4.3.1 An assessment of the existing bus facilities within the vicinity of the proposed development has been undertaken following a site visit on the 1st October 2009.

4.3.2 The development site is well located for access to public transport with bus stops within comfortable walking distance of the development site. The nearest bus stops are the Nancy Road pair, within 153 - 179 metres of the development site. The eastbound bus stop consists of a flag on a street lighting column. **Plate 9** refers:



Plate 9 – Eastbound Bus Stop, Nancy Road

4.3.3 The westbound bus stop consists of a bus shelter and timetable display.

Plate 10 refers:



Plate 10 – Westbound Bus Stop, Nancy Road

- 4.3.4 There are also bus stops on Cemetery Road, within 179 – 190 metres of the development site. The northbound bus stop consists of a bus shelter, and timetable display. **Plate 11** refers:



Plate 11 – Northbound Bus Stop, Cemetery Road

- 4.3.5 The southbound bus stop consists of a post and flag. **Plate 12** refers:



Plate 12 – Southbound Bus Stop, Cemetery Road

4.3.6 A drawing (JN835-NWK-006) is contained in **Appendix D** which confirms the bus stop infrastructure within a 400-metre walk distance of the site.

4.3.7 An assessment of the existing bus services within the vicinity of the proposed development has been undertaken, and route and timetable information has been obtained courtesy of the Yorkshire Traveline website. All bus timetables and routes operating on Nancy Road and Cemetery Road are summarised in **Table 4** below.

	Direction/Route/Operator	Frequency of Service		
		Morning	Daytime	Evening
Monday - Friday	Barnsley – Pontefract 36 Stagecoach	0705, 0815, 0832	0937, 1037, 1137, 1237, 1337, 1437, 1537, 1642	1742, 1914, 2014, 2114, 2214, 2314
Saturday		0832	0937, 1037, 1137, 1237, 1337, 1437, 1537, 1642	1742, 1914, 2014, 2114, 2214, 2314
Sunday		-	1114, 1214, 1314, 1414, 1514, 1614	1714, 1814, 1914, 2014, 2114, 2214, 2314
Monday - Friday	Pontefract – Barnsley 36 Stagecoach	0659, 0759, 0843	0936, 1036, 1136, 1236, 1336, 1436, 1515, 1528, 1536, 1636	1736, 1916, 2016, 2116, 2216, 2316
Saturday		0753, 0840	0936, 1036, 1136, 1236, 1336, 1436, 1536, 1636	1736, 1916, 2016, 2116, 2216, 2316
Sunday		-	1016, 1116, 1216, 1316, 1416, 1516, 1616,	1716, 1816, 1916, 2016, 2116, 2216, 2316

Monday - Friday	Barnsley - Grimethorpe 37A Redline Buses	0807	-	1722
Saturday		-	1520	-
Monday - Friday	Grimethorpe – Barnsley 37A Redline Buses	-	1505	-
Monday - Friday	Barnsley Centre – Hemsworth – Barnsley Centre 38 / 38A Redline Buses	0840	0953, 1053 1159, 1307 1537, 1627	1702
Saturday			0954, 1154, 1412	

Table 4 – Bus Services

4.3.8 The contents of the above tables were correct at the time of printing and clearly illustrate that there are already frequent opportunities for travel around Grimethorpe and neighbouring areas by bus.

5 PROPOSED DEVELOPMENT

5.1 Introduction

- 5.1.1 This chapter will discuss in detail the proposed development site and the impact of new trips generated by the development.

5.2 Proposed Development

- 5.2.1 The proposed development provides 108 residential dwellings, which are a mixture of private and affordable.

5.3 Proposed Parking

- 5.3.1 Car parking spaces will be provided in accordance with government guidance, and specific local guidance.
- 5.3.2 Cycle parking spaces will be provided in accordance with government guidance, and specific local guidance.

5.4 Trip Generation

- 5.4.1 In order to calculate the level of new trips that will be generated by the proposed development, the TRICS 2009 database has been interrogated to provide a statistically valid estimate of the likely rate of trip generation (full information contained in **Appendix E**). A modal split pie chart is contained below to illustrate the potential division of trips via mode. **Plate 13** refers:

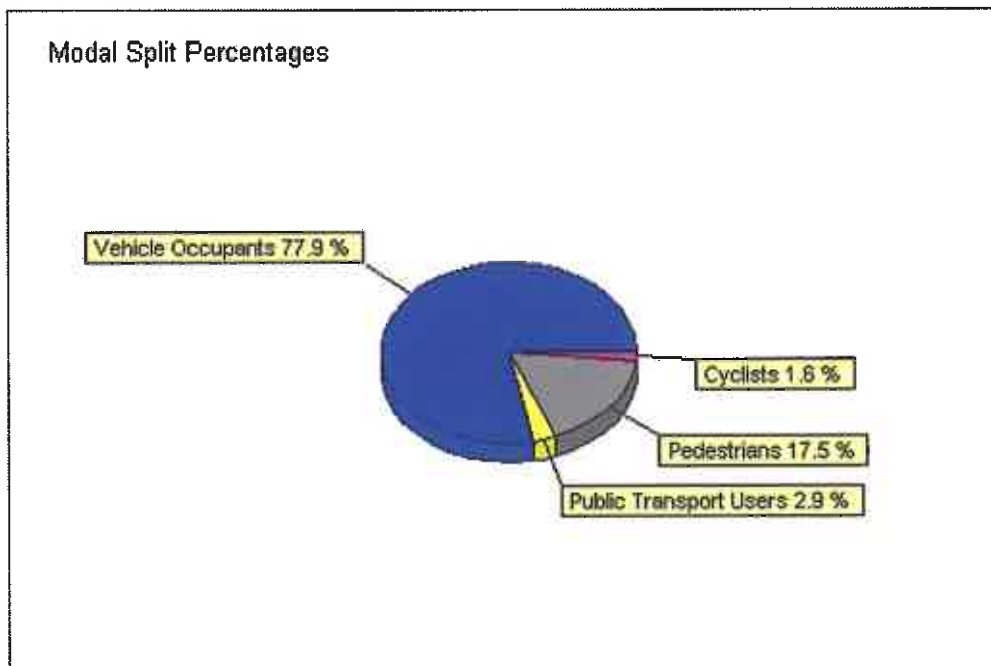


Plate 13 – Residential Development

5.4.2 The resulting trip generations are displayed below in **Table 5** below:

Use	AM Peak Hour (08:00 – 09:00)		PM Peak Hour (17:00 – 18:00)	
	Arrivals	Departures	Arrivals	Departures
Per Dwelling	0.186	0.398	0.372	0.241
108 Residential Dwellings – Vehicles	21	44	42	27
108 Residential Dwellings – Pedestrians	6	25	9	6
108 Residential Dwellings – Cyclists	1	1	1	1
108 Residential Dwellings – Public Transport Users	2	5	2	1

Table 5 – Proposed Trip Generations

- 5.4.3 To summarise, the proposed development would generate a worst case of 65 2-way trips in the AM peak hour and 69 2-way trips in the PM peak hour for an 108 dwelling residential development.

5.5 Census Data

- 5.5.1 The 2001 Census holds the most up-to-date source of data about the population of Grimethorpe, which can be used to check that the trip generations and modal splits we are proposing for this development site are appropriate. Grimethorpe is located in the North East Ward of Barnsley Metropolitan district, a map is contained in **Plate 14** below:



Plate 14 – Census Grimethorpe Area

- 5.5.2 According to the 2001 Census Data, car ownership in Grimethorpe is slightly lower than in Barnsley, with 35% of households without a car compared to only 32% for Barnsley. 43% of households have 1 car in Grimethorpe compared to 44% in Barnsley, and 18% have 2 or more cars compared to 20% in Barnsley. **Plates 15** and **16** below illustrate:

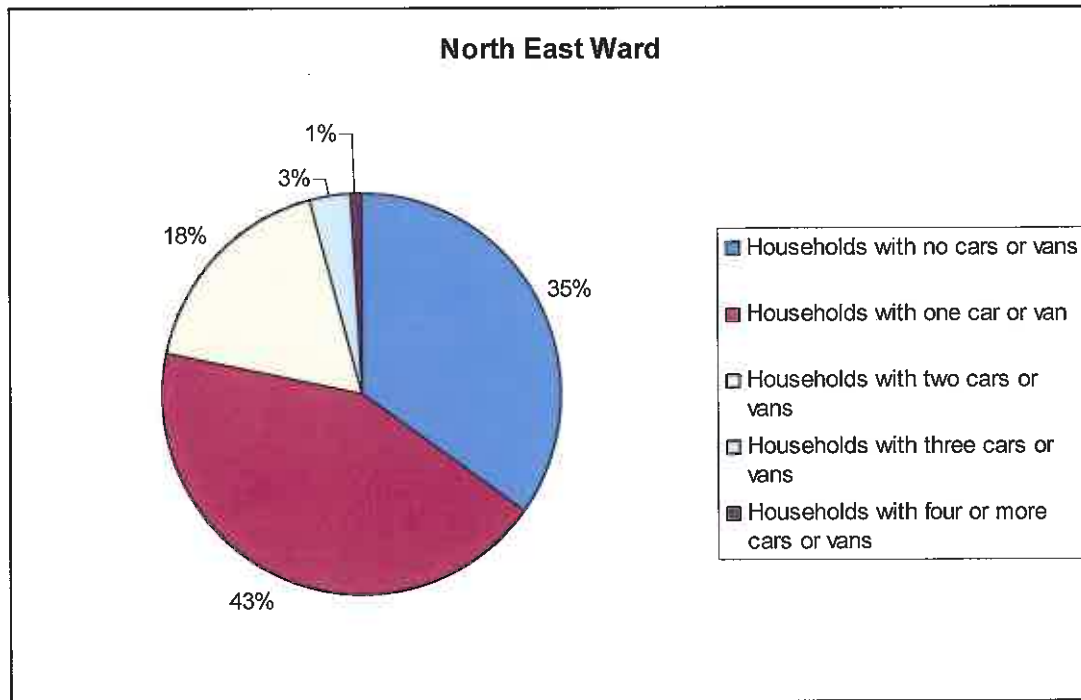


Plate 15 – Car Ownership per household in Grimethorpe (2001 Census)

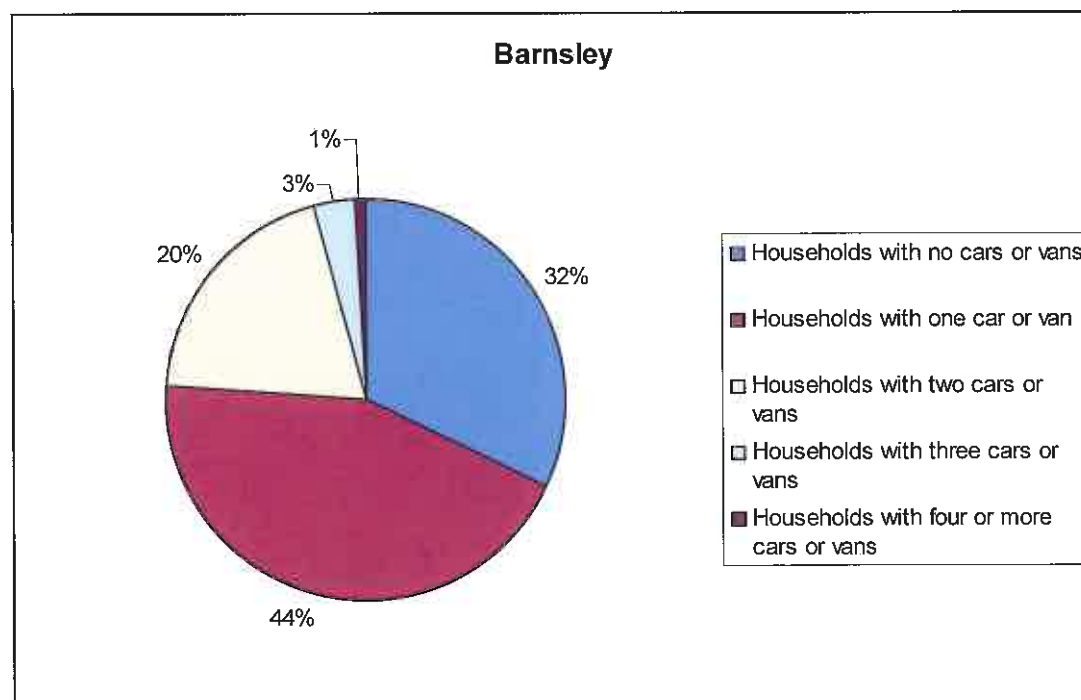


Plate 16 – Car ownership per household in Barnsley (2001 Census)

5.5.3 The impact of car ownership in Grimethorpe is illustrated in **Plate 17** below where car use is by far the most popular mode of travel, with 77% of journeys to work made by people driving or as a passenger in a car. The percentage of

people who travel to work via a sustainable mode of transport such as walking, cycling, and public transport is 9%, 1% and 10% respectively, providing a total of 20% of all journeys.

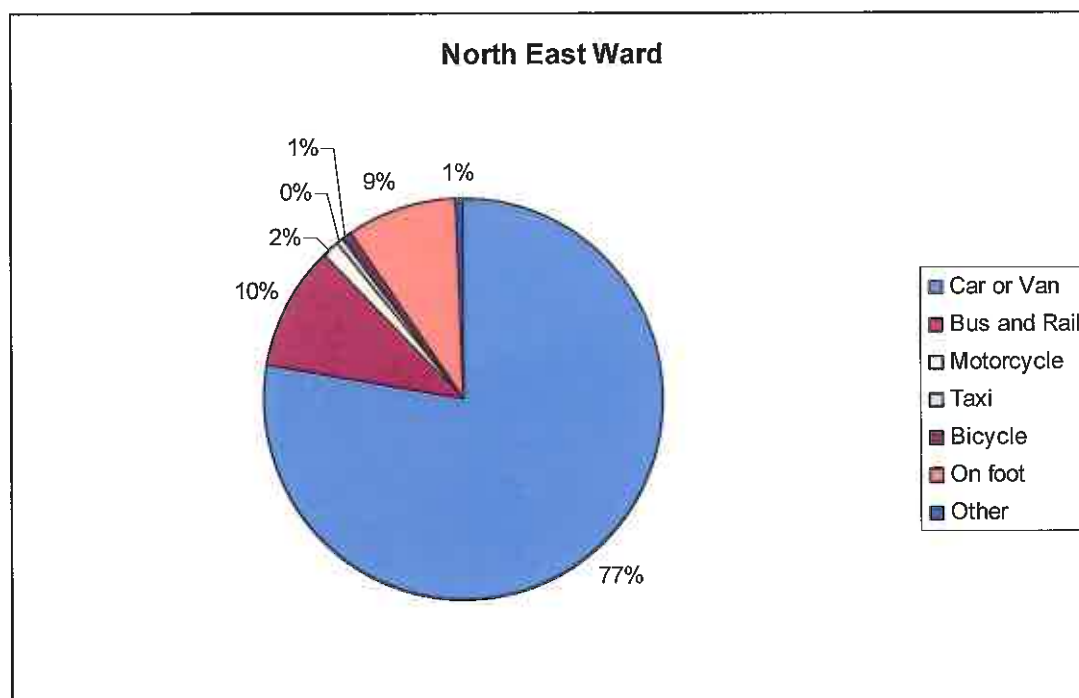


Plate 17 – Travel to Work by Mode by Grimethorpe Residents (2001 Census)

5.5.4 **Plate 18** below demonstrates that the car is slightly less dominant with 76% of people in Barnsley travelling to work made by people driving a car or as a passenger in a car. In turn, the percentage of people who use sustainable travel modes has increased to 23% of the modal split (12% walking, 1% cycling, and 10% public transport).

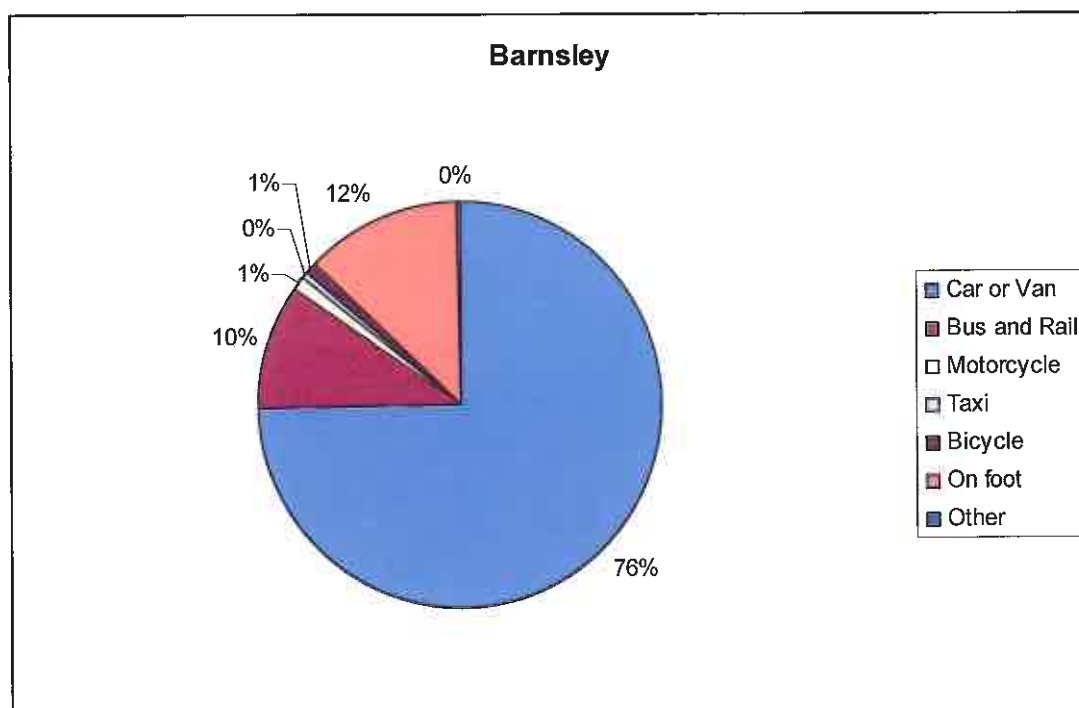


Plate 18 – Travel to Work by Mode by Barnsley Residents (2001 Census)

5.5.5 **Plate 19** below demonstrates that 13% of journeys to work by residents of Grimethorpe are less than 2 km, a comfortable walking distance, and 18% are between 2 and 5 km, so comfortable cycling or public transport distance.

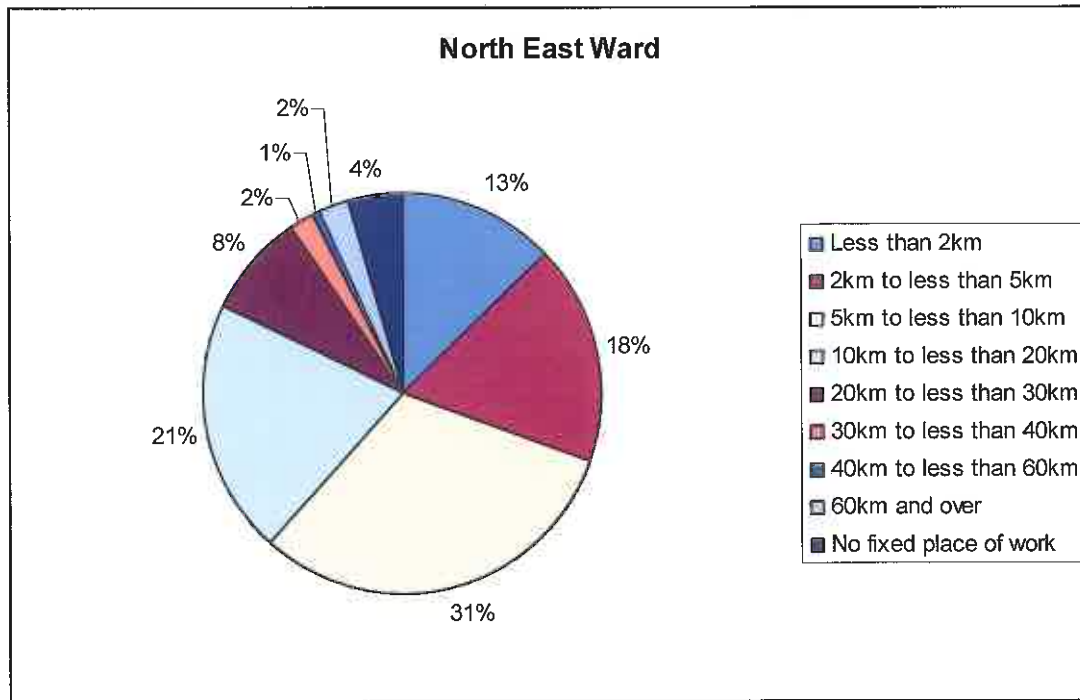


Plate 19 - Distance Travelled to Work by Grimethorpe Residents (2001 Census)

5.5.6 In comparison, **Plate 20** below demonstrates that 23% of journeys to work by Barnsley residents are less than 2 km and 22% of journeys are between 2 and 5 km.

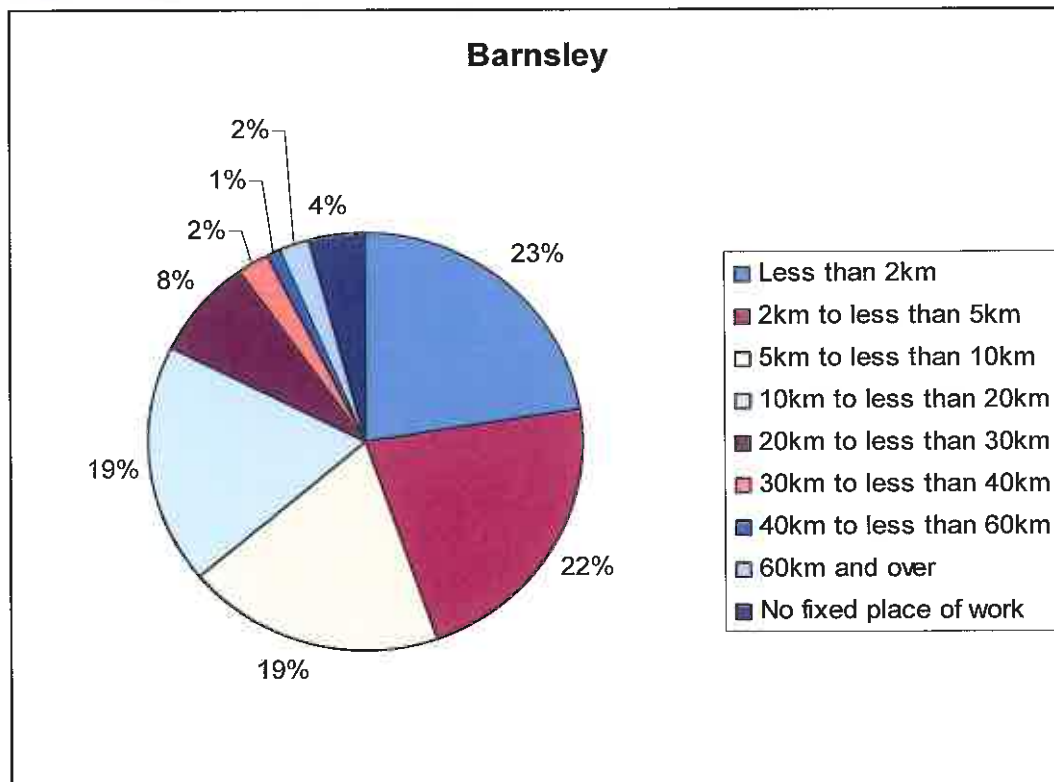


Plate 20 - Distance Travelled to Work by Barnsley Residents (2001 Census)

Conclusion

5.5.7 From the investigations above into the 2001 Census data for Grimethorpe and Barnsley it is likely that the majority of trips generated by the proposed development site will be by car approximately 77%, with sustainable travel modes approximately 20%. This is a similar level to the results of the TRICS investigations; therefore, it is acceptable to use these surveys for estimating the likely trip generations on the local highway network.

5.6 Trip Distribution

5.6.1 Following the investigation into the 2001 Census Data for Grimethorpe, it is still not clear what are the likely origin and destinations of the trips generated to/from the proposed development. A development trip distribution diagram (JN848-NWK-006) illustrating the likely assignment of development traffic is attached at **Appendix F**.

6 IMPACT APPRAISAL

6.1 Introduction

- 6.1.1 This chapter will discuss in greater detail the likely impact of the proposed development site as measured against the government's five objectives for transport (outlined in A New Deal for Transport and A New Deal for Trunk Roads White Papers), applied through the New Approach to Appraisal (NATA).

6.2 Environment

- 6.2.1 Barnsley has four Air Quality Management Areas (AQMA) at present, none of which are applicable to Grimethorpe. As a result of the declaration of the AQMA, the M1 Action Plan has now been published and the Council is developing measures to tackle air pollution in these areas.
- 6.2.2 In terms of environmental impact of the development, the proposal will result in the generation of motorised vehicle trips. However the subsequent improvement of accessibility through transport improvements to provide new linkages such as improvements to public transport, would mediate the impact.

6.3 Safety

- 6.3.1 In order to confirm the safety record on the road network within the area of influence of the proposed development site, the personal injury collision statistics for the five year period from January 2004 to September 2009 have been obtained from Barnsley Metropolitan Borough Council.
- 6.3.2 Analysis of the collision statistics confirms that since January 2004, there have been a total of 3 collisions within the search area. Closer inspection of the interpreted listings reveals that the majority of collisions have occurred as a result of pedestrian and cyclist error e.g. failing to look properly, and ignoring traffic signals.

6.3.3 Based on the information identified in the collision analysis, it is considered likely that the development proposals will not result in a statistically significant increase in the frequency or severity of collisions in this area of Grimethorpe.

6.4 Economy

6.4.1 Plate 21 below demonstrates that out of the people in Grimethorpe who are of an economically active age; 58% are employed full-time, 21% part-time, 10% are self-employed, 3% are full-time students and 8% unemployed.

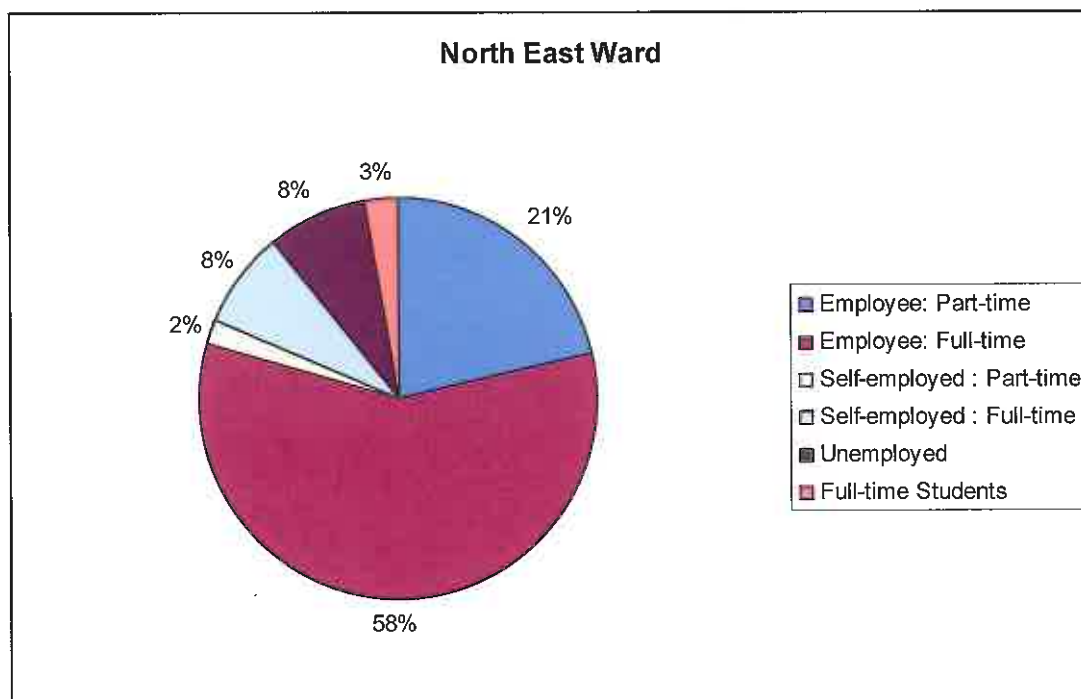


Plate 21 – Economic Activity by Grimethorpe Residents (2001 Census)

6.4.2 Plate 22 demonstrates that the largest percentage of people (20%) work in wholesale and retail, followed by manufacturing (19%), health and social work (13%), and construction (10%).

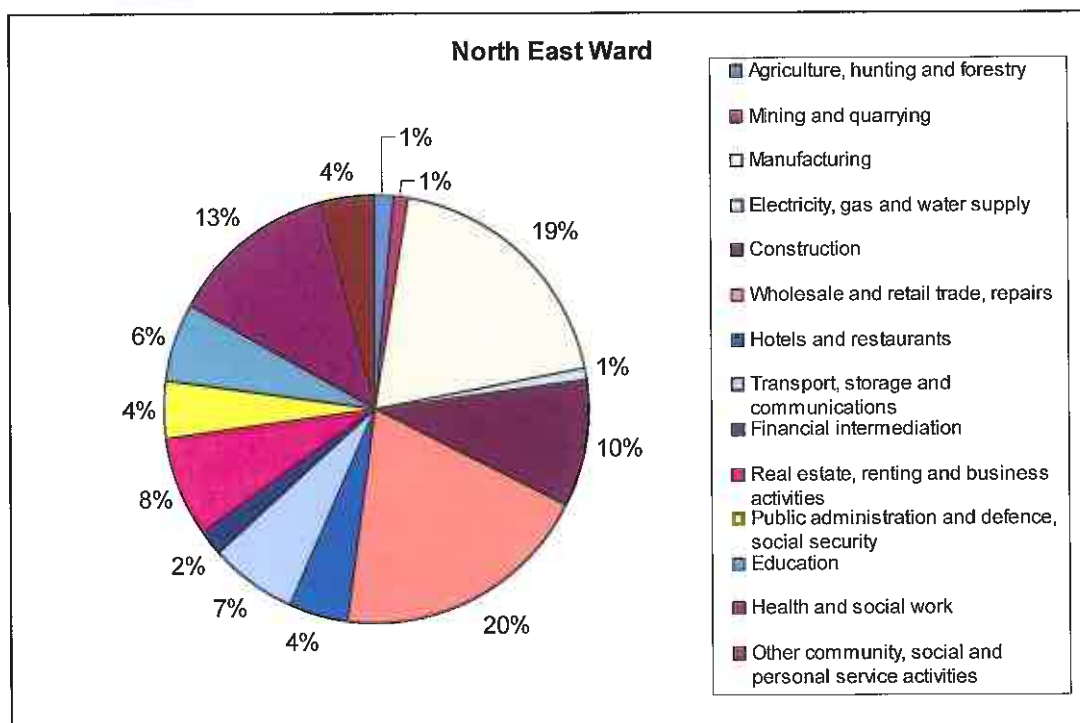


Plate 22 – Employment Industry by Grimethorpe Residents (2001 Census)

6.5 Accessibility

6.5.1 Barnsley's Transportation Service supports Barnsley's vision of a 21st Market Town, to ensure that smaller settlements within the borough become sustainable communities. A good transport network is crucial as a means by which people engage in economic, social and recreational activities. Transport also underpins the business life of Barnsley and connects the many separate strands of life within the borough for example, where people live, work, shop and play; where businesses operate, obtain goods, services and the employees they need to sustain a profitable business. It is the provision of a balanced transport system, which will facilitate Barnsley's vision and ensure accessibility for all its residents.

6.5.2 Barnsley's Transportation Service undertakes the following:

- The preparation, development, monitoring and review of the authority's Transport Strategy
- Securing transportation investment

- Preparation of the authority's input to the South Yorkshire Local Transport Plan
- Preparation of transportation inputs to Council strategies such as the Community Plan, Local Development Framework, Local Area Agreements
- Liaison and joint working with the South Yorkshire Passenger Transport Executive on passenger transport issues such as services, interchanges and shelters

6.5.3 South Yorkshire's Second Local Transport Plan is the Transport Strategy and Action Plan for the next 5 year period (2006/07 – 2010/11). It explains how South Yorkshire as a whole, will address Transport Shared Priorities, which are:

- Tackling congestion
- Addressing accessibility
- Better road safety
- Improving air quality and respecting other quality of life issues

6.5.4 The Plan also sets a longer-term vision of what local transport will look like in the future and identifies how local transport plays a key role in supporting the transformation of South Yorkshire. The plan covers the whole of South Yorkshire, which has an area of 1,552 km² and is home to over 1.2 million residents. It has been prepared as a joint plan by the four Councils in South Yorkshire (Barnsley, Doncaster and Rotherham Metropolitan Borough Councils and Sheffield City Council) and the Passenger Transport Executive.

6.5.5 It provides the evidence that supports analysis of the problems and challenges that South Yorkshire face; and identifies best value for money solutions to transport problems. In addition, LTP2:

- Sets out why local transport policy is important to other aspects, including education, health, leisure, jobs, economic development, environmental issues and land use.
- Explains how transport supports the long term vision to transform the local economy.

- Sets out a strategy that defines how the local transport network can be improved over the next 5 years.
- Explains the targets and indicators against which will be used to measure progress up to 2011.

6.5.6 The South Yorkshire LTP2 contains the Accessibility Planning Strategy in Appendix B. A key requirement for accessibility to improve in the long-term is an effective transport system, especially a healthy public transport market. The Local Transport Plan and its supporting documents develop the shape and quality of the sub-regional transport networks and how these will be managed to serve the economic, social, and environmental development of South Yorkshire. Accessibility Planning complements this, providing a key input and focusing on the:

- Spatial distribution of developments, including housing and employment
- Shape and quality of the local access networks which provide access to facilities and to the core public transport networks
- Accessibility of services provided (e.g. location, opening times, methods of delivery)

6.5.7 In addition to this overarching role, the Accessibility Strategy also aims to provide specific solutions to accessibility issues relating to:

- Geographical areas – the communities of South Yorkshire
- Population groups – with their specific needs, for example the young and old
- Services, jobs and facilities – which people need to live their lives
- Specific developments being considered in Local Authority Local Development Frameworks and those highlighted in Chapter 2 of the Local Transport Plan

6.5.8 The Accessibility Strategy supports the LTP and other shared priority themes as follows

- Road Safety Strategy – Accessibility Planning will complement the focus on accident reduction by placing greater emphasis on safe walking and cycling routes.

- Air Quality Strategy – Accessibility Planning will complement this by encouraging the use of sustainable means to access facilities and services.
- Congestion Strategy – Improving access by sustainable means via improved quality and coverage will help to reduce congestion whilst improving the bus, walk and cycle networks as well as access to the tram and rail networks.

6.6 Policy Integration

Planning Policy Statement 1

6.6.1 Planning Policy Statement 1: Delivering Sustainable Development (PPS1) states that 'Planning should facilitate and promote sustainable and inclusive patterns of urban and rural development'. It is thought that this proposal is in support of PPS1 as it supports the following aims:

- the promotion of urban and rural regeneration...and create new opportunities for the people living in those communities.
- bring forward sufficient land of a suitable quality in appropriate locations to meet the expected needs for housing, for industrial development, for retail and commercial development, and for leisure and recreation.
- provides improved access for all to jobs, health, education, shops, leisure and community facilities, open space, sport and recreation.

Planning Policy Guidance Note 13

6.6.2 The development proposal will also fully support the objectives of Planning Policy Guidance Note 13: Transport (PPG13) through the integration of planning land use and transport in order to help reduce the growth in the length and number of motorised journeys and encourage alternative modes of travel to the private motor vehicle. In particular, this will include the use of an innovative travel plan.

Regional Planning Guidance

6.6.3 The Regional Spatial Strategy the Yorkshire and Humber Plan was published by the Government in May 2008 and now forms part of the Borough's

Statutory Development Plan. The Regional Spatial Strategy sets out the broad development strategy for the Region and covers topics such as housing, economic development, transport, the environment and regeneration. The Yorkshire and Humber Assembly is looking to update the Regional Spatial Strategy to look at housing growth in the Region and explore the infrastructure needed to accommodate this growth.

- 6.6.4 The core approach and spatial vision of the Yorkshire and Humber Plan is for there to be more sustainable patterns and forms of development, investment and activity plus a greater emphasis on matching needs with opportunities and managing the environment as a key resource.
- 6.6.5 Policy YH1 states that how the overall approach and key spatial priorities for the region will be for 'growth and change [to] be managed across places and communities in Yorkshire and Humber in order to achieve sustainable development...'
- 6.6.6 Within the RSS there are policies specifically for housing, the development supports Policy H1: 'The region's housing stock should be improved and increased to provide appropriate accommodation for all households wanting homes'.
- 6.6.7 The Regional Transport Strategy provides a regional framework for the delivery of transport investment and policy priorities to support the aims of the Regional Spatial Strategy. It is considered that this proposal is in support of the Yorkshire & Humber Regional Transport Strategy as the development proposal will be sustainable, and will reduce the need to travel by car; two primary objectives of this region's regional transport strategy. The development site is well located in terms of local bus services, which will enable residents and visitors to access the site, and other local services by alternative sustainable modes of transport other than the private car.

Local Planning Context

- 6.6.8 The Council is required to prepare a Local Development Framework (LDF) in accordance with the Planning and Compulsory Purchase Act 2004. The LDF will replace the Unitary Development Plan as the development plan for the

Borough. Currently consultation is taking place on the Barnsley Core Strategy (Revised Preferred Options), and there are a number of other adopted, draft or supporting LDF Documents: Barnsley Education Sites Development Plan Document (adopted), Barnsley, Doncaster and Rotherham Joint Strategic Waste Development Plan Document, Barnsley Strategic Housing Land Availability Assessment.

6.6.9 In accordance with the 'saved policy' protocol issued by the Secretary of State, Barnsley Metropolitan Borough Council produced a schedule of UDP policies which it intended to save or delete. The Secretary of State has issued a direction approving the schedule, and consequently all UDP policies have been saved with the exception of twenty policies on various topics.

6.6.10 The following 'saved' policies (and excerpts from the policies) are particularly relevant to this development proposal:

- Policy T2 Development and the Highway Network – 'Development will only be allowed if the additional demand for travel generated can be accommodated on the highway network without significant detriment to the environment or the safety and ease of movement of vehicles and pedestrians using the network, or through measures to assist public transport, cycling or walking...'
- Policy T14 Public Transport Access to Development – 'Development proposals will be required to include measures to facilitate access to, and where appropriate, by public transport services'
- Policy T22 Car Parking Standards and Contributions – 'New development shall be provided with no more car parking, servicing and manoeuvring space than is necessary in order to ensure there is no significant adverse impact upon: a) highway safety, b) the local environment...
- Policy T26 Facilities for Cyclists – 'Provision of facilities for cyclists...will be encouraged as an integral part of new developments...'
- Policy T27 Walking – 'The council will seek to encourage and support walking as a mode of transport, and the design and layout of all developments will be required to take account of the needs of pedestrians'.

6.7 Highway Impact

6.7.1 In order to assess the impact of the proposed development on the local highway network, an opening year assessment has been undertaken for 2012. Assessment of a 2017 future year has also been undertaken.

6.7.2 In order to derive the forecast base peak hour traffic flows for the assessment years confirmed above, the existing traffic movements as recorded in the traffic survey have been factored using 1997 NRTF central growth estimates adjusted by TEMPRO to tailor the forecast to local circumstances. The appropriate NRTF adjusted growth factors are identified in **Table 6** below:

	AM PEAK	PM PEAK
2009 – 2012 Opening Year	1.052	1.060
2009 – 2017 Design Year	1.150	1.169

Table 6 - Adjusted NRTF Growth Factors for Assessment Years

6.7.3 The resulting 2012 and 2017 peak hour base (without development) traffic flows for the local road network are illustrated on the summary distribution diagrams on drawing numbers **JN848-NWK-007** and **JN848-NWK-008** in **Appendix G**.

6.8 Operational Assessment

6.8.1 Capacity testing has been confined to the Burntwood Road / Cemetery Road / Acorn Way traffic signal junction. It was not thought necessary to undertake capacity assessments on any further junctions as they were observed (during the survey work) to be operating well within capacity with little evidence of significant levels of congestion/queuing during the peak hours.

6.8.2 LinSig capacity tests have been carried out for various base and future years as detailed below

- 2009 Base
- 2017 Without Development
- 2017 With Development

6.8.3 The full printed output information is contained in **Appendix H** at the rear of the report. The key results from the capacity tests are summarised in **Tables 7 to 9** below.

2009 Base Flows

AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00-18:00)		
Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)
Acorn Way Ahead, Right & Left	12.8	0.8	Acorn Way (East) Ahead, Right & Left	11.1	0.8
Cemetery Road (North) Ahead, Right & Left	5.4	0.4	Cemetery Road (North) Ahead, Right & Left	7.0	0.6
Burntwood Road, Ahead, Right & Left	6.6	0.4	Burntwood, Road, Ahead & Left	2.3	0.2
Cemetery Road (South) Ahead, Right & Left	12.8	1.1	Cemetery Road (South) Ahead, Right & Left	11.3	0.9
Cycle Time – 60 Seconds			Cycle Time – 60 Seconds		
PRC 601.3%			PRC 696.1%		
Total Delay 0.94 PCU/h			Total Delay 0.94 PCU/h		

Table 7 – 2009 Base Flows

6.8.4 This junction is currently controlled by Vehicle Actuation which means that the cycle times will constantly vary throughout the day. On site observations

demonstrated that the average cycle time was relatively low, so a cycle time of 60 seconds was used to model the junction in LinSig.

6.8.5 The LinSig results demonstrate that the four armed cross roads of Acorn Way / Cemetery Road / Burntwood Road is performing well within capacity in the AM and PM peak hours with the Practical Reserve Capacity (PRC) values at 601.3% and 696.1%. This means that any queue forming at the junction will disperse within a cycle.

2017 Without Development

AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00-18:00)		
Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)
Acorn Way Ahead, Right & Left	13.5	0.9	Acorn Way (East) Ahead, Right & Left	12.2	0.8
Cemetery Road (North) Ahead, Right & Left	5.8	0.4	Cemetery Road (North) Ahead, Right & Left	7.9	0.6
Burntwood Road, Ahead, Right & Left	7.5	0.5	Burntwood, Road, Ahead & Left	3.7	0.2
Cemetery Road (South) Ahead, Right & Left	14.2	1.2	Cemetery Road (South) Ahead, Right & Left	12.6	1.0
Cycle Time – 60 Seconds			Cycle Time – 60 Seconds		
PRC 535.3%			PRC 615.9%		
Total Delay 1.03 PCU/h			Total Delay 0.90 PCU/h		

Table 8 - 2017 Without Development

6.8.6 The LinSig results demonstrate that in 2017 with no development the junction will still be performing well within capacity in the AM and PM peak hours, with the PRC values at 535.3% and 615.9%. This demonstrates that there should be no congestion at the junction and that any queue formed should disperse within a cycle.

2017 With Development

AM Peak Hour (08:00-09:00)			PM Peak Hour (17:00-18:00)		
Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)	Link Name	Degree of Saturation (%)	Mean Maximum Queue (PCU)
Acorn Way Ahead, Right & Left	15.4	1.1	Acorn Way (East) Ahead, Right & Left	13.1	0.9
Cemetery Road (North) Ahead, Right & Left	6.4	0.5	Cemetery Road (North) Ahead, Right & Left	11.3	0.9
Burntwood Road, Ahead, Right & Left	14.8	1.0	Burntwood, Road, Ahead & Left	9.0	0.6
Cemetery Road (South) Ahead, Right & Left	15.0	1.3	Cemetery Road (South) Ahead, Right & Left	12.9	1.1
Cycle Time – 60 Seconds			Cycle Time – 60 Seconds		
PRC 485.5%			PRC 584.5%		
Total Delay 1.39 PCU/h			Total Delay 1.18 PCU/h		

Table 9 - 2017 With Development

6.8.7 The LinSig results demonstrate that the development trip generations will not have any significant effect on the junction in 2017. The results have confirmed that the junction will continue to perform well within capacity in the AM and PM peak hours, even with the development with the PRC values at 485.5%

and 584.5%. This means that the junction should not be congested and that any queues formed will clear within a cycle.

7 SUMMARY AND CONCLUSIONS

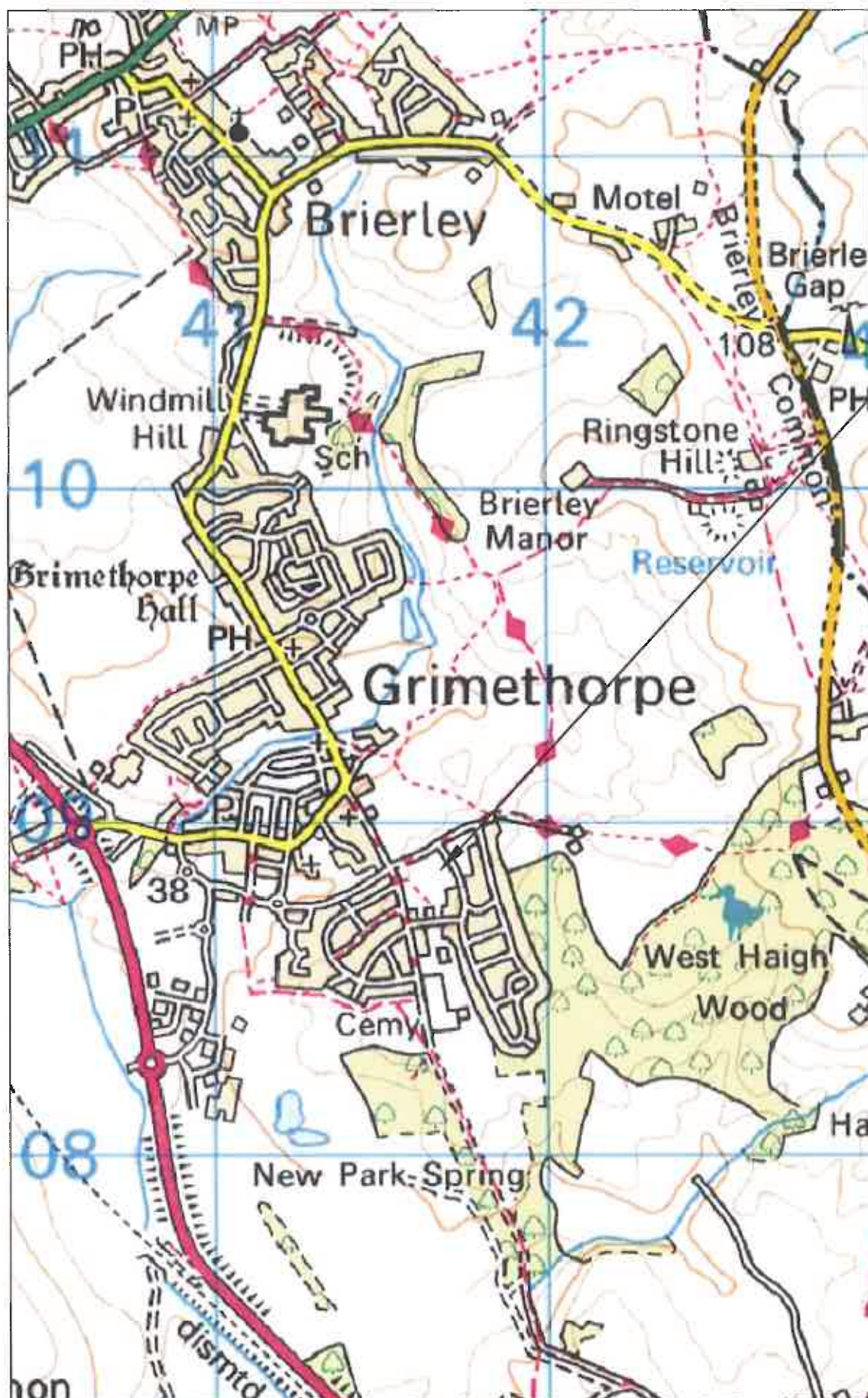
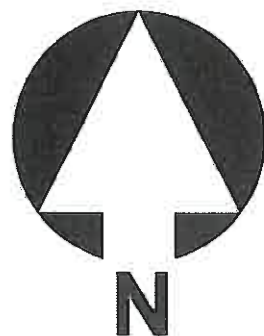
- 7.1 Morgan Tucker was commissioned by Strata Homes to produce a transport assessment in support of a planning application for a proposed residential development.
- 7.2 The format and layout of this report take account of the latest transport assessment guidance, as issued by the Department for Transport in March 2007.
- 7.3 In order to confirm the safety record on the road network within the area of influence of the proposed development site, the personal injury collision statistics for the five year period from January 2004 to September 2009 were obtained from Barnsley Metropolitan Borough Council. Analysis of the collision statistics confirms that since January 2004, there have been a total of 3 collisions within the search area. It is considered likely that the development proposals will not result in a statistically significant increase in the frequency or severity of collisions in the area surrounding the development site.
- 7.4 Analysis of the pedestrian and cycle infrastructure, and bus services in the vicinity of the site confirms that there are realistic opportunities for future residents of the development site to adopt sustainable modes of travel.
- 7.5 The proposed development provides 108 residential dwellings, which are a mixture of private and affordable.
- 7.6 To summarise, the proposed development would generate a worst case of 65 2-way trips in the AM peak hour and 69 2-way trips in the PM peak hour for 108 dwelling residential development.
- 7.7 Car and cycle parking spaces will be provided in accordance with government guidance, and specific local guidance.
- 7.8 Capacity testing has been confined to the Burntwood Road / Cemetery Road / Acorn Way traffic signal junction. It was not thought necessary to undertake

capacity assessments on any further junctions as they were observed (during the survey work) to be operating well within capacity with little evidence of significant levels of congestion/queuing during the peak hours.

- 7.9 The LinSig results confirm that the development trip generations will not have any significant effect on the Burntwood Road / Cemetery Road / Acorn Way traffic signalised junction in 2017. The junction will continue to perform well within capacity in both the AM and PM peak hours.
- 7.10 Accordingly, this proposal is considered to be a good example of sustainable development in accordance with the ethos of PPS1, PPG13 and other local policies.

APPENDIX A

Location Plan



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Client

Strata Homes

Project Title

Land at Burntwood Road, Grimethorpe

Drawing Title

Location Plan

Drawn By
CR

Checked By
VRG

Approved By
BS

Date
8/10/09

Scale
NTS

Purpose
Information

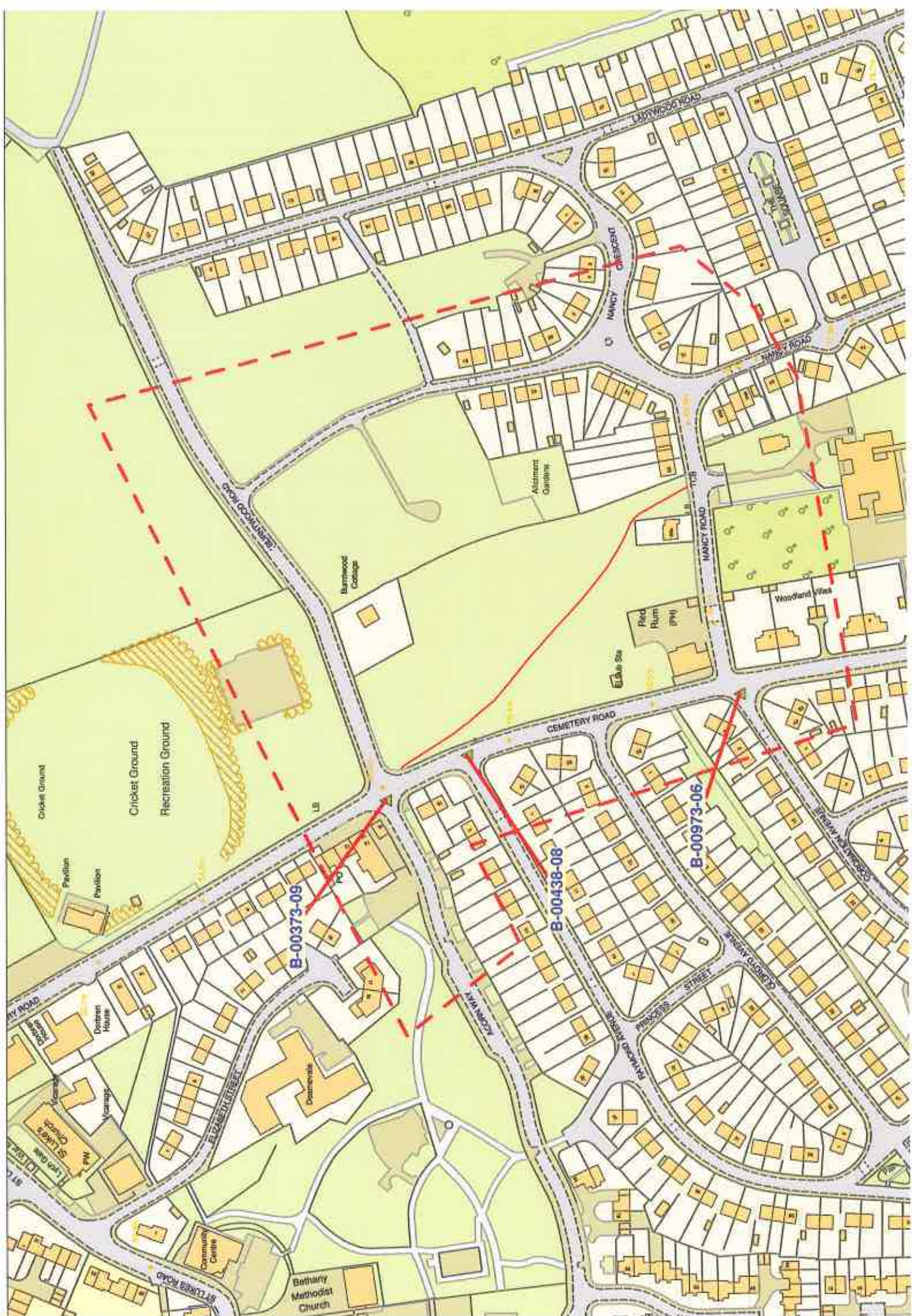
Drawing Number

JN848 - NWK - 001

Rev

APPENDIX B

Personal Injury Collision Data



TRAFFMAP AccsMap - Accident Analysis System	INTERPRETED LISTING	Run on: 07/10/2009
Accidents between dates 01/01/2004 and 07/09/2009 (68) months Selection: Notes: Selected using Pre-defined Query : District - (Barnsley) collision		
B-00973-06	31/07/2006	Monday Time:1848
Easting: 441,569	Northings: 408,672	
Fine without high winds	Road Surface:Dry	Daylight:street lights present
Road Type: Single carriageway	Speed Limit: 30	
Location: CORONATION AVE GRIMETHORPE 10 MTSFROM J/W CEMETERY RD Description:V1 TV CORONATION AVE IN DIRC OF CEMETERY RD WHEN V2(PEDCYC) PULLED OUT IN FRONT OF V1. V1 CLIPPED WHEEL OF V2 CAUSING RIDER TO FALL		
Vehicle Reference1	Car	Going ahead
First point of impact:Front		
Vehicle direction: E to W		Journey: Other/Not known
Age of Driver :		Breath test:Driver not contacted
Contributory Factors : 405		
Vehicle Reference2	Pedal cycle	Going ahead
First point of impact:Back		
Vehicle direction: N to S		Journey: Other/Not known
Age of Driver : 8		Breath test:Not requested
Contributory Factors : 405		
Casualty Reference 1	Age:8	Female Driver/rider
Ped Dir:		Severity:Slight
Ped Location:		Ped Movement : Not pedestrian

TRAFFMAP AccsMap - Accident Analysis System	INTERPRETED LISTING	Run on: 07/10/2009
Accidents between dates 01/01/2004 and 07/09/2009 (68) months Selection: Notes: Selected using Pre-defined Query : District - (Barnsley) collision		
B-00438-08	06/03/2008	Thursday Time:1050
Easting: 441,539	Northings: 408,807	
Fine without high winds	Road Surface:Dry	Daylight:street lights present
Road Type: Single carriageway	Speed Limit: 30	
Location: CEMETERY RD GRIMETHORPE AT J/W RAYMOND AVE Description:BUS SETT OFF FROM TF LGTS WHEN CHILD FELL AND BANGED HIS HEAD.		
Vehicle Reference1	Bus or coach	Moving off
First point of impact:Did not impact		
Vehicle direction: S to N		Journey: Journey as part of work
Age of Driver : 22		Breath test:Driver not contacted
Contributory Factors : 999		
Casualty Reference 1	Age:22	Male Passenger
Ped Dir:		Severity:Slight
Ped Location:		Ped Movement :

Accidents between dates 01/01/2004 and 07/09/2009 (68) months
 Selection:
 Selected using Pre-defined Query : District - (Barnsley) collision
 Notes:
 B-00373-09 03/04/2009 Friday Time:1640 Vehicles 1 Casualties 1 Slight
 Easting: 441,517 Northing: 408,847
 Fine without high winds Road Surface:Dry Daylight:street lights present
 Road Type: Single carriageway Speed Limit: 30

Location: CEMETERY RD GRIMETHORPE J/W ACORN WAY
 Description:V1 ON CEMETERY RD INDICATING R TO TURN L ONTO ACORN WAY, JCT
 CONTROLLED BY ATS PED XING, LIGHTS WERE AT GREEN FOR V1 & AS V1
 BEGAN TO TURN PED RAN INTO SIDE OF V1.

Vehicle Reference1 Car Turning left
 First point of impact:Front
 Vehicle direction: S to N Journey: Other/Not known
 Age of Driver : 30 Breath test:Driver not contacted
 Contributory Factors : 802 810

Casualty Reference 1 Age:15 Male Pedestrian Severity:Slight
 Ped Dir:Pedestrian Di Ped Movement : Driver's nearside
 Ped Location:On Ped Crossing

Accidents involving:

	Fatal	Serious	Slight	Total
Motor vehicles only excluding 2-wheels	0	0	2	2
2-wheeled motor vehicles	0	0	0	0
Pedal cycles	0	0	1	1
Horses & other	0	0	0	0
Total	0	0	3	3

Casualties:

	Fatal	Serious	Slight	Total
Vehicle driver	0	0	0	0
Passenger	0	0	1	1
Motorcycle rider	0	0	0	0
Cyclist	0	0	1	1
Pedestrian	0	0	1	1
Other	0	0	0	0
Total	0	0	3	3

APPENDIX C

Traffic Survey Results

Cemetery Road
(Northbound)

4
52
6
2
46
2

47
54
6
9
1
7

Acorn Way

64
54
1
3
68
56

11
6
20
6
0
4

Cemetery Road
(Southbound)

1
3
0
4
26
14
5
2

Development
Site

Burntwood
Road

08:00 - 09:00 AM Peak Hour
17:00 - 18:00 PM Peak Hour

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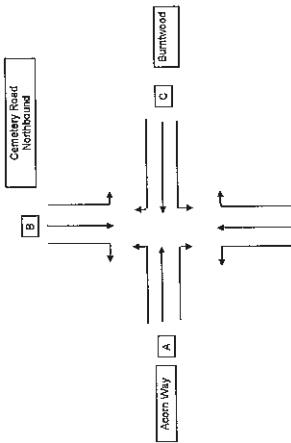
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Client	Strata Homes		Drawn By	CR	Checked By	VRG	Approved By	BS
			Date	8/10/09	Scale	NTS		
Project Title	Land at Burntwood Road, Grimselthorpe		Purpose		Information			
			Drawing Number		JN848 - NWK - 002			
Drawing Title	2009 Base Traffic Flows		Drawing Number		JN848 - NWK - 002			
			License number					



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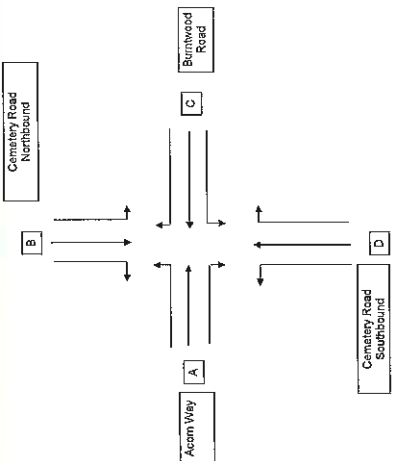
Date of Survey: 1st October 2009

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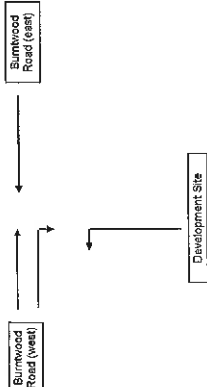
Junction: Cemetery Road / Acom Way / Burnwood Road
Date of Survey: 2nd of October 2009

Time		Movement A to B										Movement B to A										Movement C to D										Movement D to C									
From	To	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL										
7:30	7:45			1			1																																		
7:45	8:00			1			1																																		
8:00	8:15			1			1																																		
8:15	8:30			1			1																																		
8:30	8:45			1			1																																		
8:45	9:00			1			1																																		
9:00	9:15			1			1																																		
9:15	9:30			1			1																																		
9:30	9:45			1			1																																		
9:45	10:00			1			1																																		

Time		Movement C to A										Movement A to C										Movement D to B										Movement B to D									
From	To	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL	Peds	Motor cycle	Bus and Coach	LOW Van	HGV	TOTAL										
7:30	7:45			3			3																																		
7:45	8:00			3			3																																		
8:00	8:15			5			5																																		
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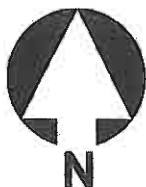


Date of Survey: 1st and 2nd of October 2009

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APPENDIX D

Sustainable Transport Information



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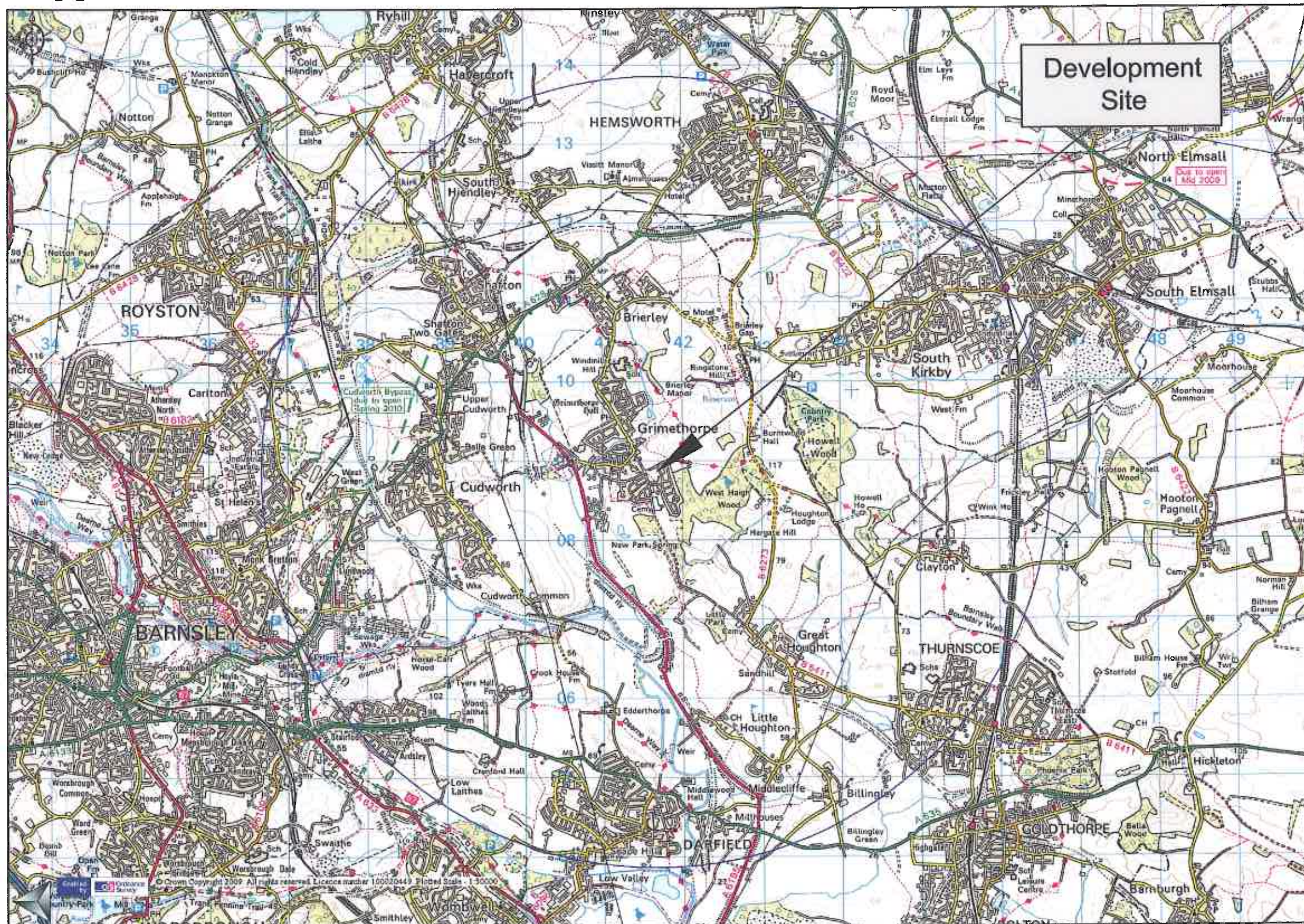
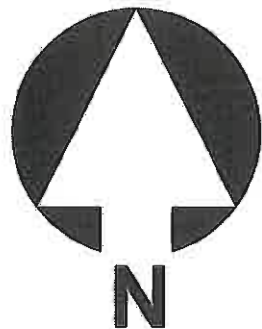
Client	Strata Homes
Project Title	Land at Burntwood Road, Grimethorpe
Drawing Title	2KM Pedestrian Catchment Area

Drawn By	CR	Checked By	VRG	Approved By	BS
Date	8/10/09	Scale	NTS		
Purpose	Information				
Drawing Number	JN848 - NWK - 003	Rev			
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Client		
Strata Homes		
Project Title		
Land at Burntwood Road, Grimethorpe		
Drawing Title		
5KM Cycle Isochrone		
Drawn By	Checked By	Approved By
CR	VRG	BS
Date	Scale	
8/10/2009	NTS	
Purpose		
Information		
Drawing Number		Rev
JN/848/NWK/004		



Key

Bus Stop ●

Development Site

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Rev	Amendment	Date
-----	-----------	------

Client Strata Homes	Drawn By CR	Checked By VRG	Approved By BS
Project Title Land at Burntwood Road, Grimethorpe	Date 8/10/09	Scale NTS	
Drawing Title 400m Public Transport Isochrone	Purpose Information	Drawing Number JN848 - NWK - 005	Rev
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APPENDIX E

TRICS Outputs

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL VEHICLES

- Selected regions and areas:**
- 05 EAST MIDLANDS**
 - DS DERBYSHIRE 1 days
 - LE LEICESTERSHIRE 1 days
 - LN LINCOLNSHIRE 1 days
 - 06 WEST MIDLANDS**
 - ST STAFFORDSHIRE 1 days
 - WM WEST MIDLANDS 3 days
 - WO WORCESTERSHIRE 3 days
 - 07 YORKSHIRE & NORTH LINCOLNSHIRE**
 - NY NORTH YORKSHIRE 3 days
 - 08 NORTH WEST**
 - CH CHESHIRE 2 days
 - GM GREATER MANCHESTER 1 days
 - LC LANCASHIRE 1 days
 - 09 NORTH**
 - CB CUMBRIA 3 days
 - TW TYNE & WEAR 1 days

Filtering Stage 2 selection:

Parameter: Number of dwellings
 Range: 10 to 150 (units:)

Public Transport Provisions:

Selection by: Include all surveys

Date Range: 01/01/00 to 24/04/09

Selected survey days:

- Monday 4 days
- Tuesday 7 days
- Wednesday 3 days
- Thursday 3 days
- Friday 4 days

Selected survey types:

- Manual count 21 days
- Directional ATC Count 0 days

Selected Locations:

- Edge of Town Centre 1
- Suburban Area (PP56 Out of Centre) 8
- Edge of Town 11
- Neighbourhood Centre (PP56 Local Centre) 1

Selected Location Sub Categories:

- Residential Zone 17
- No Sub Category 4

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLES

Calculated factor: 1 DWELLS

Estimated TRIP rate value per 112 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

ARRIVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	Estimated Trip Rate
00:00 - 01:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
01:00 - 02:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
02:00 - 03:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
03:00 - 04:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
04:00 - 05:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
05:00 - 06:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
06:00 - 07:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
07:00 - 08:00	21	63	0.072	21	63	0.271	10.361	21	63	0.343	30.457
08:00 - 09:00	21	63	0.186	21	63	0.388	44.530	21	63	0.584	65.361
09:00 - 10:00	21	63	0.206	21	63	0.256	24.398	21	63	0.442	49.422
10:00 - 11:00	21	63	0.172	21	63	0.183	20.484	21	63	0.354	44.108
11:00 - 12:00	21	63	0.211	21	63	0.192	21.506	21	63	0.412	46.133
12:00 - 13:00	21	63	0.220	21	63	0.192	21.506	21	63	0.401	44.952
13:00 - 14:00	21	63	0.225	21	63	0.192	21.506	21	63	0.431	48.325
14:00 - 15:00	21	63	0.225	21	63	0.192	21.506	21	63	0.431	48.325
15:00 - 16:00	21	63	0.171	21	63	0.270	30.277	21	63	0.503	56.458
16:00 - 17:00	21	63	0.340	21	63	0.241	24.205	21	63	0.564	63.168
17:00 - 18:00	21	63	0.372	21	63	0.222	24.988	21	63	0.613	68.651
18:00 - 19:00	21	63	0.246	21	63	0.192	21.506	21	63	0.508	56.938
19:00 - 20:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
20:00 - 21:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
21:00 - 22:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
22:00 - 23:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
23:00 - 24:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
TOTAL			2.030			2.889	317.004			5.679	636.157

Parameter summary

Trip rate parameter range selected:
 Survey date range:
 Number of weekdays (Monday-Friday):
 Number of Saturdays:
 Number of Sundays:
 Surveys manually removed from selection:

10 - 150 (units:)
 01/01/00 - 24/04/09
 21
 0
 0
 0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL PUBLIC TRANSPORT USERS

- Selected regions and areas:
- 05 EAST MIDLANDS**
 DS DERBYSHIRE 1 days
 LE LEICESTERSHIRE 1 days
 LN LINCOLNSHIRE 1 days
- 06 WEST MIDLANDS**
 ST STAFFORDSHIRE 1 days
 WM WEST MIDLANDS 3 days
 WO WORCESTERSHIRE 3 days
- 07 YORKSHIRE & NORTH LINCOLNSHIRE**
 NY NORTH YORKSHIRE 3 days
- 08 NORTH WEST**
 CH CHESHIRE 2 days
 GM GREATER MANCHESTER 1 days
 LC LANCASHIRE 1 days
- 09 NORTH**
 CB CUMBRIA 3 days
 TW TYNE & WEAR 1 days

Filtering Stage 2 selection:

Parameter: Number of dwellings
 Range: 10 to 150 (units:)

Public Transport Provision:

Include all surveys

Date Range: 01/01/00 to 24/04/09

Selected survey days:

- Monday 4 days
 Tuesday 7 days
 Wednesday 3 days
 Thursday 3 days
 Friday 4 days

Selected survey types:

- Manual count 21 days
 Directional ATC Count 0 days

Selected Locations:

- Edge of Town Centre 1
 Suburban Area (PP56 Out of Centre) 8
 Edge of Town 11
 Neighbourhood Centre (PP56 Local Centre) 1

Selected Location Sub Categories:

- Residential Zone 17
 No Sub Category 4

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
MULTI-MODAL PUBLIC TRANSPORT USERS
 Calculation factor: 1 DWELLS
 Estimated TRIP rate value per 112 DWELLS shown in shaded columns
 BOLD print indicates peak (busiest) period

ARRIVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS
00:00 - 01:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
01:00 - 02:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
02:00 - 03:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
03:00 - 04:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
04:00 - 05:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
05:00 - 06:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
06:00 - 07:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
07:00 - 08:00	21	63	0.007	21	63	0.041	21	63	0.009	21	63
08:00 - 09:00	21	63	0.018	21	63	0.014	21	63	0.014	21	63
09:00 - 10:00	21	63	0.014	21	63	0.011	21	63	0.011	21	63
10:00 - 11:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
11:00 - 12:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
12:00 - 13:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
13:00 - 14:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
14:00 - 15:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
15:00 - 16:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
16:00 - 17:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
17:00 - 18:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
18:00 - 19:00	21	63	0.011	21	63	0.011	21	63	0.011	21	63
19:00 - 20:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
20:00 - 21:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
21:00 - 22:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
22:00 - 23:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
23:00 - 24:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
Total Rates			0.144			0.144			0.144		

Parameter summary

Trip rate parameter range selected:
 Survey date date range:
 Number of weekdays (Monday-Friday):
 Number of Saturdays:
 Number of Sundays:
 Surveys manually removed from selection:

10 - 150 (units:)
 01/01/00 - 24/04/09
 21
 0
 0
 0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL PEDESTRIANS

Selected regions and areas:

- 05 EAST MIDLANDS**
 DS DERBYSHIRE 1 days
 LE LEICESTERSHIRE 1 days
 LN LINCOLNSHIRE 1 days
06 WEST MIDLANDS
 ST STAFFORDSHIRE 1 days
 WM WEST MIDLANDS 3 days
 WO WORCESTERSHIRE 3 days
07 YORKSHIRE & NORTH LINCOLNSHIRE
 NY NORTH YORKSHIRE 3 days
08 NORTH WEST
 CH CHESHIRE 2 days
 GM GREATER MANCHESTER 1 days
 LC LANCASHIRE 1 days
09 NORTH
 CB CUMBRIA 3 days
 TW TYNE & WEAR 1 days

Filtering Stage 2 selection:

Parameter: Number of dwellings
 Range: 10 to 150 (units:)

Public Transport Provision:

Include all surveys

Date Range: 01/01/00 to 24/04/09

Selected survey days:

- Monday 4 days
 Tuesday 7 days
 Wednesday 3 days
 Thursday 3 days
 Friday 4 days

Selected survey types:

- Manual count 21 days
 Directional ATC Count 0 days

Selected Locations:

- Edge of Town Centre 1
 Suburban Area (PP56 Out of Centre) 8
 Edge of Town 11
 Neighbourhood Centre (PP56 Local Centre) 1

Selected Location Sub Categories:

- Residential Zone 17
 No Sub Category 4

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL PEDESTRIANS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 112 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

ARRIVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS
00:00 - 01:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
01:00 - 02:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
02:00 - 03:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
03:00 - 04:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
04:00 - 05:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
05:00 - 06:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
06:00 - 07:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
07:00 - 08:00	21	63	0.279	21	63	0.272	21	63	0.275	21	63
08:00 - 09:00	21	63	0.053	21	63	0.061	21	63	0.111	21	63
09:00 - 10:00	21	63	0.010	21	63	0.031	21	63	0.109	21	63
10:00 - 11:00	21	63	0.038	21	63	0.061	21	63	0.119	21	63
11:00 - 12:00	21	63	0.066	21	63	0.053	21	63	0.108	21	63
12:00 - 13:00	21	63	0.056	21	63	0.050	21	63	0.107	21	63
13:00 - 14:00	21	63	0.051	21	63	0.055	21	63	0.107	21	63
14:00 - 15:00	21	63	0.050	21	63	0.047	21	63	0.107	21	63
15:00 - 16:00	21	63	0.160	21	63	0.075	21	63	0.205	21	63
16:00 - 17:00	21	63	0.125	21	63	0.080	21	63	0.205	21	63
17:00 - 18:00	21	63	0.085	21	63	0.050	21	63	0.131	21	63
18:00 - 19:00	21	63	0.072	21	63	0.058	21	63	0.130	21	63
19:00 - 20:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
20:00 - 21:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
21:00 - 22:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
22:00 - 23:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
23:00 - 24:00	0	0	0.000	0	0	0.000	0	0	0.000	0	0
Total Entries			0.538			0.562			0.720		0.720
			96.081			96.482			192.563		192.563

Parameter summary

Trip rate parameter range selected:
 Survey date range:
 Number of weekdays (Monday-Friday):
 Number of Saturdays:
 Number of Sundays:
 Surveys manually removed from selection:

10 - 150 (units:)
 01/01/00 - 24/04/09
 21
 0
 0
 0

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED
MULTI-MODAL CYCLISTS

Selected regions and areas:

- 05 EAST MIDLANDS**
 DS DERBYSHIRE 1 days
 LE LEICESTERSHIRE 1 days
 LN LINCOLNSHIRE 1 days
06 WEST MIDLANDS
 ST STAFFORDSHIRE 1 days
 WM WEST MIDLANDS 3 days
 WO WORCESTERSHIRE 3 days
07 YORKSHIRE & NORTH LINCOLNSHIRE
 NY NORTH YORKSHIRE 3 days
08 NORTH WEST
 CH CHESHIRE 2 days
 GM GREATER MANCHESTER 1 days
 LC LANCASHIRE 1 days
09 NORTH
 CB CUMBRIA 3 days
 TW TYNE & WEAR 1 days

Filtering Stage 2 selection:

Parameter: Number of dwellings
 Range: 10 to 150 (units:)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/00 to 24/04/09

Selected survey days:

- Monday 4 days
 Tuesday 7 days
 Wednesday 3 days
 Thursday 3 days
 Friday 4 days

Selected survey types:

- Manual count 21 days
 Directional ATC Count 0 days

Selected Locations:

- Edge of Town Centre 1
 Suburban Area (PPS6 Out of Centre) 8
 Edge of Town 11
 Neighbourhood Centre (PPS6 Local Centre) 1

Selected Location Sub Categories:

- Residential Zone 17
 No Sub Category 4

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL CYCLISTS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 112 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

APPROVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. DWELLS	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Estimated Trip Rate	Estimated Trip Rate
00:00 - 01:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
01:00 - 02:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
02:00 - 03:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
03:00 - 04:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
04:00 - 05:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
05:00 - 06:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
06:00 - 07:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
07:00 - 08:00	21	63	0.009	21	63	0.014	1.602	21	63	0.023	2.614
08:00 - 09:00	21	63	0.006	21	63	0.011	1.181	21	63	0.017	1.856
09:00 - 10:00	21	63	0.004	21	63	0.005	0.506	21	63	0.008	0.843
10:00 - 11:00	21	63	0.004	21	63	0.005	0.506	21	63	0.008	1.012
11:00 - 12:00	21	63	0.005	21	63	0.002	0.199	21	63	0.007	0.759
12:00 - 13:00	21	63	0.004	21	63	0.005	0.506	21	63	0.011	1.181
13:00 - 14:00	21	63	0.004	21	63	0.003	0.337	21	63	0.007	0.759
14:00 - 15:00	21	63	0.007	21	63	0.004	0.422	21	63	0.011	1.181
15:00 - 16:00	21	63	0.011	21	63	0.004	0.422	21	63	0.015	1.602
16:00 - 17:00	21	63	0.013	21	63	0.013	1.365	21	63	0.024	2.699
17:00 - 18:00	21	63	0.010	21	63	0.008	0.843	21	63	0.018	1.939
18:00 - 19:00	21	63	0.010	21	63	0.003	0.337	21	63	0.012	1.349
19:00 - 20:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
20:00 - 21:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
21:00 - 22:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
22:00 - 23:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
23:00 - 24:00	0	0	0.000	0	0	0.000	0.000	0	0	0.000	0.000
TOTAL RATES			0.000			0.074	8.095			0.162	17.795

Parameter summary

Trip rate parameter range selected:
 Survey date date range:
 Number of weekdays (Monday-Friday):
 Number of Saturdays:
 Number of Sundays:
 Surveys manually removed from selection:

10 - 150 (units:)
 01/01/00 - 24/04/09
 21
 0
 0
 0

APPENDIX F

Development Trip Assignment

Cemetery Road
(Northbound)

18
9

3
33

Acorn Way

15
14
29
13

Cemetery Road
(Southbound)

0
4
5
2

Development
Site

Burntwood
Road

08:00 - 09:00 AM Peak Hour
17:00 - 18:00 PM Peak Hour

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Client	Strata Homes		Drawn By CR	Checked By VRG	Approved By BS
Project Title	Land at Burntwood Road, Gt. Methorpe		Date 8/10/09	Scale NTS	
Drawing Title	Development Trip Assignment		Purpose Information Drawing Number JN848 - NWK - 006 Licence number		



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E-Mail :- info@morgantucker.co.uk
www.morgantucker.co.uk

APPENDIX G

Traffic Distribution Diagrams

Cemetery Road
(Northbound)

5
58
7
2
53
2

54
63
7
11
1
8

Acorn Way

74
63
1
4
78
65

13
7
23
7
0
5

Cemetery Road
(Southbound)

1
4
0
5
30
16
6
2

Development
Site

Burntwood
Road

08:00 - 09:00 AM Peak Hour
17:00 - 18:00 PM Peak Hour

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Client

Strata Homes

Drawn By
CR

Checked By
VRG

Approved By
BS

Date
14/10/09

Scale
NTS

Project Title

Land at Burntwood Road, Grimeithorpe

Person
Information

Dealing Number

JN848 - NWK - 008

Licence number

Drawing Title

2017 Without Development
Traffic Flow Distribution



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Cemetery Road
(Northbound)

4
55
6
2
48
2

49
57
6
10
1
7

Acorn Way

67
57
1
3
72
59

12
6
21
6
0
4

Cemetery Road
(Southbound)

1
3
0
4
27
15
5
2

Development
Site

Burntwood
Road

08:00 - 09:00 AM Peak Hour
17:00 - 18:00 PM Peak Hour

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MORGAN TUCKER.

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Client	Strata Homes			Drawn By	CR	Checked By	VRG	Approved By	BS
				Date	14/10/09	Scale	NTS		
Project Title	Land at Burntwood Road, Grimethorpe			Purpose		Information			
				Drawing Number		JN848 - NWK - 007			
Drawing Title	2012 Without Development Traffic Flow Distribution					License number			



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APPENDIX H

LinSig Outputs

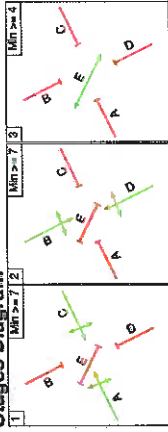
Phase Intergreens Matrix

Terminating Phase	Starting Phase				
	A	B	C	D	E
A		5	5	8	
B	5		5	8	
C	5	5		5	8
D	5	5	5		8
E	5	5	5	5	

Phases In Stage

Stage No.	Phases in Stage
1	A C
2	B D
3	E

Stages Diagram



Phase Delays

There are no phase delays defined in this stage stream

Prohibited Stage Changes

To Stage	From Stage
1	2 3
2	1 5 8
3	2 5 8

Link Input Data

Arm/ Link	Link Name	Link Type	Num Lanes	Phases	Start Disp.	End Disp.
1/1	Acorn Way Left Ahead Right	O	1	A	2	3
2/1	Cemetery Rd North Right Left Ahead	O	1	B	2	3
3/1	Burntwood Road Ahead Right Left	O	1	C	2	3
4/1	Cemetery Rd South Left Ahead Right	O	1	D	2	3
5/1	Acorn Way Exit	U	1		2	3
6/1	Cemetery Rd Nth Exit	U	1		2	3
7/1	Burntwood Road Exit	U	1		2	3
8/1	Cemetery Rd Sth Exit	U	1		2	3

Lane Input Data

Arm/ Lane	Link Num	Physical Length (PCU)	Expected Usage (PCU)	Sat Flow Type	User Saturation Flow (PCU/hr)	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)
1/1 (Acorn Way Lane 1)	Link 1 (Acorn Way Left Ahead Right)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 6 Left (Cemetery Rd Nth Exit)	Inf
									Arm 7 Ahead (Burnwood Road Exit)	Inf
									Arm 8 Right (Cemetery Rd Sth Exit)	Inf
2/1 (Cemetery Rd North Lane 1)	Link 1 (Cemetery Rd North Right Left Ahead)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 5 Right (Acorn Way Exit)	Inf
									Arm 7 Left (Burnwood Road Exit)	Inf
									Arm 8 Ahead (Cemetery Rd Sth Exit)	Inf
3/1 (Burnwood Road Lane 1)	Link 1 (Burnwood Road Ahead Right Left)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 5 Ahead (Acorn Way Exit)	Inf
									Arm 6 Right (Cemetery Rd Nth Exit)	Inf
									Arm 8 Left (Cemetery Rd Sth Exit)	Inf
4/1 (Cemetery Rd South Lane 1)	Link 1 (Cemetery Rd South Left Ahead Right)	Inf	Inf	User	1800	3.25	0.00	Y	Arm 5 Left (Acorn Way Exit)	Inf
									Arm 6 Ahead (Cemetery Rd Nth Exit)	Inf
									Arm 7 Right (Burnwood Road Exit)	Inf

Give-Way Link Input Data

Arm/ Link	Link Name	Movement	Max Flow when Closing Way (PCU/hr)	Opposing Link	Opp. Link Centr.	Opp. Movem.	Right Turn Queue (PCU)	Non- Blocking Storage (PCU)	RTF	Right Turn Give up Time (s)	Max Turns in Intersection (PCU)
1/1	Acorn Way Left Ahead Right	1/1 to 8/1	1440	3/1	1.09	3/1	2.00	1.00	0.50	2	2.00
2/1	Cemetery Rd North Right Left Ahead	2/1 to 3/1	1440	4/1	1.09	4/1	2.00	1.00	0.50	2	2.00
3/1	Burnwood Road Ahead Right Left	3/1 to 8/1	1440	1/1	1.09	1/1	2.00	1.00	0.50	2	2.00
4/1	Cemetery Rd South Left Ahead Right	4/1 to 7/1	1440	2/1	1.09	2/1	2.00	1.00	0.50	2	2.00

5/1 (Acorn Way Exit Lane 1)	Link 1 (Acorn Way Exit)	Inf	Inf	1800	3.25	0.00	Y	
6/1 (Cemetery Rd Nth Exit Lane 1)	Link 1 (Cemetery Rd Nth Exit)	Inf	Inf	1800	3.25	0.00	Y	
7/1 (Burntwood Road Exit Lane 1)	Link 1 (Burntwood Road Exit)	Inf	Inf	1800	3.25	0.00	Y	
8/1 (Cemetery Rd Sth Exit Lane 1)	Link 1 (Cemetery Rd Sth Exit)	Inf	Inf	1800	3.25	0.00	Y	

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2009 AM Peak (PCU)'	08:00	09:00	01:00	$F3*0.2+F4*0.4+F5+F6*2+F7*2.3$
2: '2009 PM Peak (PCU)'	16:30	17:30	01:00	$F8*0.2+F9*0.4+F10+F11*2+F12*2.3$
13: '2017 AM Peak Base'	08:00	09:00	01:00	
14: '2017 PM Peak Base'	17:00	18:00	01:00	$F13+F17$
15: '2017 AM Peak Base+Dev'	08:00	09:00	01:00	
16: '2017 PM Peak Base+Dev'	17:00	18:00	01:00	$F14+F18$

Flow Group 1: '2009 AM Peak (PCU)'
Traffic Flow Matrix
Desired Flow :

	Destination					Tot.
	A	B	C	D		
Origin	A	0	5	7	49	62
	B	6	0	1	51	58
	C	21	10	0	0	32
	D	65	72	1	0	139
	Tot.	93	88	9	100	290

Link Traffic Flows

Arm/Link	Flow Group 1: 2009 AM Peak (PCU)
1/1	62
2/1	58
3/1	32
4/1	139
5/1	93
6/1	88
7/1	9
8/1	100

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Acorn Way Lane 1)						This lane uses a directly entered Saturation Flow	1800
2/1 (Cemetery Rd North Lane 1)						This lane uses a directly entered Saturation Flow	1800
3/1 (Burntwood Road Lane 1)						This lane uses a directly entered Saturation Flow	1800
4/1 (Cemetery Rd South Lane 1)						This lane uses a directly entered Saturation Flow	1800
5/1 (Acorn Way Exit Lane 1)						Infinite Saturation Flow (on Exit Link)	Inf
6/1 (Cemetery Rd Nth Exit Lane 1)						Infinite Saturation Flow (on Exit Link)	Inf
7/1 (Burntwood Road Exit Lane 1)						Infinite Saturation Flow (on Exit Link)	Inf
8/1 (Cemetery Rd Sth Exit Lane 1)						Infinite Saturation Flow (on Exit Link)	Inf

Flow Group 2: '2009 PM Peak (PCU)'

Traffic Flow Matrix

Desired Flow :

	Destination				
	A	B	C	D	Tot.
Origin	A	0	52	2	2
	B	9	0	7	57
	C	5	5	0	3
	D	57	59	3	0
	Tot.	71	116	12	62

Link Traffic Flows

Arm/Link	Flow Group 2: 2009 PM Peak (PCU)
1/1	56
2/1	73
3/1	12
4/1	119
5/1	71
6/1	119
7/1	12
8/1	62

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Acorn Way Lane 1)		This lane uses a directly entered Saturation Flow					1800
2/1 (Cemetery Rd North Lane 1)		This lane uses a directly entered Saturation Flow					1800
3/1 (Burnthwood Road Lane 1)		This lane uses a directly entered Saturation Flow					1800
4/1 (Cemetery Rd South Lane 1)		This lane uses a directly entered Saturation Flow					1800
5/1 (Acorn Way Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
6/1 (Cemetery Rd Nth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
7/1 (Burnthwood Road Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
8/1 (Cemetery Rd Sth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf

Flow Group 13: '2017 AM Peak Base'

Traffic Flow Matrix

Desired Flow :

	Destination				
	A	B	C	D	Tot.
Origin	A	0	5	7	53
	B	7	0	1	54
	C	23	13	0	36
	D	74	78	1	153
	Tot.	104	96	9	316

Link Traffic Flows

Arm/Link	Flow Group 13: 2017 AM Peak Base
1/1	65
2/1	62
3/1	36
4/1	153
5/1	104
6/1	96
7/1	9
8/1	107

Lane Saturation Flows

Arm/ Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Acorn Way Lane 1)		This lane uses a directly entered Saturation Flow					1800
2/1 (Camelary Rd North Lane 1)		This lane uses a directly entered Saturation Flow					1500
3/1 (Burntwood Road Lane 1)		This lane uses a directly entered Saturation Flow					1800
4/1 (Camelary Rd South Lane 1)		This lane uses a directly entered Saturation Flow					1800
5/1 (Acorn Way Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
6/1 (Camelary Rd Nth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
7/1 (Burntwood Road Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
8/1 (Camelary Rd Sth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf

Flow Group 14: '2017 PM Peak Base'
Traffic Flow Matrix
Desired Flow :

Origin	Destination				Tot
	A	B	C	D	
A	0	58	2	2	62
B	11	0	8	63	82
C	7	7	0	5	19
D	63	65	4	0	132
Tot	81	130	14	70	295

Link Traffic Flows

Arm/Link	Flow Group 14: 2017 PM Peak Base
1/1	62
2/1	82
3/1	19
4/1	132
5/1	81
6/1	130
7/1	14
8/1	70

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Acom Way Lane 1)		This lane uses a directly entered Saturation Flow					1800
2/1 (Cemetery Rd North Lane 1)		This lane uses a directly entered Saturation Flow					1800
3/1 (Burntwood Road Lane 1)		This lane uses a directly entered Saturation Flow					1800
4/1 (Cemetery Rd South Lane 1)		This lane uses a directly entered Saturation Flow					1800
5/1 (Acom Way Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
6/1 (Cemetery Rd Nth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
7/1 (Burntwood Road Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
8/1 (Cemetery Rd Sth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf

Flow Group 15: '2017 AM Peak Base+Dev'

Traffic Flow Matrix

Desired Flow :

		Destination					Tot.
		A	B	C	D		
Origin	A	0	5	25	53	83	
	B	7	0	4	54	65	
	C	52	28	0	0	80	
	D	74	78	1	0	153	
	Tot.	133	111	30	107	381	

Link Traffic Flows

Arm/Link	Flow Group 15: 2017 AM Peak Base+Dev
1/1	83
2/1	65
3/1	80
4/1	153
5/1	133
6/1	111
7/1	30
8/1	107

Lane Saturation Flows

Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/Hr)
1/1 (Acom Way Lane 1)		This lane uses a directly entered Saturation Flow					1800
2/1 (Cemetery Rd North Lane 1)		This lane uses a directly entered Saturation Flow					1800
3/1 (Burntwood Road Lane 1)		This lane uses a directly entered Saturation Flow					1800
4/1 (Cemetery Rd South Lane 1)		This lane uses a directly entered Saturation Flow					1800
5/1 (Acom Way Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
6/1 (Cemetery Rd Nth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
7/1 (Burntwood Road Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
8/1 (Cemetery Rd Sth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf

Flow Group 16: '2017 PM Peak Base+Dev'

Traffic Flow Matrix

Desired Flow :

	Destination					Tot.
	A	B	C	D		
Origin	A	0	58	11	2	71
	B	11	0	41	63	115
	C	20	21	0	5	46
	D	63	65	4	0	132
	Tot.	94	144	56	70	364

Link Traffic Flows

Arm/Link	Flow Group 16: 2017 PM Peak Base+Dev
1/1	71
2/1	115
3/1	46
4/1	132
5/1	94
6/1	144
7/1	56
8/1	70

Lane Saturation Flows

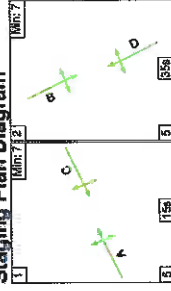
Arm/Lane	Lane Width (m)	Gradient	Nearside Lane	Allowed Turns	Turning Radius (m)	Turning Prop.	Sat flow (PCU/hr)
1/1 (Acorn Way Lane 1)		This lane uses a directly entered Saturation Flow					1800
2/1 (Cometary Rd North Lane 1)		This lane uses a directly entered Saturation Flow					1800
3/1 (Burntwood Road Lane 1)		This lane uses a directly entered Saturation Flow					1800
4/1 (Cometary Rd South Lane 1)		This lane uses a directly entered Saturation Flow					1800
5/1 (Acorn Way Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
6/1 (Cometary Rd Nth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
7/1 (Burntwood Road Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf
8/1 (Cometary Rd Sth Exit Lane 1)		Infinite Saturation Flow (on Exit Link)					Inf

Scenario 1: '2009 AM Peak'

Staging Plan 1: 'AM Peak'

Flow Group 1: '2009 AM Peak (PCU)'

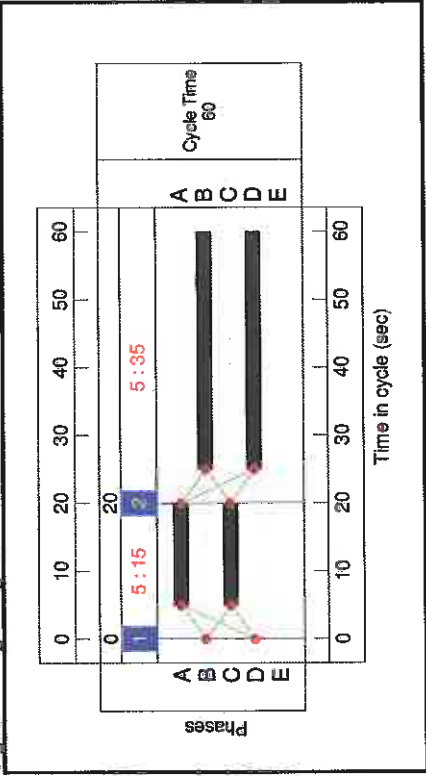
Staging Plan Diagram



Stage Timings

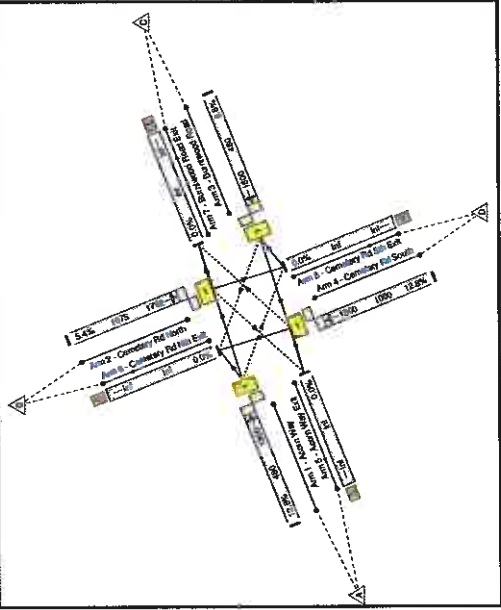
Stage	1	2
Duration	15	35
Change Point	0	20

Signal Timings Diagram



Full Input Data And Results

Junction Layout Diagram



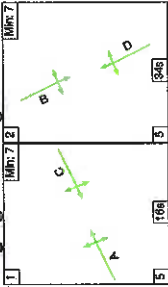
Full Input Data And Results

[illegible]

Full Incent Data And Results

Link Results												
Link Name	Link Type	Stage	Position in Proposed Route	Foot Path	Access Point	Road Grade	Total Chain (ft)	Vertical Curve (ft)	Max. Cut (ft)	Max. Fill (ft)	Prop. Cut (ft)	Prop. Fill (ft)
11A	Aspen Way	Q	N/A	A		1	15	-	62	1600	1800	480
12A	Chimney Hill	D	N/A	B		1	25	-	38	1800	1770	1075
13A	Burnwood Road and Right-of-Way	Q	N/A	C		1	15	-	22	1800	1800	400
14A	Chimney Hill	D	N/A	D		1	38	-	100	1800	1800	1000
15A	Aspen Way	U	N/A	-		-	-	-	13	14	nd	Inf
16A	Chimney Hill	U	N/A			-	-	-	88	14	nd	nd
17A	Burnwood Road and Right-of-Way	U	N/A	-		-	-	-	9	14	Inf	Inf
18A	Chimney Hill	U	N/A			-	-	-	100	14	nd	nd

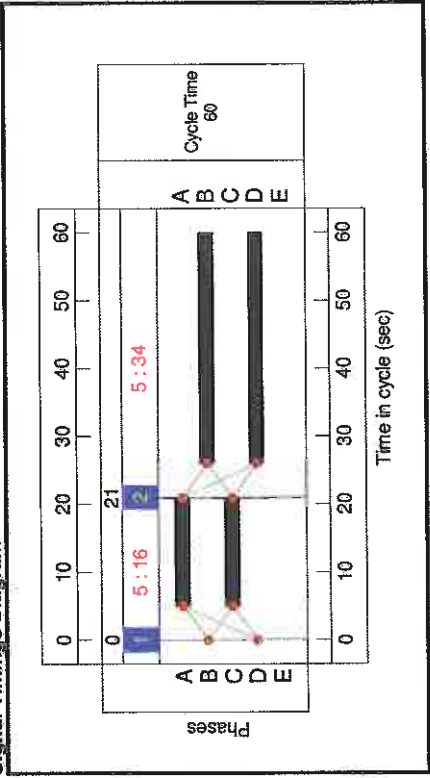
Scenario 2: '2009 PM Peak'
Staging Plan 2: 'PM Peak'
Flow Group 2: '2009 PM Peak (PCU)'
Staging Plan Diagram



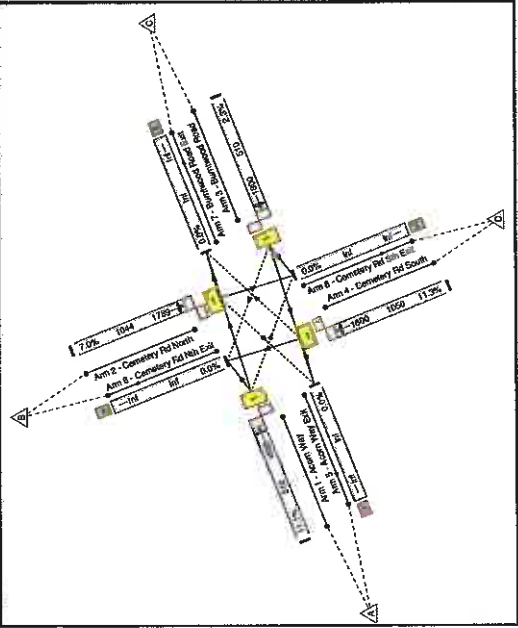
Stage Timings

Stage	1	2
Duration	16	34
Change Point	0	21

Signal Timings Diagram



Junction Layout Diagram



Full Input Data And Results

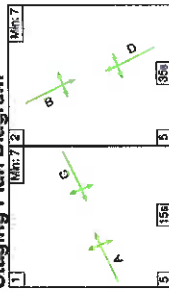
[illegible]

Full Input Data And Results

Link Results														
Link Head	Link Name	Link Type	Stage	Location in Effluent Route	Pool Phase	Access Point	Mean Flow (m³)	Total Capacity (m³)	Volume From JWH (m³)	Available From JWH (m³)	48hrs Net Flow (m³/48hrs)	Area Net (m²)	Capacity (m³)	Net 24hrs Flow (m³)
1A	Access Way Left Ahead Right	O	N/A	N/A	A		1	15	-	55	1000	1000	510	11.1
2B	Gateway Rd Left Ahead Right	O	N/A	N/A	B		5	34	-	23	1000	1799	1044	23
3A	Burwood Road Ahead Right Left	O	N/A	N/A	C		1	16	-	12	1000	1000	510	2.3
4A	Gateway Rd South Left Ahead Right	O	N/A	N/A	D		6	34	-	119	1000	1000	1000	11.3
2B	Access Way Left	U	N/A	N/A	-		-	-	-	71	10	10	Inf	0.0
5A	Gateway Rd South Left	U	N/A	N/A	-		-	-	-	119	34	34	100	0.0
2B	Burwood Road On	U	N/A	N/A	-		-	-	-	12	10	10	Inf	0.0
1B	Access Way Left	U	N/A	N/A	-		-	-	-	100	34	34	100	0.0

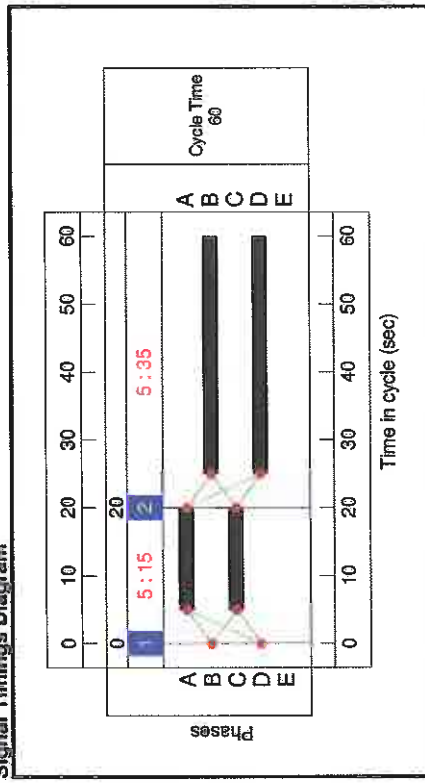
Full Input Data And Results

Scenario 3: '2017 AM Peak No Dev'
Staging Plan 1: 'AM Peak'
Flow Group 13: '2017 AM Peak Base'
Staging Plan Diagram



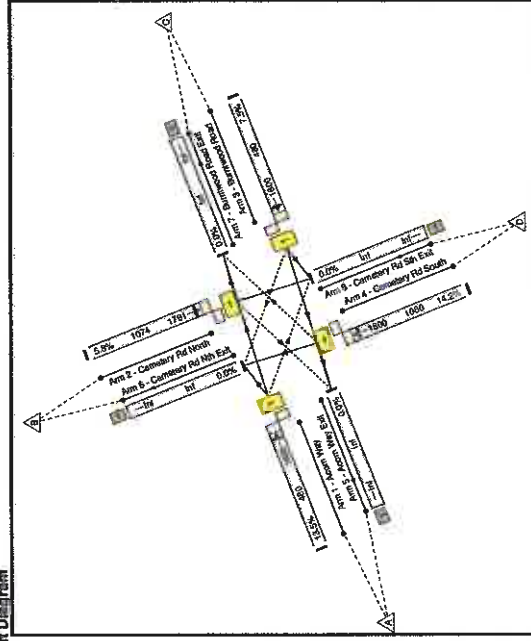
Stage Timings		
Stage	1	2
Duration	15	35
Change Point	0	20

Signal Timings Diagram



Full Input Data And Results

Junction Layout Diagram



Full Input Data And Results

Link Results

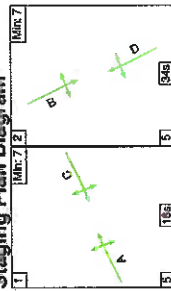
Link Results															
Link Name	Link Class	Link Type	Stage (Meters)	Position to Fillet (Meters)	Full Phase	Approx. Measure	Node Count	Total Count (M)	Approx. Count (M)	Spanned Area (m ²)	Node Area (m ²)	Area Ratio (Spanned/Node)	Area Ratio (Spanned/Node)	Capacity (m ²)	Days Left (%)
1a)	Access Way East Shared Right	O	N/A	N/A	A		1	15	-	65	1300	1000	Inf	450	13.5
37a)	Canalside Rd East Access	O	N/A	N/A	B		1	30	-	100	1000	1000	Inf	1275	5.8
3a)	Dunwood Road Access Right Left	O	N/A	N/A	C		1	15	-	36	1800	1500	Inf	460	7.5
4a)	Canalside Rd South Left Access Right	O	N/A	N/A	D		1	20	-	150	1000	8000	Inf	10000	14.2
5a)	Access Driv GSE	U	N/A	N/A	-		-	-	-	104	Inf	Inf	Inf	Inf	0.0
6a)	Canalside Rd West Left	U	N/A	N/A	-		-	-	-	90	Inf	Inf	Inf	Inf	0.0
7a)	Brimwood Road East	U	N/A	N/A	-		-	-	-	9	Inf	Inf	Inf	Inf	0.0
8a)	Canalside Rd West Left	U	N/A	N/A	-		-	-	-	1107	Inf	Inf	Inf	Inf	0.0

Scenario 4: '2017 PM Peak No Dev'

Staging Plan 2: 'PM Peak'

Flow Group 14: '2017 PM Peak Base'

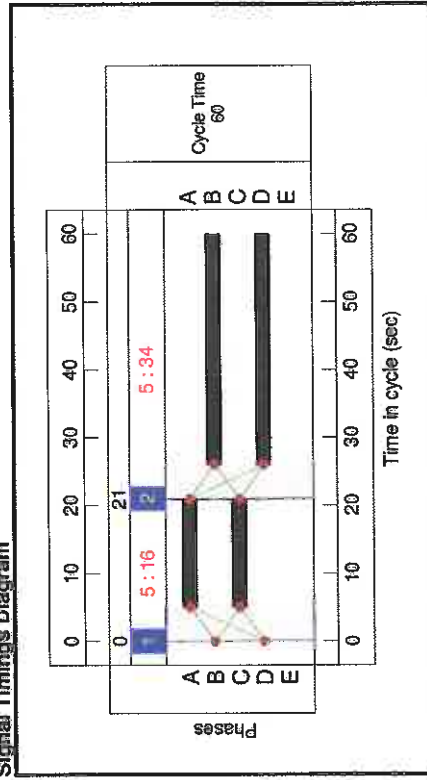
Staging Plan Diagram



Stage Timings

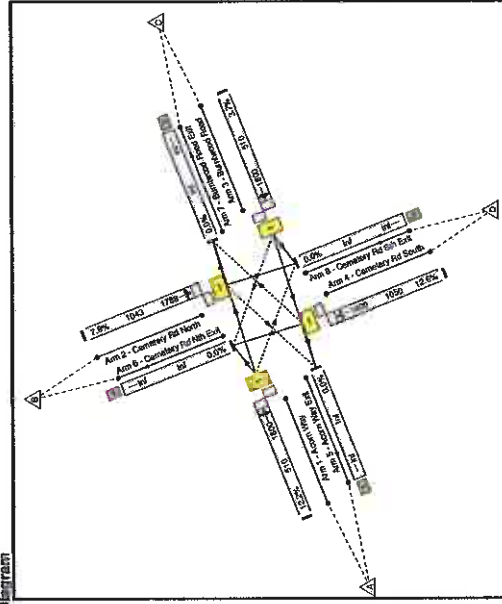
Stage	1	2
Duration	16	34
Change Point	0	21

Signal Timings Diagram



Full Input Data And Results

Junction Layout Diagram



Full Input Data And Results

Link Name	Existing (year)	Leaving (year)	Turnover w/Gap (year)	Turnover When Overweight (year)	Turnovers to Compliance (year)	Unfused Spurting (year)	Round Overse Daily (year)	Storage Area Before Spurting (year)	Total Turnover (year)	Av. Daily Turnover (year)	Min. Rate of Gullies Exceed (year)	Round Overall Gullies (year)	Mean Rate of Gullies (year)
1	62	62	2	0	0	0.2	0.1	0.0	0.3	20.0	0.0	0.1	0.0
2	62	62	18	0	0	0.1	0.0	0.0	0.0	7.4	0.0	0.0	0.0
3	19	19	7	0	0	0.1	0.0	0.0	0.1	10.7	0.2	0.0	0.2
4	132	132	4	0	0	0.2	0.1	0.0	0.0	7.0	0.0	0.1	0.0
5	81	81	1	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6	132	132	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7	14	14	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8	72	72	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

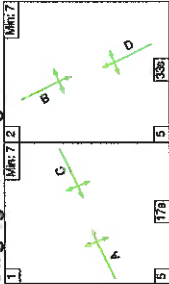
PFC for fused link 62: 0.00
 Total Cycle for All Links: 0.00
 Total Cycle for All Links: 0.00
 Cycle Time (hr): 60

Full Input Data And Results

Link Results															
Last Name	Link Name	Link Type	Stage / Milestone	Position in Planned Route	Full Name	Arrive / Finish	Run / Connect	Total Open (s)	Close Open / Close (s)	Deployment Time (min)	Close Time (min)	Link Latency (sec/mile)	Capacity (Mbps)	Link Speed (Mbps)	Link Status
101	Access Wire Left Above Right	O	N/A	N/A	A		1	10	-	62	1800	1800	510	12.2	OK
201	Connectivity Mid Right Right	O	N/A	N/A	B		1	24	-	111	1800	1700	1000	7.3	OK
301	Bandwidth Roadward Right Left	O	N/A	N/A	C		1	10	-	19	1300	1800	510	3.7	OK
401	Connectivity Mid South Left Around Right	O	N/A	N/A	D		1	24	-	132	1800	1800	1000	12.3	OK
501	Access Wire Exit	U	N/A	N/A	-		-	-	-	21	181	181	10	0.0	OK
601	Connectivity Mid	O	N/A	N/A	-		-	-	-	133	181	181	10	0.0	OK
701	Bandwidth Road End	U	N/A	N/A	-		-	-	-	14	181	181	10	0.0	OK
801	Connectivity Mid	U	N/A	N/A	-		-	-	-	70	181	181	10	0.0	OK

Full Input Data And Results

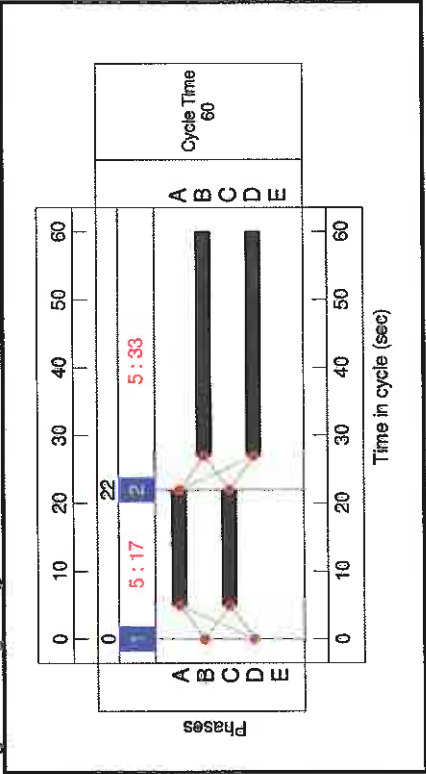
Scenario 5: '2017 AM Peak With Dev'
Staging Plan 1: 'AM Peak'
Flow Group 15: '2017 AM Peak Base+Dev'
Staging Plan Diagram



Stage Timings

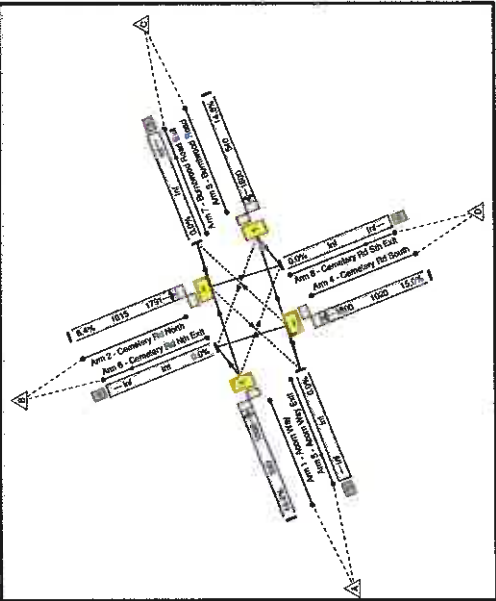
Stage	1	2
Duration	17	33
Change Point	0	22

Signal Timings Diagram



Full Input Data And Results

Junction Layout Diagram



Full Input Data And Results

Link Item	Existing (sqm)	Leaching (gms)	Remains in place (gms)	Turnover When Implemented (year)	Turnover to Recycle (year)	Uniformity (variety)	Amount of Protein Shown (gms)	Storage Area (sqm)	Total Protein (gms)	Air Drying (gms)	Max. Such Amount of Leachate (gms)	Revol. of Chemical Change (year)	Heat Loss (gms)
191	33	33	32	0	1	0.4	0.1	0.6	0.2	20.1	1.0	0.1	1.1
201	46	46	2	0	8	2.1	0.0	0.0	0.7	2.8	0.0	0.0	0.5
301	80	80	28	0	0	0.3	0.1	0.0	0.4	19.5	1.0	0.1	1.0
401	143	143	1	0	8	2.3	0.1	0.0	0.4	0.3	1.2	0.0	1.2
501	130	133	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
601	111	111	-	-	-	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
701	20	20	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
801	197	197	-	-	-	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

PPIC for Overall Link 191: 485.5

PPIC for Overall Link 201: 485.5

Scale: Overall for Recycled Links: 1.38

Scale: Overall for Recycled Links: 1.39

PPIC for Overall Link 191: 485.5

PPIC for Overall Link 201: 485.5

Cycle Time (s): 50

Full Input Data And Results

Link Records																
Link Label	Link Desc.	Link Type	Stage	Facilities in Different Route	Full Phase	Access Phase	Mass Grouting	Total Load (kN)	Mass Grout (kg)	Grout Rate (kg/m)	Concrete Pump (m³/hr)	Max. Set. Time (min)	Min. Set. (mm)	Max. Set. (mm)	Capacity (kN)	Age (yr)
10	Acorn Way Left Ahead Right	O	N/A	N/A	A	-	1	17	-	83	1800	1800	540	15.4		
20	Canterbury Rd Left Ahead Right	O	N/A	N/A	B	-	3	33	-	45	1800	1720	1212	8.4		
30	Blackhead Road Ahead Right Left	O	N/A	N/A	C	-	1	17	-	80	1800	1800	540	14.0		
40	Canterbury Rd South Left	O	N/A	N/A	D	-	5	33	-	150	1800	1800	1800	18.0		
50	Acorn Way Left	U	N/A	N/A	-	-	-	-	-	132	18	18	Inf	0.0		
60	Canterbury Rd Left	U	N/A	N/A	-	-	-	-	-	111	18	18	Inf	0.0		
70	Blackhead Road Left	U	N/A	N/A	-	-	-	-	-	53	18	18	Inf	0.0		
80	Canterbury Rd Left	U	N/A	N/A	-	-	-	-	-	110	18	18	Inf	0.0		

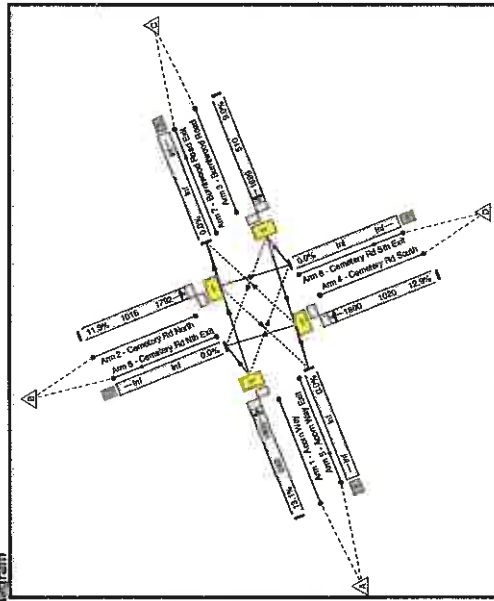
Scenario 6: '2017 PM Peak With Dev'
Staging Plan 2: 'PM Peak'
Flow Group 16: '2017 PM Peak Base+Dev'
Staging Plan Diagram



Stage	1	2
Duration	17	33
Change Point	0	22

[illegible]

Junction Layout Diagram



Full Input Data And Results

Link Name	Existing (ft)	Carrying (ft)	Turnout Width (ft)	Turnout to Superelevation (ft)	Offroad Safety (ft)	Shoulder Overall Width (ft)	Storage Area (ft)	Total Width (ft)	As. Safety Width (ft)	Side Slope (ft)	Final + Overall Change (ft)	Mean Side Slope (ft)
111	71	71	2	0	0	0.2	0.1	0.0	0.4	18.2	6.8	0.1
211	116	116	68	3	0	0.2	0.1	0.0	0.9	18.1	10.8	0.1
311	46	46	21	0	0	0.2	0.0	0.0	0.2	18.3	0.5	0.0
411	182	182	4	0	0	0.2	0.1	0.0	0.2	18.1	1.6	0.1
511	94	94	-	-	0	0.1	0.0	-	0.0	0.0	0.0	0.0
611	181	181	348	-	-	3.0	10.0	-	2.2	0.2	10.2	0.2
711	50	50	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0
811	101	101	-	-	-	0.0	10.0	-	0.2	18.0	10.2	10.0

PPS for Shoulder Lane 10' 594.5
PPS for Shoulder Lane 10' 594.5
PPS for Shoulder Lane 10' 594.5

Total Shoulder for Shoulder Lane 10' 1.18
1085' Over All Lanes 1.18
1085' Over All Lanes 1.18

Cycle Time (s): 60

Full Invo! Data And Results

Unit Results													
Unit Name	Unit Type	Range	Position in Fitment Grade	Post Position	Area Phase	Phase Change	Total Shares (M)	Arrears Percent (%)	Deposited Share (Mn)	Next Set (Months)	Area Set (Mn)	Capacity (Mn)	Days Left (Mn)
1st	O	N/A	N/A	A		1	17	-	71	1200	1200	540	13.1
2nd	C	N/A	N/A	B		2	33	-	116	1600	1700	1000	11.3
3rd	O	N/A	N/A	C		1	17	-	48	1200	1200	510	9.9
4th	C	N/A	N/A	B		2	33	-	120	1600	1800	1000	10.9
5th	U	N/A	N/A			-	-	-	24	1st	1st	1st	9.0
6th	U	N/A	N/A			-	-	-	14.4	1st	1st	1st	9.0
7th	U	N/A	N/A			-	-	-	50	1st	1st	1st	9.0
8th	U	N/A	N/A			-	-	-	70	1st	1st	1st	9.0