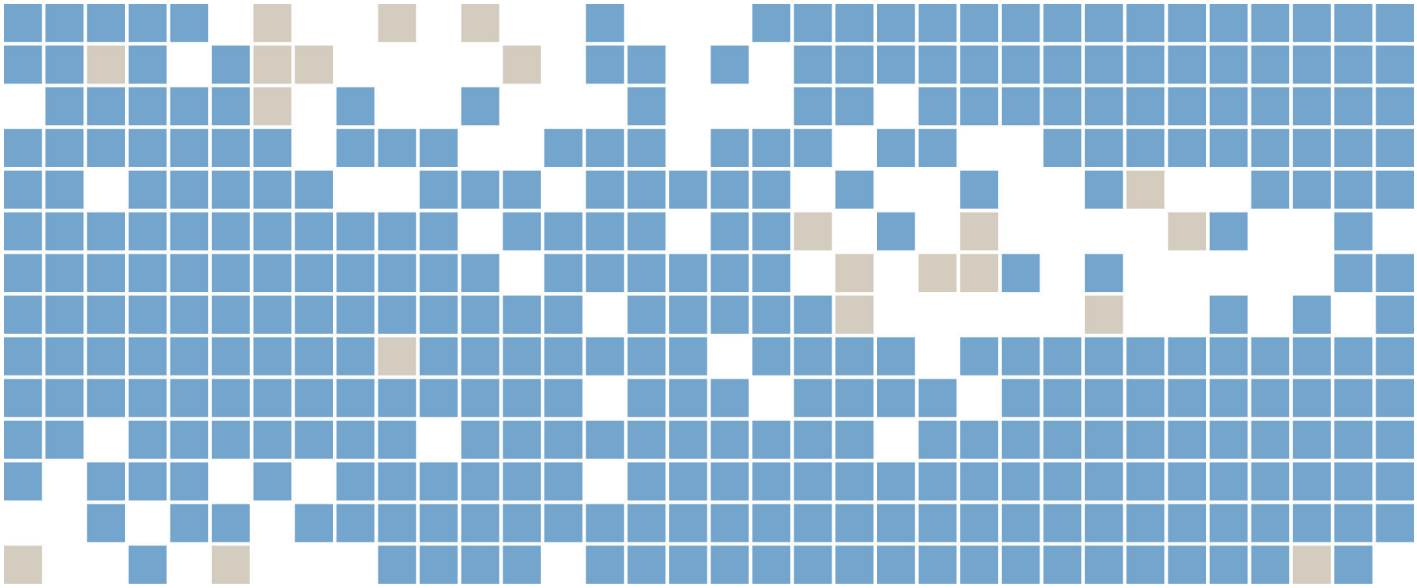

North East Sector, Crawley
Transport Assessment

George Wimpey UK Limited

Persimmon Homes Limited

June 2006

QM

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Appendices

1 Introduction

1.1 FOREWORD

1.1.1 WSP Development and Transportation has been commissioned by George Wimpey UK Limited and Permission Homes Limited to provide transportation advice relating to the development of the North East Section (NES) site in Crawley, West Sussex. A plan showing the location of the NES site is shown on Figure 1. Figure 2 provides a street plan of Crawley.

1.1.2 The proposed development site is bounded to the north by Radford Road and Steers Lane and to the south by the A2011 Crawley Avenue. The eastern boundary is formed by the M23 whilst to the west, the London to Brighton Railway line. The B2036 Balcombe Road and a number of minor roads traverse the site.

1.1.3 The North East Sector (NES) site at Crawley has been allocated within the adopted Crawley Borough Local Plan since the 1990's for residential development comprising 2700 dwellings. A planning application was submitted in 1998 for a mixed use development comprising in the main 2200 dwellings, a school, employment, commercial and a park and ride site. The application was supported by a Transport Assessment based on comprehensive consultations with West Sussex County Council (WSCC), Highways Agency (HAg) and Crawley Borough Council (CBC) and an advanced level of agreement had been reached for transport mitigation measures prior to the Government's Article 14 direction in March 1999 preventing a planning permission being granted until the situation with Gatwick's second runway had been resolved.

1.1.4 In 2005, it was decided to appeal the original planning application and the appeal is programmed to commence in October 2006. It was decided that given the length of time elapsed since the original Transport Assessment was prepared in 1998/1999, a new Transport Assessment would be required to support the application at the appeal.

1.1.5 A Transport Assessment scoping report was prepared in March 2006 and submitted to WSCC and HAg for comment and agreement. Subsequent correspondence, discussions and meetings with WSCC and HAg took place to address the TA scoping and the full TA has been prepared based on these discussions in conjunction with the content of the scoping report.

1.1.6 A new masterplan has been prepared for the North East Sector site incorporating the current approach to urban design, a copy of which is contained in Appendix 1. An amended planning application has also been submitted for 1900 dwellings and removal of the park and ride.

1.2 TRANSPORT ASSESSMENT STRUCTURE

1.2.1 The framework of the TA and the contents of each chapter are summarised as follows :

Section 2 : The Local Transport Network

Describes the transport network in the vicinity of the NES site including highways, pedestrian and cycle routes, bus services and rail services.

Section 3 : Development Proposals

Describes the development proposals and sets out the proposed masterplan principles, development content and access proposals.

Section 4 : Sustainable Transport Assessment

Considers the opportunities and proposals for travel by sustainable transport modes and how the proposed development can help to encourage sustainable travel mode choices. This section describes the proposals for travel by pedestrian, cycle, bus and rail modes.

Section 5 : Traffic Flow Predictions

Describes the methodology used to predict the future residual travel by car on the local road network both without and with the proposed development. The traffic predictions are separately assessed for unrestrained and target predictions in background travel growth and mode share change.

Section 6 : Junction Improvements and Operational Assessment

Describes the assessments undertaken of the junctions as agreed with the authorities. Where there has been identified a material increase in traffic, junction improvements have been investigated on a nil-detriment basis (as agreed with West Sussex County Council and the Highways Agency), in that the operation of the junctions is no worse, but where possible, better than in the absence of the NES development. The safety aspects of the highway infrastructure within the study area have also been considered based on road traffic accident data.

Section 7 : M23 Junction 10 Operational Assessment

This section of the TA investigates the operation of Junction 10 separately from other junctions for the benefit of the Highways Agency.

Section 8 : Transport Policies

Reviews current transport policies of the Government, West Sussex County Council and Crawley Borough Council that are relevant to the NES site.

Section 9 : Conclusions

Summarises the main conclusions from each section and gives an overall recommendation on the sustainability of the development proposals in complying with sustainable travel policies while mitigating the residual impact of travel by private car.

2 The Local Transport Network

2.1 INTRODUCTION

2.1.1 This section describes the local transport network available for pedestrians, cyclists and motor vehicles in the vicinity of the NES site. Figure 2 shows a street plan of the area surrounding the NES site.

2.2 PEDESTRIAN FACILITIES

2.2.1 The area immediately surrounding the NES site is currently poor in the provision of pedestrian facilities. Balcombe Road has a footway on the western side adjacent to the site. Pedestrian refuges across Balcombe Road are available in the vicinity of the Heathy Farm/crematorium access roads.

2.2.2 The position of the site in relation to Crawley Avenue and the railway line currently restricts the opportunities for walking to the main local destinations.

2.3 CYCLE FACILITIES

2.3.1 The cycle network in the immediate vicinity of the NES site is currently poor with few purpose built features; however, to the west of the railway line, good segregated cycle facilities are available linking to the north to Gatwick and south towards the town centre. A map showing current and proposed cycle facilities in Crawley is contained in Appendix 2.

2.3.2 A National Cycle Network route is located which passes along Gatwick Road from Gatwick Airport in the north and Three Bridges Station/town centre in the south as shown on the SUSTRANS map extract in Appendix 2. The map extract also shows a proposed future National Cycle Network route passing through the NES site from Radford Road in the north, passing beneath the existing sub-way under Crawley Avenue in the south and beyond.

2.4 EXISTING BUS ROUTES

2.4.1 In recent years there has been a major investment in bus services and infrastructure in the Crawley Area, particularly the Fastway guided bus services 10 and 20. Bus stops along these routes have real time information for passengers, which are also available on Metrobus website. There has been a substantial increase in bus patronage in Crawley in recent years, namely a 23% increase in bus usage across the network.

2.4.2 Crawley bus station is located in the town centre, near to Crawley station. There is also a travel shop in the bus station where timetable books can be obtained and season tickets bought.

2.4.3 There are a number of bus routes that already operate on the roads adjacent to the site. There are also other routes close by which currently serve Gatwick Road to the east of the site and the Pound Hill area to the south of the site which may present opportunities for public transport services to the development.

2.4.4 Tables 2.1 and 2.3 show the services that are available in the vicinity of the site and provides details of their frequency, destinations and days of operation. Figure 3 shows how these routes relate geographically to the site. All routes are operated by Metrobus, with some being supported by West Sussex County Council.

Table 2.1 Existing Bus Routes – Serving Roads Adjacent to the Site

Route No.	Places Served	Days of Operation	Frequency	First and Last
Serving Roads Adjacent to the Site				
X90/490	Gatwick, Copthorne, Felbridge, East Grinstead	Mon – Fri	2 per day	16:08 & 17:38
X90/490	East Grinstead, Felbridge, Copthorne, Gatwick	Mon – Fri	5 per day	04:15 & 07:57
544	Dormansland, Lingfield, Smallfield, Burstow, Crawley	Tues	1 per day	09:41
544	Crawley, Burstow, Smallfield, Lingfield, Dormansland	Tue	1 per day	12:15
526 (Clockwise)	Crawley, Charlwood, Hookwood, Horley, Smallfield, Burstow, Copthorne, Tinsley Green, Crawley	Mon – Fri, Sat	1 per hour 1 per 1½ hour	07:15 & 18:55 08:50 & 17:20
527 (Anti-Clockwise)	Crawley, Tinsley Green, Copthorne, Burstow, Smallfield, Horley, Hookwood, Charlwood, Crawley	Mon – Fri, Sat	1 per hour 1 per 1½ hour	06:37 & 17:35 07:48 & 16:05

2.4.5 These routes are relatively infrequent with the 526/527 route being a circular route with the 526 operating the clockwise direction and the 527 operating the anti-clockwise direction. This route is long and serves a number of destinations; it takes approximately 1 hour and 10 minutes to complete the circuit. These routes are also fully supported by West Sussex County Council and operated under contract by Metrobus.

2.4.6 The X90/490 and route 544 are infrequent services which already serve many parts of the site.

Table 2.2 Existing Bus Routes – Serving Gatwick Road

Route No.	Places Served	Days of Operation	Frequency	First and Last
Serving Gatwick Road				
10 (Fastway)	Gatwick Airport, City Place, Manor Royal, Crawley, Broadfield, Bewbush	Mon – Fri Sat Sun	10 min 10 min 20 min	00:15 & 23:45 00:15 & 23:45 00:15 & 23:45
10 (Fastway)	Bewbush, Broadfield, Crawley, Manor Royal, City Place, Gatwick Airport	Mon – Fri Sat Sun	10 min 10 min 20 min	00:15 & 23:45 00:15 & 23:45 00:15 & 23:45
20 (Fastway)	Broadfield, Town Centre South, Three Bridges, Gatwick Airport, Horley Town Centre, Horley Langshott	Mon – Fri Sat Sun	20 min 20 min 1 per hour	05:20 & 22:34 05:20 & 22:34 05:35 & 22:34
20 (Fastway)	Horley Langshott, Horley Town Centre, Gatwick Airport, Three Bridges, Town Centre South, Broadfield	Mon – Fri Sat Sun	20 min 20 min 1 per hour	05:10 & 22:50 05:10 & 22:50 05:50 & 23:30
200	Bewbush, Gossops Green, Ilfield, Langley Green, Manor Royal, City Place, Gatwick Airport	Mon – Fri Sat Sun	30 min 30 min 30 min	04:26 & 23:00 04:26 & 23:00 04:26 & 23:00
200	Gatwick Airport, City Place, Manor Royal, Langley Green, Ilfield, Gossops Green, Bewbush	Mon – Fri Sat Sun	30 min 30 min 30 min	04:51 & 23;34 05:02 & 23:34 05:02 & 23:34

2.4.7 Table 2.2 above shows the bus routes that currently serve Gatwick Road which is located to the east of the site beyond the railway line. Access to these routes would be via Radford Road or Crawley Avenue. There are no existing direct pedestrian routes from the site that could more easily access these services on Gatwick Road.

2.4.8 The Fastway services present a very high frequency and high quality bus service along this corridor which could be beneficial to the site, serving a number of destinations that would be important for the site residents including : Gatwick Airport, Three Bridges Station and Crawley Town Centre.

Table 2.3 Existing Bus Routes – Serving Pound Hill

Route No.	Places Served	Days of Operation	Frequency	First and Last
Serving Pound Hill, Wakenhams Green and Crabbet Park				
4/5	Ilfield West, Ilfield, Crawley, Three Bridges, Pound Hill (5 – Crabbet Park), (4 – Wakenhams Green, Crabbet Park)	Mon – Fri Sat Sun	15 min 15 min 30 min	06:10 & 22:49 07:25 & 22:49 07:19 & 22:19
4/5	(5 – Crabbet Park, Wakenhams Green), 4 – Wakenhams Green), Pound Hill, Three Bridges, Crawley, Ilfield, Ilfield West	Mon – Fri Sat Sun	15 min 15 min 30 min	06:28 & 23:19 07:18 & 23:19 07:48 & 22:46

2.4.9 The Pound Hill area of Crawley is located to the south of Crawley Avenue which runs along the southern edge of the development site. A 15 minute frequency service is in operation in this area and provides linkages to Three Bridges Station and Crawley Town Centre in particular.

2.4.10 Metrobus also operate the majority of school services; however, most are served by normal existing routes with minor diversions at school times.

2.5 EXISTING RAIL SERVICES

2.5.1 Crawley residents have the opportunity to travel from Three Bridges rail station and Crawley rail station. Rail services from these stations are generally provided by Southern Railways and provide access to the following destinations:

- Horley
- Horsham
- Gatwick Airport
- Brighton (Approx. 25 min.)
- Chichester
- London Victoria (Approx. 20 min.)

2.5.2 The nearest commuter railway station to the NES site is Three Bridges, which is at a distance of about 2km from the centre of the site. Train services from Three Bridges station are operated by Southern Trains to destinations such as London, Brighton etc.,

2.5.3 The following facilities are available at Three Bridges station :

- Ticket office

- Taxi rank

2.6 LOCAL ROAD NETWORK

2.6.1 A description of the principal roads in the vicinity of the site is given below :

- Balcome Road – A two-way single carriageway road running north to south forming the B2036 between Horley and Crawley. Balcombe Road has a speed limit of 40mph and has frontage access to a variety of properties including public houses and the crematorium, South of Crawley Avenue, Balcombe Road enters the existing residential areas of Crawley. Balcombe Road meets the A2220 Copthorne Road at a roundabout junction.

  To the north of the site (south of Antlands Lane), The Balcombe Road carries 1450 and 2120 total two-way vehicles during the morning and evening peak hours respectively. The corresponding flows on Balcombe Road at the south end of the site (north of Crawley Avenue) are 1610 and 1498 vehicles during the morning and evening peak hours respectively.

- Radford Road – A two-way single carriageway road running east to west between a priority junction with Balcombe Road and a roundabout at Gatwick Road. There is residential frontage access to Radford Road in the vicinity of Balcombe Road. Radford Road also passes over the Gatwick stream and the Three Bridges station to Gatwick railway line. Radford Road has a 40mph speed limit.

- Steers Lane – a two-way single carriageway road between Radford Road and Balcombe Road. The majority of traffic on Steers Lane goes to and from the south onto Balcombe Road. Steers Lane has a 40mph speed limit.

- Crawley Avenue – The 2011 Crawley Avenue is the main route into Crawley from the M23 Junction 10 and the East Grinstead area. Crawley Avenue is a dual carriageway road. The speed limit on Crawley Avenue is currently 60mph. The junction of Crawley Avenue and Balcombe Road is currently formed by west facing slip roads.

- Gatwick Road – Gatwick Road runs between the A2011 and A23 through the Manor Royal employment/industrial area and currently has a speed limit of 40mph. Gatwick Road also forms part of the Fastway bus route and has recently been improved with bus lanes in either direction and short stretches of guided bus way.

3 Development Proposals for NES Crawley

3.1 INTRODUCTION

3.1.1 This section outlines the key land uses on the site, and provides details of the on-site transport infrastructure which will be provided as part of the NES proposals. A copy of the development masterplan is contained in Appendix 1.

3.2 LAND USE

3.2.1 The 1998 planning application for the NES site comprised the following uses :

- 2200 dwellings, (a further 500 dwellings are allocated within the full Local Plan allocation);
- 5000 sq.m B1/B2/B8 employment;
- Local centres/commercial/community facilities (2,500 sq.m);
- Playing fields; and
- First and Middle School;

It is also proposed to safeguard a site for park and ride should WSCC/CBC decide to implement a park and ride in the future.

3.3 NES DETAILED MASTERPLAN

3.3.1 A detailed masterplan has been prepared to illustrate the NES development proposals and a copy of this is contained in Appendix 1.

3.4 NES DEVELOPMENT CONTENT

Residential

3.4.1 In order to undertake a rigorous assessment of travel demand for the proposed development, the following detailed development content breakdown has been used based on 40% affordable dwellings.

Table 3.1 Dwelling Type Breakdown Mix

	Housing	Flats	Total
Affordable	20%	20%	40%
Market	55%	5%	60%
Total	75%	25%	

Commercial/Retail

3.4.2 A floor area of 2500 sq.m total of commercial/retail floorspace is stated within the planning application. This level of development is deemed of an appropriate size to

serve the new neighbourhood while not attracting trips from offsite. It is therefore considered that there will be no significant offsite traffic generated by the proposed commercial/retail area during the morning and evening peak hour.

3 Form Entry Primary School

3.4.3 Whilst under current Government rules on school admissions, it cannot be guaranteed that all pupils within the NES site will attend the school provided; however, the likelihood is that the vast majority of pupils will be sourced from within the development and therefore no significant numbers of offsite trips in the morning peak hour will occur. School trips do not affect the evening peak hour.

Employment

3.4.4 The employment trip rate is based upon a mixture of B1, B2 and B8 land uses, comprising a total of 5000 sq.m. The proposed breakdown of employment land use, and the anticipated floor space area is provided in Table 3.2 below.

Table 3.2 Employment Land Use

Land Use	Floor Area (sq.m)
B1 (33%)	**1667**
B2 (33%)	**1667**
B8 (33%)	**1667**

3.5 ACCESS

3.5.1 There are proposed to be the following vehicular access points to the local highway network from the NES site, as highlighted on Figure 4 namely :

- Traffic signal controlled junction onto A2011 Crawley Avenue via Balcombe Road;
- Two traffic signal controlled junctions onto Balcombe Road;
- Traffic signal tee junction onto Steers Lane.

3.5.2 General arrangement drawings of each proposed access are contained in the relevant Appendix to the TA.

3.6 PEDESTRIAN AND CYCLE FACILITIES

3.6.1 Pedestrian and cycle facilities will be provided within the NES site as shown on the masterplan with connections to the following offsite locations :

- Between the Steers Lane site access and Gatwick Road comprising the SUSTRANS National Cycle Network route;

- Under the A2011 Crawley Avenue using the underpass between the NES site and Grafton Park to the south of the A2011 as part of the SUSTRANS National Cycle Network; and
- Along the north side of the A2011 Crawley Avenue to the Hazelwick Interchange for access to the town centre and Manor Royal south. These are described in more detail in section 4 of this TA.

3.6.2 The proposed internal footway/cycleway network which is incorporated within the Masterplan layout illustrated in Appendix I. It has been developed to optimise accessibility between residential areas and various other facilities including public transport.

3.6.3 A north/south pedestrian/cycle route is proposed. This would form part of the National Cycle Network route being promoted by SUSTRANS. It links to the SUSTRANS route at the north of the site via a signal controlled crossing at Radford Road and a segregated crossing of the rail line at Radford Road Bridge. It links to the SUSTRANS route south of the site via the existing Crawley Avenue underpass north of Grattons Park.

3.6.4 An east/west route would link between the existing public footpaths to the east of the M23, via the existing M23 accommodation bridge, and Steers Lane (using sections of the existing public footpath) thus providing a link to the neighbourhood facilities, and primary school. From Steers Lane a new footpath will link in a south westerly direction to the SUSTRANS north-south route. Further south, a westerly link provides access to the proposed employment area.

3.6.5 A more southerly east/west route would link the south east of the development to the proposed employment are (traversing the northern boundary of the crematorium).

3.6.6 A circular route is proposed linking the SUSTRANS route at Radford Road, the north western residential area, the proposed employment area, the recreation areas in the south west of the site, the southern end of the SUSTRANS route, the southern residential areas, Balcombe Road south of the crematorium, the eastern residential areas and Balcombe Road north of Steers Lane.

3.7 BUS FACILITIES

3.7.1 The main streets that serve the two residential areas east and west of Balcombe Road will be designed to accommodate bus movements while maximising the number of dwellings within easy walking distance of the main streets. Bus shelters will be provided to a good standard and ready to accept real time information signs.

3.8 BALCOMBE ROAD DIVERSION

3.8.1 The masterplan submitted with the original 1998 application incorporated a diversion of Balcombe Road by way of a ‘distributor road’ skirting around the eastern perimeter of the site in association with closing Balcombe Road to general traffic except buses. This requirement was originally set out in the development brief for the site as prepared by CBC.

3.8.2 For the new masterplan it has been concluded that on the basis of current best urban design practice, the ‘distributor road’ diversion is not an appropriate approach.

The new masterplan has now replaced the 'distributor road' with a street designed for all modes while keeping Balcombe Road open. It is considered that the severance effect of keeping Balcombe Road open to traffic can be mitigated for by a traffic calming scheme to reduce vehicle speeds in conjunction with a reduced speed limit to 30 mph.

3.8.3 At the north and south access points to the site off Balcombe Road, it is proposed to introduce traffic signal control to demarcate the ends of the traffic calming scheme. For the section of Balcombe Road between the two accesses, it is proposed to introduce a mixture of traffic calming measures (e.g. raised tables, chicanes, narrowings etc.,) interspersed with signal controlled pedestrian/cycle crossings to fit in with masterplan footpath/cycleway network.

4 Sustainable Transport Assessment

4.1 INTRODUCTION

4.1.1 When consideration is being given as to where to locate and how to implement new development, the opportunities for travel by sustainable modes of transport, especially day to day facilities, are given high importance under current Government guidance.

4.1.2 This section reviews the location of the NES site with respect to local day to day facilities, both internal and external to the site, the proposed improvements to the transport network and the accessibility of the site to sustainable modes of transport.

4.2 TRAVEL CHARACTERISTICS IN CRAWLEY

4.2.1 Crawley Borough is a major destination for employment trips, namely Gatwick Airport, the Manor Royal Estate and the town centre itself.

4.2.2 Crawley is ranked at number one in the South East Region for net in commuting, there being more people travelling into the area to work than travel out. An imbalance therefore exists in Crawley between the number of jobs and the number of residents.

4.2.3 Providing more housing in the Borough to address the jobs/housing imbalance will consequently reduce the need for commuting trips from outside the Borough.

4.2.4 The location of the NES site is considered the best location to help resolve the jobs/housing imbalance given that it is only a short journey to reach all three main employment destinations, namely Gatwick Airport, Manor Royal area and the town centre.

4.2.5 By virtue of the location of the NES site, it is therefore considered that the NES site has a significant potential to reduce both the number of journeys to work by car and also the length of journeys to work.

4.3 LOCAL FACILITIES

4.3.1 Within Crawley, there are major employment opportunities, shopping and town centre uses, leisure facilities and a range of education establishments as well as Gatwick Airport. The main local land use destinations for day to day journeys in Crawley are shown on Figure 5.

4.3.2 PPG13 refers to walking and cycling as having the potential to replace short car trips, particularly those under 2km for walking and 5km for cycling although cycling is still a feasible journey mode for distances greater than 5km.

4.4 FACILITIES WITHIN WALKING DISTANCE

4.4.1 Figure 5 illustrates all existing facilities in the vicinity of the site. Indicative journey times from the site boundary have been prepared at 5 minute intervals up to 25 minutes and are shown on Figure 6. The walking speed which has been used to develop the distance travelled is 100m per minute (as derived from PPG13 “A Guide to Better Practice”), which is equivalent to 3.5mph, approaching a brisk walking pace.

4.4.2 Examples of existing day to day destinations within Crawley that can be reached within a 20 minute walk from the NES site are notably :

- Employment areas (Manor Royal, County Oak Forge Wood, Gatwick Business Park and Gatwick Airport);
- Hazelwick Secondary School;
- Milton Mount First and Middle Schools;
- Three Bridges Station
- Gatwick Airport Station;
- Tesco Store;
- Dentist;
- Doctor.

4.4.3 The footpath/footway network proposed within the site is indicated on Figure 4. The provisional masterplan layout has been designed to allow permeability of routes within the site.

4.5 FACILITIES WITHIN CYCLING DISTANCE

4.5.1 Given the size of Crawley, Figure 7 illustrates that all of Crawley and Horley is accessible within a 20 minute cycle ride of the site. Indicative cycle isochrones from the site are based on a cycling speed of 300m per minute, which is approximately 12 mph.

4.6 PROPOSED OFFSITE PEDESTRIAN AND CYCLE FACILITIES

4.6.1 The onsite pedestrian and cycle facilities incorporated within the masterplan are described in Section 3.0. The offsite pedestrian and cycle facilities to which financial contributions are appropriate are described as follows and are shown on Figure 8.

- The new Crawley Avenue cycleway along the north side of Crawley Avenue linking the North East Sector to Manor Royal and to the pedestrian overbridge at Hazelwick Roundabout;
- The provision of a segregated footway/cycleway at Radford Road rail bridge (in conjunction with the SUSTRANS route) and introduction of traffic signal controlled shuttle working for traffic to accommodate the cycle route;
- The provision of a segregated cycle/pedestrian route on the east side of Northgate Avenue;
- St Mary's Drive Mandatory/Advisory cycle lanes;
- SUSTRANS route south of Crawley Avenue (through existing underpass) and through Grafton Park to link with St Mary's Drive.

4.7 BUS ACCESSIBILITY AND PROPOSALS

4.7.1 The public transport strategy for the NES site has been prepared in consultation with West Sussex County Council and the local bus operators, Metrobus.

4.7.2 WSP have produced a strategy for providing a high standard of public transport for the NES site. The public transport strategy is detailed in a separate report from this TA including options considered and phasing viability assessments but its contents are summarised below.

4.7.3 The layout of the masterplan largely dictates the nature of the route through the site. As a result of this, a circular route around the site is proposed. The suggested route around the site is shown in Figure 9 which includes an indication of routes entering the site from the north and from the south of the site.

4.7.4 The proposed route through the site would serve all local amenities including areas of employment, the local centre, the school and the community centre. Through the suggested location of the bus stops all dwellings are within 400m of a proposed stop which ensures all residents have access to the public transport services.

4.7.5 The bus stop infrastructure will provide a high quality waiting environment for passengers and all stops will be provided with high quality shelters.

4.7.6 Information will be comprehensive and reliable through the provision of real time passenger information at all the stops located within the site.

4.7.7 It is further proposed that suitable kerbing will be provided at all new bus stops to ensure a good level of accessibility to the vehicles for all users.

4.7.8 There are a number of factors that affect public transport use that have been well researched and are now generally accepted as influencing public transport use. This includes the total journey time (including walking, waiting and in-vehicle time), the reliability, information, flexibility, hours of operation, fares and ticketing and overall comfort and quality of the vehicle, shelter and information.

4.7.9 To overcome these issues, the gap between the perceived difficulty in making a trip by bus compared to private car needs to be reduced. In this public transport strategy these factors have been taken into account leading to a strategy that aims to encourage use of public transport by providing a high level of service to key destinations in the surrounding area. It aims to support and enhance the existing bus network by supplementing it with additional services where appropriate to help achieve financial viability in the longer term, whilst also giving consideration to existing improvement schemes such as the Fastway project.

4.7.10 The quality and frequency of a bus service influences its demand. With this in mind, it is proposed that a high level of service should be achieved for the development. West Sussex County Council does not set out a specification for bus service levels associated with new developments in their Bus Strategy; however, WSP have used experience from elsewhere to determine a suitable level of service for the development.

4.7.11 It is suggested that the following levels of service provide an excellent bus service for the development and should be achievable at Crawley North East :

- Monday to Friday – 06:30 to 19:30 4 per hour;
- Monday to Friday – 19:30 to 23:30 3 per hour;
- Saturday – 07:30 to 19:30 4 per hour;
- Saturday – 19:30 to 23:30 3 per hour;

- Sunday – 09:00 to 23:00 2 per hour.

4.7.12 There are a number of destinations that it will be important to serve by bus to ensure that the residents have a choice of sustainable transport modes. In particular it is suggested that the following destinations by bus should be available from the site :

- Crawley town centre;
- Three Bridges station;
- Gatwick Airport;
- Manor Royal Industrial Estate.

4.7.13 With all of these factors in mind, the following options for providing the suggested level of bus service for the site have been considered and investigated during the development of the preferred strategy, both individually and as packages to achieve the necessary specification for the site :

- Option 1 : Route 526/527 diversion and frequency enhancement;
- Option 2 : Route 4/5 extension and frequency enhancement;
- Option 3 : Shuttle service providing a direct link to the Fastway service;
- Option 4 : Site specific shuttle bus service.

4.7.14 Following consideration of the above options, the preferred approach to bus service provision for the site is to extend the existing route 4/5 to and around the site to provide a two-way 15 minute frequency service. This would serve Three Bridges rail station and Crawley town centre. It is further proposed that this is combined with a shuttle bus service for the site to serve Manor Royal and Gatwick Airport.

4.7.15 The proposed bus services provide an overall bus frequency within the site of 8 buses per hour on a Monday to Saturday and 4 buses per hour on a Sunday. This represents an excellent overall level of public transport provision for Crawley NES and serves the primary destinations of the site residents.

4.7.16 It is proposed that the 4/5 extension should occur from the early stages of development providing 4 buses per hour for the site after the first year of occupation. It is further proposed that after the first year of house occupation, a frequency of 4 services per hour is provided to Manor Royal and Gatwick Airport. The days and hours of operation would be as suggested in paragraph 4.7.11.

4.7.17 A financial viability assessment of the proposed bus strategy was undertaken as part of the Public Transport Strategy Report and concluded that a financial contribution to revenue support will be needed in the early years of the development buildout but that the services will not require financial support beyond about 1800 dwellings.

4.8 TRAVEL PLAN

4.8.1 A major part of recent Government guidance is the emergence of travel plans, not only for employment land uses where a degree of control can be exercised over the

travel behaviour of employees but also for residential land uses, where safer measures are needed to encourage new residents to make journeys without their car.

4.8.2 A Travel Plan comprises a package of measures which raise awareness, encourage and provide incentives for people to choose more sustainable means of travel and thereby reduce traffic generation and congestion.

4.8.3 PPG13 states that Travel Plans should be a requirement of new developments. Organisations implement travel plans as a means of changing the mode of travel of employees by reducing car use and increasing the use of public transport, walking and cycling modes. It is difficult to be too prescriptive at the planning application stage given that travel plans are implemented by organisations which may not be in place until after permission has been granted.

4.8.4 With regard to residential development, Community Travel Plans can help influence people's mode of travel. As part of the NES Community Travel Plan, arrangements will be put in place to provide each new homeowner with a locally tailored travel information pack giving details of all local facilities and the range of destinations accessible by non-car modes. This will include individual visits offered to each household as they take up residence to discuss travel options and how to use local public transport. A similar offer would be made to local businesses. This should be the case as people move in throughout the period of development, whether they move into a brand new house or they move in after others have moved out. A household travel information pack should be provided for each house. A Community Travel Plan could be prepared as a condition of a planning consent.

4.9 CONCLUSIONS

4.9.1 Crawley is ranked at number one in the South East Region for net in commuting, there being more people travelling into the area to work than travel out. An imbalance therefore exists in Crawley between the number of jobs and the number of residents. By virtue of the location of the NES site, it is therefore considered that the NES site has a significant potential to reduce both the number of journeys to work by car and also the length of journeys to work.

4.9.2 The NES development offers, given its accessible proximity to a significant and comprehensive mix of land uses, a high potential to meet the day to day travel needs of residents by sustainable modes and reduce the length of journeys.

4.9.3 The location of the NES site will offer its residents the opportunity to travel by walk, cycle or bus to major destinations in Crawley including education, leisure, employment and the various town centre uses together with Gatwick Airport.

4.9.4 The proposals for off-site pedestrian and cycle linkages will provide residents of the site with the opportunity to walk or cycle to the main local destinations.

4.9.5 With respect to the proposed public transport strategy, the NES development will provide a good level of public transport services to major local destinations while being financially viable in the long term.

4.9.6 The proposed bus services provide an overall bus frequency within the site of 8 buses per hour on a Monday to Saturday and 4 buses per hour on a Sunday. This represents an excellent overall level of public transport provision for Crawley NES and serves the primary destinations of the site residents.

4.9.7 With regard to residential development, arrangements will be put in place to provide each new occupier with a locally tailored travel information pack giving details of all local facilities and the range of destinations accessible by non-car modes as part of a Community Travel Plan to be prepared as a condition once permission has been granted.

5 Traffic Flow Predictions

5.1 INTRODUCTION

5.1.1 This section of the TA describes the methodology, assumptions and calculations undertaken in developing the traffic flow predictions.

5.1.2 The proposed methodology for preparation of the traffic flow predictions was set out in the scoping assessment submitted to the highway authorities, West Sussex County Council (WSCC) and Highways Agency (HAg), in March 2006.

5.2 HISTORIC TRAFFIC DATA

5.2.1 The future traffic flow predictions undertaken within a TA usually incorporate allowances for background traffic growth based on, for example, the TEMPRO software. The background growth factors thus derived assume unconstrained ability for the highway network to absorb traffic flow increases; however, in the vicinity of most urban areas, traffic growth is restrained by the network constraints especially during the peak hours. This often leads to over-prediction of future traffic flows and hence over-design of junction improvements which can then provide unnecessary traffic capacity and hence induce traffic growth. Prior to undertaking the traffic forecasts, an investigation of historic traffic growth was therefore undertaken to establish how traffic flows have changed in Crawley and on the M23 over the last 10 years.

5.3 M23 NORTH AND SOUTH OF JUNCTION 10

5.3.1 Historic traffic data for the M23 was obtained from the TRADS database for up to the previous 10 years where available. This data was analysed for year on year traffic flows on the M23 and is shown on the graphs in Appendix 5.

5.3.2 For the M23 north of Junction 10, it can be seen that there has been no traffic growth in either the AM or PM peak hours for at least the last seven years. Similarly there has been negligible traffic growth on the southbound M23 south of Junction 10 since 2002 during either AM or PM peak hours. For the northbound carriageway south of Junction 10 there has been negligible peak hour growth since 1998 during the PM peak but there has been more significant growth on the northbound carriageway during the AM peak although this can be attributed to the introduction of Junction 10a north pointing slips.

5.3.3 For Junction 10 itself, recently collected traffic counts for April 2006 were compared to counts collected during 1997. Traffic flows at Junction 10 itself have reduced by 9% between 1997 and 2006 during the AM peak hour although there has been a modest increase of about 1% per annum during the PM peak hour. There is an argument here for not using any peak hour growth and in fact this approach was actually agreed with the Highways Agency for Junction 10 as set out in the original TA for M23 Junction 10 dated March 1998.

5.3.4 Traffic flows on roads in Crawley as collected in April 2006, have also been compared to flows from the 1990's and it is evident that traffic flows have reduced on the majority of roads in Crawley.

5.3.5 It is evident from the conclusions of the historic traffic flow assessment that peak hour traffic growth has generally not occurred in Crawley and therefore the use of

unrestrained background traffic growth needs to be treated with extreme caution to avoid over-prediction of traffic.

5.4 2006 OBSERVED TRAFFIC

5.4.1 Traffic counts were undertaken on behalf of WSP in March 2006 at the junctions set out on Figure 10. These junctions form the study network for the junction assessments undertaken for this TA.

5.4.2 The observed turning movements at each of the junctions counted are shown on the traffic flow diagrams contained in Appendices 7 and 8 for the morning and evening peak hours respectively.

5.5 ASSESSMENT YEARS

5.5.1 Within the TA scoping discussions, the following assessment years were agreed with WSCC and the HAg :

- 2006;
- 2018; and
- 2025 (additional assessment year for Highways Agency junctions only).

5.6 BACKGROUND TRAFFIC GROWTH

5.6.1 Within the TA, two alternative traffic growth scenarios have been considered which are :

- Unrestrained traffic growth which represents predictions based on historic car based travel patterns and no network capacity restraint; and
- Target traffic growth based on WSCC LTP targets for reduction in growth of traffic representing the effect of policies and measures to engender a greater travel mode share by sustainable travel modes but also peak hour network restraint and peak spreading.

5.6.2 Local traffic growth factors for the NES site have been generated from TEMPRO using the South East version origin-destination dataset. Growth factors have been obtained for Great Britain and Crawley Borough for the following periods :

- 2006 to 2018; and
- 2006 to 2025.

5.6.3 The TEMPRO growth factors have been used to localise NRTF97 central growth factors by road type. Copies of the TEMPRO outputs and the growth factor calculations are contained in Appendix 6. The unrestrained growth factors used in the assessments in this TA are summarised in Table 5.1 below :

Table 5.1 : TEMPRO Localised NRTF97 Growth Factors

	AM Peak Period	PM Peak Period
2006 to 2018	1.196	1.230
2006 to 2025	1.212	1.267

5.6.4 The WSCC Local Transport Plan (LTP) contains a target growth of 0.8% per annum (see extracts of the WSCC LTP in Appendix 4). The target growth factors based on 0.8% per annum as agreed with WSCC and HAg are shown in Table 5.2 below.

Table 5.2 : Target Growth Factors

	Growth Factor
2006 to 2018	1.100
2006 to 2025	1.163

5.6.5 Given the low historic traffic growth trends in Crawley and on the M23, it is considered that target growth is more likely and that unrestrained growth will result in an over-prediction of traffic.

5.7 BACKGROUND TRAFFIC PREDICTIONS

5.7.1 It has been agreed with WSCC and HAg that the TEMPRO growth factors include specifically for planned housing and employment developments and therefore other developments in Crawley and East Grinstead are considered to be allowed for in background growth so as to avoid double counting of traffic and over-prediction of traffic. In addition, background growth has only been applied to through traffic routes (e.g. M23, A2011, A264, A23, Gatwick Road) to avoid growthing traffic on local roads and accesses where development is complete.

5.7.2 The area of the NES site beyond the 1998 application boundary has been included as an extra 500 dwellings within the development traffic predictions to make a total of 2700 dwellings. The background traffic flow diagrams for the years 2018 and 2025 are contained in Appendices 7 and 8 for the AM and PM peak hours respectively.

5.8 TRIP GENERATION

5.8.1 The TRICS database has been interrogated to obtain trip rates for the different land uses within the NES site. The following trip rates have been agreed with WSCC and HAg.

Residential

5.8.2 Residential trip rates have been obtained for private and non-private houses and private and non-private flats. The trip rates as agreed with WSCC and HAg are

given in Tables 5.3 to 5.6 below and copies of the TRICS outputs are contained in Appendix 9.

Table 5.3 : Private Housing Trip Rates per Household

	Arrivals	Departures
AM Peak	0.11	0.41
PM Peak	0.37	0.19

Table 5.4 : Non-Private Housing Trip Rates per Household

	Arrivals	Departures
AM Peak	0.18	0.34
PM Peak	0.39	0.27

Table 5.5 : Private Flats Trip Rates per Household

	Arrivals	Departures
AM Peak	0.07	0.20
PM Peak	0.15	0.08

Table 5.6 : Non-Private Flats Trip Rates per Household

	Arrivals	Departures
AM Peak	0.06	0.09
PM Peak	0.12	0.09

5.8.3 In order to undertake a rigorous assessment of travel demand for the proposed development, the following detailed development content breakdown has been used based on 40% affordable dwellings.

Table 5.7 : Dwelling Type Breakdown Mix

	Housing	Flats	Total
Affordable	20%	20%	40%
Market	55%	5%	60%
Total	75%	25%	

Employment

5.8.4 Trip rates for the employment land uses have been obtained from TRICS database. The mean trip rates per 100m² as agreed with WSCC and HAg are summarised in Tables 5.8 to 5.10 below and copies of the TRICS output files are contained in Appendix 9.

Table 5.8 : B1 Employment Trip Rates per 100m²

	Arrivals	Departures
AM Peak	1.74	0.19
PM Peak	0.16	1.49

Table 5.9 : B2 Employment Trip Rates per 100m²

	Arrivals	Departures
AM Peak	0.46	0.10
PM Peak	0.04	0.29

Table 5.10 : B8 Employment Trip Rates per 100m²

	Arrivals	Departures
AM Peak	0.15	0.08
PM Peak	0.12	0.17

5.8.5 The trip rates above have been multiplied by the respective land use areas above to obtain the traffic generated by the NES site as shown in Appendix 10. Table 5.11 below shows the total number of car trips generated in the morning and evening peak hours.

Table 5.11 : Total Car Trips from the NES Site

	Arrivals	Departures
AM Peak	323	894
PM Peak	845	499

5.9 TRIP INTERNALISATION

5.9.1 There are a number of ancillary land uses on the NES site including the retail stores and the proposed school. There will therefore be a number of trips which are likely to remain within the NES site, or be linked to these land uses. As such, the number of off-site trips has been reduced to take account of this and to avoid over-prediction of traffic (refer to Appendix 10).

5.10 TRIP ASSIGNMENT AND DISTRIBUTION

5.10.1 The journey to work tables from the 2001 census have been interrogated for Pound Hill North ward in Crawley Borough to use as a proxy for the distribution of all journeys originating from the NES site. The journey from Pound Hill North ward tables are used to generate the distribution of traffic from the residential land uses within the NES site, and the journey to Pound Hill North ward data have been used to generate the distribution of traffic from the other land uses within the site.

5.10.2 The distribution by zone data summary is contained on the calculation sheets in Appendix 10.

5.10.3 Traffic has been assigned to these zones using the most likely routes from the NES site, which has been split into two areas, east and west of Balcombe Road, as both parts are likely to have slightly different routings to some zones. Where there are two or more possible routes to a zone, traffic has been split between the routes. Calculations in Appendix 10 summarise the exit points of traffic from the NES study network, and the traffic assigned to each of these exit points. The traffic flow diagrams contained in Appendices 11 and 12 show the percentage distribution of traffic from each land use for the morning and evening peak hours respectively.

5.11 TRAFFIC FLOW DIAGRAMS

5.11.1 Traffic flow diagrams have been used to assign the generated traffic using the above described trip distribution and assignment methodologies. The diagrams also illustrate trips generated by each land use individually, the resultant percentage increase in total traffic flow arising from the NES development and the proportion of heavy goods vehicles.

5.11.2 The diagrams have been prepared for both the unrestrained traffic growth and target traffic growth scenarios for the assessment years 2018 and 2025 and are contained in Appendices 11 and 12 for the morning and evening peak hours respectively. The predicted traffic flows derived have been used to assess the performance of each junction included in the scope of assessment. Details of the junction assessments are described in Section 6.0 and 7.0 of this TA.

5.12 CONCLUSIONS

5.12.1 It is evident from the conclusions of the historic traffic flow assessment that peak hour traffic growth has generally not occurred in Crawley and therefore the use of unrestrained background traffic growth needs to be treated with extreme caution to avoid over-prediction of traffic.

5.12.2 Detailed traffic flow calculations have been undertaken to fully assess the impact of the residual net change in traffic flows arising from the development proposals. The traffic flow predictions include background traffic growth for the 2018 and 2025 assessment years.

5.12.3 The proposed methodology for preparation of the traffic flow predictions was set out in the scoping assessment submitted to the highway authorities prior to

preparation of this TA. Within the TA, two alternative traffic growth scenarios have been considered namely unrestrained and target growth.

5.12.4 Given the low historic traffic growth trends in Crawley and on the M23, it is considered that target growth is more likely and that unrestrained growth will result in an over-prediction of traffic.

5.12.5 On this basis, where junction improvements are identified to be necessary in the TA, the improvements have been designed on the basis of accommodating target traffic growth only on a nil-detriment basis; however, the improvements are also tested for unrestrained growth as a sensitivity scenario.

6 Junction Operational Assessments

6.1 INTRODUCTION

6.1.1 This section of the TA concerns the assessment of the performance of selected junctions within the study network and which are shown on Figure 10. The existing junctions have been modelled using the traffic flow predictions described in Section 5. Where the impact of traffic arising from the NES development is considered material, improvements to the junctions have been prepared on a nil-detriment basis; that is, the performance of the junctions following implementation of the proposed NES development will be no worse (or potentially much better) than the conditions with no improvements and without the proposed development. The M23 Junction 10 is considered separately in Section 7.

6.1.2 The results of the junction assessments are described in this section with conclusions regarding each junction and an overall conclusion concerning the conditions on the network in the future assessment years.

6.1.3 The morning and evening peak traffic flow predictions have been used to assess the performance of the existing junctions and, where appropriate, the effect of improvements to the junctions.

6.1.4 Given the low historic traffic growth trends in Crawley and on the M23, it is considered that target growth is more likely and that unrestrained growth will result in an over-prediction of traffic.

6.1.5 On this basis, where junction improvements are identified to be necessary in the TA, the improvements have been designed on the basis of accommodating target traffic growth only on a nil-detriment basis; however, the improvements are also tested for unrestrained growth as a sensitivity scenario.

6.2 BASE YEAR 2006

6.2.1 Observed traffic data collected in 2006 has been used to model the existing baseline junction performance.

6.3 ASSESSMENT YEAR 2018

6.3.1 The junction locations on Figure 10 have been assessed using the following traffic flow predictions :

- Background traffic;
- Background with completed NES development.

6.3.2 Two scenarios have also been tested for each junction :

- Unrestrained background growth with and without development; and
- Target background traffic growth with and without development.

6.4 JUNCTION ASSESSMENTS

6.4.1 This section describes the junction operation assessments undertaken to determine the effect of traffic arising from the NES development on the local highway

network in Crawley. The following junctions, the locations of which are shown on Figure 10, have been assessed :

- F Hazelwick Roundabout (A2011 Crawley Avenue/Hazelwick Avenue/Northgate Avenue/Gatwick Road);
- G Tushmore Roundabout (Crawley Avenue/London Road/Langley Drive);
- K Balcombe Road/Steers Lane;
- M Balcombe Road/Radford Road;
- N Balcombe Road/Antlands Lane;
- O Balcombe Road/Copthorne Road/Worth Park Avenue;
- A A23/Gatwick Road/Gatwick Perimeter Road;
- B Gatwick Road/Beehive Ring Road;
- C Gatwick Road/Radford Road/James Watt Way;
- D Gatwick Road/Fleming Way;
- E Gatwick Road/Manor Royal;
- L Radford Road/Steers Lane;
- Site Access Junctions; and
- Radford Road Railway Bridge.

6.4.2 The junctions in the above list have been modelled using appropriate software. The results of the junction assessments are summarised in this section for each junction, with additional information comprising, existing and improved layouts where appropriate, modelling results and summary tables of junction performance modelling included in the Appendices to the TA.

6.4.3 Road traffic accident data has been obtained for the previous 3 years for roads within the study network. The accident locations are shown on Figure 11.

6.4.4 Junction improvements, where appropriate, have been prepared on a nil detriment basis, that is the junction performance with the NES development and highway improvement is no worse than with the existing junction but without the NES development. Where improvements have been prepared which identify a solution to resolve any remaining congestion beyond the nil detriment requirement, it is not implicit that the NES development is responsible for funding the full improvement.

6.4.5 The remainder of this section of the TA describes the junction assessments and, where applicable, highway improvements and summarises the results of the junction operational assessment using the predicted traffic flows.

6.5 HAZELWICK INTERCHANGE

6.5.1 The Hazelwick interchange is a large five arm roundabout with a flyover between Hazelwick Avenue and Gatwick Road and a free flow left turn lane between Gatwick Road and Crawley Avenue (east). The predominant traffic movements are the right turn from Crawley Avenue (east) to Gatwick Road in the morning peak hour, and

the return movement in the evening peak hour. Drawing No.0560/SK/100 located in Appendix 13 shows the existing layout of the roundabout.

6.5.2 A sample ARCADY output file is contained in Appendix 13 for the "2006 AM" and PM traffic scenario to show the geometric parameters which have been used. ARCADY results for the other scenarios tested are summarised on the table in Appendix 13.

6.5.3 The ARCADY modelling predicts that capacity will be exceeded in both the morning and evening peak hours in the "2018" traffic flow scenarios without the NES development. In the morning peak hour, queuing is predicted on Crawley Avenue (east) and Hazelwick Avenue under all traffic scenarios. The evening peak hour models predict that capacity will be exceeded on Crawley Avenue (east), Hazelwick Avenue, Northgate Avenue and Crawley Avenue (west).

6.5.4 The degree of oversaturation predicted in the morning peak hour means that providing a roundabout improvement will not provide sufficient capacity. The junction improvement proposed for the Hazelwick roundabout is therefore to signalise all five arms of the roundabout as shown on Drawing No. 0560/SK16 contained in Appendix 13 Spiral lane markings are proposed to channel vehicles in the correct lane around the junction.

6.5.5 The capacity of the proposed signalised roundabout has been assessed by using TRANSYT. A lane flow balancing exercise has been undertaken using Flow Round, and then applied to the TRANSYT links. A copy of the TRANSYT Link diagram, Flowround output and link flows spreadsheet is contained in Appendix 13 for the "2018 T + D" traffic scenario. The TRANSYT model results for all scenarios are summarised in the table in Appendix 13 and a copy of the TRANSYT output for the "2018 T + D" scenario is also contained in Appendix 13.

6.5.6 The TRANSYT modelling demonstrates that the proposed traffic signal junction operates within capacity in the morning peak hour under the "2018 T + D" traffic scenario, and much better than a nil detriment. The proposed junction layout therefore offers a much better than nil detriment improvement to the junction.

6.6 TUSHMORE ROUNDABOUT

6.6.1 The Tushmore roundabout is a five arm signalised roundabout junction with toucan crossings across the entry and exit lanes on all arms. On the A23 London Road arm the Fastway guided bus lane meets the roundabout and passes through the central island to exit at the London Road (south) arm. As built drawings and lane markings for the roundabout have been obtained from WSCC, and are contained in Appendix 14.

6.6.2 The existing junction has been modelled using TRANSYT. The toucan crossings have been modelled using pedestrian links and are assumed to be called in every cycle. The Fastway bus links have been modelled as bus only links and are again assumed to be called very cycle. Copies of the RR67 saturation flow calculations, TRANSYT link diagram, Flowround outputs, link flow spreadsheet and TRANSYT output files for the "2018 T + D" scenario are contained in Appendix 14 and information for the other scenarios tested are summarised in the table in Appendix 14.

6.6.3 The TRANSYT modelling of the existing roundabout shows that the existing junction arrangement has adequate capacity to accommodate both background traffic growth and traffic arising from the NES development.

6.7 BALCOMBE ROAD/STEERS LANE

6.7.1 The junction of Balcombe Road and Steers Lane is a three arm priority junction, with an island on the minor arm between the left and right turning traffic entering Steers Lane. The existing layout of the junction is shown on Drawing No. 0560/SK/112.

6.7.2 The existing junction has been assessed using PICADY and a copy of the output file for the "2018" traffic scenario is contained in Appendix 15. The PICADY model results for all of the scenarios tested are summarised in the table in Appendix 15.

6.7.3 The PICADY modelling predicts that the junction has adequate capacity to accommodate the traffic arising from the NES development.

6.7.4 The accident plot on Figure 11 shows that there were three slight injury accidents recorded. This is not indicative of an accident problem at this junction.

6.8 BALCOMBE ROAD/RADFORD ROAD

6.8.1 The junction of Balcombe Road and Radford Road is a three arm priority junction, with a narrow right turn lane on Balcombe Road and a left turn flow on the Radford Road arm. The existing layout of the junction is shown on Drawing No. 0560/SK/104 contained in Appendix 16. A site visit to the junction in the morning peak hour observed that a queue forms on Balcombe Road back to Antlands Lane caused by traffic turning right into Radford Road.

6.8.2 The performance of the existing junction has been assessed using PICADY. A copy of the PICADY output file for the "2006" traffic scenario is contained in Appendix 16. The PICADY model results are summarised in the table in Appendix 16.

6.8.3 The PICADY modelling of the existing junction, backed up by a site observation, shows that the existing junction is over capacity at the current time and therefore requires works to improve its operation.

6.8.4 It is proposed that the right turn movement from Radford Road to Balcombe Road be banned (given that this movement volume is very low and an alternative readily exists at Steers Lane/Balcombe Road junction) and the junction signalised. The constrained nature of the junction means that it is not possible to provide a right turn lane for traffic turning into Radford Road from Balcombe Road, therefore the traffic signals have been staged such that the phases for traffic heading northbound and southbound along Balcombe Road run separately. The proposed layout of the junction is shown on Drawing No. 0560/SK/105 contained in Appendix 16.

6.8.5 The capacity of the proposed junction improvement has been tested using LINSIG and a sample output file for the "2018 T + D" traffic scenario is contained in Appendix 16. A summary of the LINSIG modelling results is contained in the table in Appendix 16 and shows that the proposed junction layout will provide a better than nil detriment improvement to the junction.

6.8.6 the accident plot on Figure 11 shows that there were three slight injury accidents at this junction which is not indicative of an exceptional accident problem, nonetheless the proposed improvement should help reduce accident risk.

6.9 BALCOMBE ROAD/ANTLANDS LANE

6.9.1 The junction of Balcombe Road and Antlands Lane is currently a three arm roundabout; the existing layout of the junction is shown on Drawing No.. 0560/SK/106 in Appendix 17.

6.9.2 The performance of the existing roundabout has been assessed using ARCADY and a sample output file for the "2018" traffic scenario is contained in Appendix 17. A summary of the ARCADY model results is contained in the table in Appendix 17.

6.9.3 The ARCADY modelling predicts that the junction has sufficient capacity in the morning peak hour to accommodate traffic; however, the evening peak model predicts that capacity will be exceeded on both Balcombe Road arms in the same scenario without the NES development

6.9.4 Junction improvement works, in the form of replacing the existing roundabout with a traffic signal junction, are proposed as shown on Drawing No. 0560/SK/107 contained in Appendix 17. The capacity of the proposed junction has been assessed using LINSIG and a sample output file for the "2018 T + D" traffic scenario are contained in Appendix 17. A summary of the LINSIG modelling results is given in the table in Appendix 17.

6.9.5 The LINSIG modelling predicts that the proposed traffic signal junction will provide a better than nil detriment improvement, and will operate satisfactorily under all the traffic scenarios tested.

6.9.6 The accident plot on figure 11 shows that there were three sight accidents reported at the Balcombe Road/Antlands Lane roundabout. The proposed traffic signal junction should improve safety at the junction.

6.10 BALCOMBE ROAD/COPTHORNE ROAD/WORTH PARK AVENUE

6.10.1 The junction of Balcombe Road, Copthorne Road and Worth Park Avenue currently takes the form of a four arm roundabout. The existing layout of the junction is shown on Drawing No. 0560/SK/108 in Appendix 18.

6.10.2 The capacity of the existing roundabout has been assessed using ARCADY and a copy of the output file for the "2018" traffic scenario is contained in Appendix 18. A summary of the ARCADY model results is given in the table in Appendix 18.

6.10.3 The ARCADY modelling shows that the junction will have adequate capacity to accommodate the traffic arising from the NES development and that no improvement works are required.

6.11 A23 LONDON ROAD/GATWICK ROAD/GATWICK PERIMETER ROAD

6.11.1 The junction of the A23 and Gatwick Road currently takes the form of a four arm roundabout, the layout of which is shown on Drawing No. 0560/SK/109 in Appendix 19. The existing junction arrangement has been modelled using ARCADY and a copy of the output file for the "2018" traffic scenario is contained in Appendix 19.

6.11.2 A summary of the ARCADY model results is given in the table in Appendix 19 shows that the roundabout has sufficient capacity to accommodate both traffic growth to 2018 and the traffic arising from the NES development.

6.11.3 The accident plot on Figure 11 shows that there has been 5 slight and 1 serious accident at the junction over the last 3 years.

6.12 GATWICK ROAD/BEEHIVE RING ROAD

6.12.1 The Gatwick Road/Beehive Ring Road junction takes the form of a three arm traffic signal controlled junction which has been recently improved. The junction includes bus lanes and signal phases on Gatwick Road (south) and Beehive Ring Road. Pedestrian crossings phases are included across the Gatwick Road and north and Beehive Ring Road arms. The existing layout is shown on Drawing No. 0560/SK/110 in Appendix 20.

6.12.2 The capacity of the junction has been assessed using LINSIG and a sample output file for the "2018" traffic scenario is contained in Appendix 20. A summary of the LINSIG model results is given in the table in Appendix 20.

6.12.3 The LINSIG modelling predicts that the existing junction arrangement has sufficient capacity to accommodate both unrestrained traffic growth to 2018 and the traffic arising from the NES development area.

6.12.4 The accident plot on Figure 11 shows there to have been one slight and one serious accident at this junction over the last 3 years. Given the recent nature of the junction improvement, there is not sufficient data to determine if the improvement has reduced accident risk.

6.13 GATWICK ROAD/RADFORD ROAD/JAMES WATT WAY

6.13.1 The junction of Gatwick Road, Radford Road and James Watt Way takes the form of a four arm roundabout. Approximately 40m to the south of the roundabout, a short stretch of guided busway terminates and bus lanes also start and end to the north of the roundabout and there are toucan crossings on the Radford Road and Gatwick Road (south) arms. The existing layout of the roundabout, based upon as built drawings obtained from WSCC is shown on Drawing No. 0560/SK/111 in Appendix 21.

6.13.2 The performance of the existing roundabout has been assessed using ARCADY and a copy of the output file for the "2006" traffic scenario is contained in Appendix 21. A summary of the ARCADY modelling is given in the table in Appendix 21.

6.13.3 The ARCADY modelling predicts that capacity is exceeded on Radford Road in the 2006 during the AM peak which replicates observed conditions at this junction.

6.13.4 The proposed improvement to the roundabout is to increase the entry width and flare length on the Radford Road arm. The proposed layout is shown on Drawing

No. 0560/SK/112 The capacity of the proposed roundabout improvement has been tested using ARCADY, and a copy of the ARCADY output file for the "2018 T + D" traffic flow scenario is contained in Appendix 21.

6.13.5 The ARCADY modelling of the proposed improvement to the junction predict that the increased entry width and flare length will provide a better than nil detriment improvement to the junction, removing queuing and delays on Radford Road.

6.13.6 The accident plot shows two slight injury accidents at entries onto the roundabout, which is not indicative of an exceptional accident problem at this junction.

6.14 GATWICK ROAD/FLEMING WAY

6.14.1 The Gatwick Road/Fleming Way is a five arm, recently improved partially signalised roundabout, with traffic signals on the two Gatwick Road and Fleming Way arms. As built plans have been obtained from WSCC and the existing layout is shown on Drawing No. 0560/SK/113 in Appendix 22.

6.14.2 The performance of the existing roundabout has been assessed using TRANSYT, and copies of the link diagram, Flowround output, RR67 saturation flow calculations and a sample TRANSYT output file for the "2018" traffic scenario are contained in Appendix 22. A summary of the TRANSYT model result is given in the table in Appendix 22.

6.14.3 The TRANSYT modelling predicts that the junction has sufficient capacity to accommodate both background traffic growth and traffic arising from the NES development.

6.14.4 There are no recorded accidents at this junction over the last three years.

6.15 GATWICK ROAD/MANOR ROYAL

6.15.1 The Gatwick Road/Manor Royal junction is a recently improved three arm roundabout. A copy of the as built drawing has been obtained from WSCC, and the layout of the junction as shown on Drawing No. 0560/SK/114 in Appendix 23. The capacity of the existing roundabout has been assessed using ARCADY, and the output file for the "2018" traffic scenario is contained in Appendix 23. A summary of the ARCADY model results is given in the table in Appendix 23.

6.15.2 The ARCADY modelling predicts that the junction layout shown on the as built plans obtained from WSCC can accommodate traffic growth and the traffic arising from the NES development in the year 2018.

6.15.3 The accident plot shows that no injury accidents were reported at this junction in the three years up to 28 February 2006.

6.16 RADFORD ROAD/STEERS LANE

6.16.1 The junction of Radford Road and Steers Lane is a three arm junction with a large island. The existing layout of the junction is shown on Drawing No. 0560/SK/115.

6.16.2 The capacity of the junction has been assessed using PICADY and a copy of the output file for the "2018" traffic scenario is included at Appendix 24. A summary of the PICADY results is given in the table in Appendix 24.

6.16.3 The PICADY modelling predicts that traffic turning left from Steers Lane into Radford Road is beyond capacity in the without development scenario.

6.16.4 It is proposed to change the junction to traffic signal control to allow buses and vehicles improved access onto Radford Road from Steers Lane. The proposed junction arrangement is shown on Drawing No. 0560/SK/116 in Appendix 24. The capacity of the proposed junction layout has been assessed using LINSIG which predicts that the junction will operate satisfactorily and much better than nil detriment.

6.16.5 The accident plot shows that one serious injury accident was reported at this junction in the last three years.

6.17 CRAWLEY AVENUE SITE ACCESS

6.17.1 The proposed access onto the A2011 Crawley Avenue will take the form of a signalised junction with closure of the existing Balcombe Road slip roads, as shown on Drawing No. 0560/SK/117 which is contained in Appendix 25. The proposed junction will replace the existing Crawley Avenue/Balcombe Road grade separated junction. The capacity of the proposed junction has been tested using LINSIG and a copy of the LINSIG output for the "2018 T + D AM" traffic flow scenario is contained in Appendix 25. The results of the LINSIG modelling are summarised in the table in Appendix 25.

6.17.2 The LINSIG modelling predicts that the proposed junction arrangement will have sufficient capacity to accommodate existing growth in traffic and the traffic from the NES development.

6.18 BALCOMBE ROAD (SOUTH) SITE ACCESS

6.18.1 The Balcombe Road (south) site access will be linked to the proposed Crawley Avenue site access by a new link road to the north of the land safeguarded for a future park and ride site. The junction is proposed to be a traffic signal junction with a pedestrian crossing to maintain the existing pedestrian route along the western side of Balcombe Road. The proposed layout of the junction is shown on Drawing No. 0560/SK/118 contained in Appendix 26.

6.18.2 The capacity of the proposed junction has been tested using LINSIG, and a sample output file for the "2018" traffic scenario is contained in Appendix 26. A summary of the LINSIG results for all of the scenarios tested is given in the table in Appendix 26 shows that the proposed site access will have sufficient capacity to accommodate both the traffic formerly using the Crawley Avenue/Balcombe Road junction and the traffic arising from the NES development.

6.19 BALCOMBE ROAD (HEATHY FARM) SITE ACCESS

6.19.1 The proposed Balcombe Road (Heathy Farm) site access will take the form of a traffic signal junction as shown on Drawing No. 0560/SK/119 with a proposed toucan crossing across the Balcombe Road (north) arm of the junction. The existing Heathy Farm pub access will also be relocated within the site. The capacity of the proposed

junction has been assessed using LINSIG. A summary of the LINSIG model results is given in the table in Appendix 27 together with a sample output file for the "2018" traffic scenario. The modelling shows that the junction will operate within capacity in the assessment year 2018 with the NES development.

6.20 BALCOMBE ROAD (NORTH) SITE ACCESS

6.20.1 The proposed Balcombe Road (north) site access will take the form of a traffic signal junction as shown on Drawing No. 0560/SK/120. The capacity of the proposed junction has been assessed using LINSIG. A summary of the LINSIG model results is given in the table in Appendix 28 together with a sample output file for the "2018" traffic scenario.

6.20.2 The results of the LINSIG assessment conclude that the proposed site access will operate within capacity in the year 2018 with development.

6.21 STEERS LANE SITE ACCESS

6.21.1 The proposed layout of the Steers Lane site access is shown on Drawing No. 0560/SK/121 contained in Appendix 29 and has been tested using LINSIG. The LINSIG modelling results are summarised in the table in Appendix 29 and show that the proposed junction arrangement will operate satisfactorily. A copy of the LINSIG output file for the "2018" traffic scenario is contained in Appendix 29.

6.22 RADFORD ROAD RAILWAY BRIDGE

6.22.1 The SUSTRANS cycleway proposed from the north of the site towards Gatwick Road needs to pass over the railway at the Radford Road railway bridge; however, the bridge is not of sufficient width to accommodate two traffic lanes and a 3m footway cycleway. It is proposed that tidal flow signals be introduced at the bridge to accommodate the needs of both motorists and cyclists. The proposed layout of the traffic signals at the bridge and the associated highway works is shown on Drawing No. 0560/SK/122 contained in Appendix 30.

6.22.2 The capacity of the signals has been tested using LINSIG, based upon an intergreen time of 7 seconds between the traffic movements. The modelling results are summarised in the table in Appendix 30 and demonstrate that the proposed traffic signals will operate satisfactorily. A copy of the LINSIG output file for the "2018" traffic flow scenario is contained in Appendix 30.

6.23 CONCLUSIONS

6.23.1 The traffic flow predictions have been used to identify where the traffic arising from the NES development has a material effect on the highway network. Where this is the case, junction improvements, where appropriate, have been prepared on a nil detriment basis, that is the junction performance with the NES development and highway improvement is no worse than with the existing junction but without the NES development. Where improvements have been prepared which identify a solution to resolve any remaining congestion beyond the nil detriment requirement, it is not implicit that the NES development is responsible for funding the full improvement. The morning

and evening peak traffic flow predictions have been used to assess the performance of the existing junctions and, where appropriate, the effect of improvements to the junctions.

6.23.2 The junction operational assessments have predicted that the following junctions will be able to accommodate the NES development traffic without any junction improvement works :

- Gatwick Road/Fleming Way;
- Balcombe Road/Steers Lane;
- Balcombe Road/Copthorne Road/Worth Park Avenue;
- Gatwick Road/Manor Royal.

6.23.3 New junctions are proposed at the four site accesses and also improvements at the Radford Road railway bridge. The site access junction at Crawley Avenue will replace the slip roads between Crawley Avenue and Balcombe Road. The proposed junctions all operate satisfactorily in the future year with NES development traffic flow scenarios.

6.23.4 The junction operational assessments have also identified a number of junctions requiring improvement works to accommodate either traffic growth, the NES development or both. These junctions are :

■ Hazelwick Roundabout	–	proposed signalised roundabout
■ Balcombe Road/Radford Road	–	proposed traffic signal junction and banned right turn
■ Balcombe Road/Antlands Lane	-	proposed traffic signal junction
■ Radford Road/Steers Lane	-	proposed traffic signal junction
■ Radford Road Railway Bridge	-	proposed tidal flow traffic signals
■ Gatwick Road/Radford Road/ James Watt Way	-	proposed roundabout entry widening

6.23.5 The modelling undertaken predicts that the existing local highway network with the off site highway works listed above will be able to accommodate the traffic arising from the proposed development at the NES site.

7 M23 Junction 10 Operational Assessments

7.1 INTRODUCTION

7.1.1 This section describes the analyses undertaken to assess the impact of the NES site on Junction 10 of the M23.

7.2 HISTORIC TRAFFIC DATA

7.2.1 An analysis of historic traffic data on the M23 and Junction 10 has been undertaken and is described in Section 5.3. In brief, this assessment concluded that there has been negligible growth in traffic flows on the M23 for at least the last seven years. In addition, a comparison of traffic counts undertaken in 2006 with those collected in 1997 show that there has been a drop in traffic at Junction 10 in the morning peak hour equating to a 9.4% decrease. Traffic flows have increased in the evening peak hour by about 1% per year over this period albeit that the total flows at Junction 10 in the PM peak hour in 2006 are still less than the AM peak hour in 1997.

7.3 EXISTING JUNCTION ARRANGEMENT

7.3.1 The existing arrangement of Junction 10 is a grade separated signalised roundabout with a two lane circulatory carriageway and two lane entries. The M23 southbound diverge lane layout contains an extended auxiliary lane while the northbound diverge is of a direct taper type. The southbound merge is also a direct taper whereas the northbound merge is a two lane ghost island merge.

7.4 OBSERVATIONS OF THE EXISTING JUNCTION OPERATION

7.4.1 Observations of the operation of Junction 10 have been undertaken in both the morning and evening peak hours. During the morning peak hour queues of traffic have been observed on the southbound offslip extending from the traffic signals back to, at times, the M23 mainline. Queues were also observed in the westbound approach to Junction 10. No other significant points of congestion were observed during the morning peak hour on either the merges/diverges or the junction itself. During the PM peak no significant congestion was observed on either the merges/diverges on the junction with the exception of the eastern arm of the junction, the A264 Copthorne Way and western arm Crawley Avenue.

7.5 JUNCTION 10 CAPACITY ASSESSMENT

7.5.1 The capacity of the existing signalised roundabout at Junction 10 (see Drawing No. 0560/SK/123 in Appendix 31), has been assessed using TRANSYT. A copy of the existing layout, TRANSYT link diagram and the link flows used to test the capacity of the junction are contained in Appendix 31 along with sample TRANSYT output files for the "2025 T + D" AM and PM traffic scenarios. A summary of the TRANSYT results for all of the scenarios tested is contained in the table in Appendix 31.

7.5.2 The modelling shows that the existing junction arrangement does not currently have sufficient capacity to accommodate background traffic growth to 2018 when in the

morning peak hour capacity is exceeded on both the A264 Copthorne Way and the M23 northbound approaches to the junction, primarily because of the large right turn movement from the M23 southbound to the A2011 Crawley Avenue. The 'without development' scenarios for 2018 also predicts that capacity will be exceeded in the evening peak hour on the M23 southbound, A264 Copthorne Way and the A2011 Crawley Avenue approaches.

7.5.3 Highway works are proposed to the junction in order to increase capacity on all arms by adding a third entry lane. The circulatory carriageway has also been widened to three lanes between the M23 southbound and the A264 Copthorne Way arms in order that the traffic exiting the junction onto the M23 southbound can be in a separate lane to the traffic heading into Crawley. The proposed layout of the junction is shown on Drawing No. 0560/SK/124, a copy of which is contained in Appendix 31. The capacity of the proposed junction improvement has been assessed using TRANSYT and copies of the link diagram, link traffic flows and results for the "2025 T + D AM and PM" traffic scenario are contained in Appendix 31. A summary of the TRANSYT results for all of the traffic scenarios tested is contained in the table in Appendix 31.

7.5.4 The TRANSYT modelling of the proposed improvement to Junction 10 predicts that the junction will have adequate capacity on all approaches in both the morning and evening peak hours in the "2025"with unrestrained background growth and development traffic scenario. The proposed improvement provides a much better nil detriment improvement.

7.5.5 The accident plot obtained from WSCC (see Figure 11), shows that there were eight slight and one serious accidents in the vicinity of Junction 10 in the three years prior to 28 February 2006.

7.6 SLIP ROAD CAPACITY ASSESSMENT

7.6.1 The following section of the TA assesses the impact of the NES development on the capacity of the Junction 10 merge and diverge layouts with the M23.

7.6.2 The design of new or improved motorway merges or diverges is set out in TD22/06 and the standard of design is related to the predicted future traffic, using the diagrams labelled Figure 2/3 MW (motorway merges) and Figure 2/5 MW (motorway diverges); however, the purpose of these diagrams is for design and does not provide an accurate assessment of practical capacity. The diagrams have therefore only been used as an initial guide to the operation of the merges and diverges. If the diagram indicates a higher standard of layout for a particular flow scenario, then further consideration is given to assess whether the practical capacity has been exceeded.

Future Traffic Flows

7.6.3 Traffic flows for the M23 either side of Junction 10 have been derived from the TRADS database. Flows on the slip roads have been derived from the traffic counts undertaken at Junction 10.

7.6.4 The unrestrained and target background traffic growth factors were derived in Section 5.0 and are as follows :

Table 7.1 : Growth Factors

	Unrestrained		Target
	AM Peak Period	**PM Peak Period**	**AM or PM**
2006 to 2018	1.196	1.230	1.10
2006 to 2025	1.212	1.267	1.16

7.6.5 In Section 5.3 of this TA it was noted that for at least the last seven years there has generally been no growth in traffic on the M23. Likewise, traffic flows on Junction 10 itself have experienced little, no or negative growth. Caution must therefore be applied when applying unrestrained growth (and also target growth) as set out in Table 7.1 given that historic traffic flows show that this level of growth has not occurred. Furthermore, the capacity of the M23 has a finite limit equating to, for a 3 lane motorway, 5400 vehicles per hour (1800 vehicles per lane per hour). It is therefore not considered appropriate to assess the capacity of the merges and diverges using background growth which increases upstream flows by greater than 5400 vph, in the absence of any major schemes to widen the motorway. This methodology for capping upstream motorway flows has been agreed with the Highways Agency elsewhere on the motorway network.

7.6.6 Traffic flows have therefore been predicted for the years 2018 and 2025 and are shown on the tables in Appendix 31 which show the merge, diverge and mainline flows with upstream mainline motorway flows capped (where necessary) to 5400 vph. The equivalent tables showing the uncapped peak hour flows are also contained in Appendix 31. The contribution to the predicted flows by the NES development is also shown on the tables. The capacity assessment of each merge and diverge arrangement is now considered separately.

M23 Southbound Diverge

7.6.7 The southbound diverge for Junction 23 takes the form of a parallel diverge with an extended auxiliary lane. Observations in the morning peak hour show that the queue from the Junction 10 traffic signals extend along the slip road back to, at times, the M23 mainline carriageway. The improvement proposed to Junction 10 described earlier in this section will operate without significant queuing in the years 2025 with unrestrained growth and with the NES development. The improvement will therefore resolve the existing problem at Junction 10.

7.6.8 With regard to the operation of the southbound diverge, the Figure 2/5 MW from TD22 has been used as a starting point and the predicted flows from the tables in Appendix 31 have been plotted onto copies of the Figure 2/5 MW for the AM and PM peak hours. The existing southbound diverge arrangement is a Type B (parallel diverge). From the copies of Figure 2/5 MW in Appendix 31 it can be seen that the current diverge is suitable for all future predicted traffic flow scenarios including unrestrained in 2025.

Northbound Diverge

7.6.9 The northbound diverge arrangement is a direct taper, Type A from TD22. The predicted traffic flows from the table in Appendix 31 have been plotted on the copies of Figure 2/5 MW. For the morning peak hour in 2025, the unrestrained scenario is plotted only just within the Type B diverge. For the target flows, the Type A is satisfactory. The development flows contribute only 22 vehicles (1.5%) to the morning peak hour diverge flows and therefore it is difficult to distinguish between the without and with development scenarios plots on the Figure 2/5 MW in Appendix 31. Given that the development contributes very little traffic in the morning peak and that the existing direct taper diverge is suitable for the year 2025, no improvement to the diverge taper is required.

Northbound Merge

7.6.10 The existing northbound merge arrangement is a double ghost island merge, Type C from TD22. All traffic flow scenarios from the table in Appendix 31 have been plotted on copies of Figure 2/3 MW of TD 22 for the AM and PM peak hours. The position plotted on copies of Figures 2/3 MW in Appendix 31 show that the ghost island merge arrangement Type C is suitable and therefore no improvement is required.

Southbound Merge

7.6.11 The existing southbound merge arrangement is a direct taper, Type A from TD22. Observations of morning and evening peak hour conditions were undertaken in April/May and June 2006. No significant congestion was observed on the southbound merge during these periods.

7.6.12 The traffic flow scenarios contained in the table in Appendix 31 have been plotted on copies of Figures 2/3 MW of TD 22 and are also contained in Appendix 31.

7.6.13 It can be seen from the copy of Figure 2/3 MW to the AM peak that all future traffic scenarios fall into the direct taper Type A merge.

7.6.14 For the PM peak, the plotted point for the 2006 traffic would indicate that a parallel merge Type B is required; however, from observations of traffic conditions in the PM peak there were no capacity problems observed at the southbound merge.

7.6.15 The above demonstrates the point that the Figures 2/3 and 2/5 do not provide an accurate assessment of capacity. One factor that the figures do not account for is the volume of upstream diverge flow. If the volume of upstream diverge is low then the flow on the upstream mainline will be evenly spread over the three lanes, including the nearside lane. The flow in the nearside lane will then limit the gap opportunities for downstream merging traffic and hence the merge will be operating at its lowest capacity. Alternatively, where the upstream diverge flow volume is high, say equivalent to the capacity of one lane of the motorway, then the nearside lane will contain virtually all diverging traffic. The nearside lane downstream of the diverge will therefore be underused thereby providing ample gaps for the downstream merge which will be at its maximum capacity. The figures in TD22 do not take this into account.

7.6.16 The PM upstream diverge in 2006 is relatively high at 1320vph which means that the downstream nearside lane is lowly trafficked (compared to the outside two lanes) and hence the merge will be operating toward its upper end of capacity.

Observations of the operation of Junction 10 indicate that the nearside lane has significantly fewer vehicles than the outside two lanes and that the merge is currently operating within capacity despite the indications from Figure 2/3 that the merge should be beyond capacity.

7.6.17 The future predicted merge flow in the year 2025 is 1511 vph and 1388 vph for the unrestrained and target scenarios respectively. The NES development contributes 35 vehicles per hour in the PM peak to the merge flow which is equivalent to 2.3% of the background traffic flows in 2025. The upstream diverge flows in 2025 with background traffic growth and NES development traffic are 1769 and 1633 for the unrestrained and target scenarios respectively. Given that these diverge flows are close to the capacity of a single motorway lane, then the downstream merge will be at its maximum capacity. The use of Figure 2/3 MW is therefore not considered appropriate to use to determine capacity although the points for future traffic flow scenarios are shown on the copy of Figure 2/3 MW in Appendix 31.

7.6.18 It is therefore considered that the direct taper merge will not be at capacity in the 2025 PM peak hour given that the upstream diverge flow will fill the inside lane leaving negligible volumes of traffic on the inside lane downstream of the diverge. The merging traffic, which does not exceed the capacity of a single lane, will therefore have an underused inside lane to merge into and will therefore operate within capacity. The Highways Agency have no proposals to improve the merge layout.

7.6.19 Furthermore, the NES development will add only 35 vehicles in the PM peak hour which is not a significant volume compared to the existing and future predicted merge flows.

7.6.20 In conclusion, there is no need to improve the Junction 10 southbound merge as a result of the NES development.

7.7 CONCLUSIONS

7.7.1 The TRANSYT modelling of the proposed improvement to Junction 10 predicts that the junction will have adequate capacity on all approaches in both the morning and evening peak hours in the “2025”with unrestrained background growth and development traffic scenario. The proposed improvement provides a much better nil detriment improvement.

7.7.2 An assessment has been undertaken of the merges and diverges at Junction 10. This assessment has concluded that no improvements are required to either merges or diverges as a result of traffic movements arising from the NES development.

8 Transport Policy Background

8.1 INTRODUCTION

8.1.1 This section of the TA reviews current policies of the Government, West Sussex County Council and Crawley Borough Council that are relevant to transport aspects of the NES development.

8.2 GOVERNMENT POLICY

8.2.1 The Government's strategy for public transport is outlined in the 1998 White Paper 'A New Deal for Transport : Better for Everyone' and the subsequent daughter documents including 'From Workhorse to Thoroughbred : A Better Role for Bus Travel'. These emphasise the management of travel demand, improving conditions for public transport users and encouraging behavioural change. There is also reflected in the funding priorities of the Ten Year Plan and supported by legislation in the Transport Act. In July 2004, this approach was updated by the publication of a new Government White Paper 'The Future of Transport'.

8.2.2 PPG13 – Planning Policy Guidance Note (PPG13) published in March 2001, provides advice on transport provision for new developments. The key aim of PPG13 is to ensure that local authorities carry out their land use policies and transport programmes in ways that help to :

- promote more sustainable transport choices for both people and for moving freight;
- Promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and
- Reduce the need to travel, especially by car.

8.2.3 The document re-states the key themes of sustainable development that have emerged in recent years. It advises that major developments should be accompanied by a transport assessment, which includes details of access by walking, cycling and public transport. This TA is consistent with this approach.

8.2.4 PPG13 states that the likely availability and use of public transport is a very important ingredient in determining local policies designed to reduce the need to travel by car. In order to establish a high quality safe and secure public transport network which maximises the potential use of public transport, local authorities are encouraged to :

- Identify key routes for bus improvements and priority measures and the measures that will be taken;
- Ensure, so far as is practicable, that traffic management measures do not impede the effectiveness of public transport services;
- Explore the potential and identify any proposals for improving rail travel in liaison with SRA, including the re-opening of rail lines, or creation of new stations on existing lines, light rail or guided bus routes (giving due consideration to the funding and value for money of such proposals);
- Identify the potential for improved interchange between different transport services and between public transport and walking and cycling;

- Negotiate for improvements to public transport as part of development proposals in order to reduce the need for travel by car and the level of parking at such sites; and
- Work with transport operators and other organisations to improve personal security across the whole journey.

8.2.5 And in relation to Park and Ride, it notes that :

- Park and Ride schemes, in appropriate circumstances, can help promote more sustainable travel patterns, both at local and strategic levels and improve the accessibility and attractiveness of town centres. Well designed and well-conceived schemes should be given favourable treatment through the planning system;
- Schemes need to be developed as an integral part of the planning and transport strategy for the area, and should be included in the local transport plan;
- Schemes need to be subject to a robust assessment, including consideration of alternative sites, the impact on local amenity, and travel impacts, including traffic reduction and generation…schemes need to be designed and implemented in association with other measures, such as public transport improvements, traffic management and parking controls.

8.2.6 PPG3 – Planning Policy Guidance Note 3 : Housing, was published in 2000 and sets out the principles that should be established in order to provide integrated and sustainable development. Key to these principles is the need to :

- Create more sustainable patterns of development by building in ways which exploit and deliver accessibility by public transport to jobs, education and health facilities, shopping, leisure and local services.

8.3 REGIONAL PLANNING GUIDANCE FOR THE SOUTH EAST (RPG 9)

8.3.1 In setting out the Regional Transport Strategy, the guidance makes it clear that integration of transport and land use planning is essential to support more sustainable travel choices and to achieve the environmental, social and economic benefits that arise from efficient and responsible use of infrastructure.

8.3.2 The Guidance contains a variety of policies, all of which are aimed at producing sustainable development, which are relevant to the proposed development;

Policy T5 – Public Transport (bus, train and water-borne) should be improved to enable it to complete more effectively with the private car and to increase it share of total travel.

a) Development plans and/or local transport plans should :

- Include proposals to develop the inter-urban, urban and rural public transport network including the development of inter-modal interchange facilities, such that it supports the spatial strategy and the locational policies set out in this guidance (for example, locating higher trip generating development close to public transport services);

- Identify a strategy which secures attractive and reliable bus services in support of the spatial strategy. Consideration should be given to the potential for encouraging bus services through reallocation and priority uses such as to have the potential to encourage and support a viable public transport system.

b) In addition :

- Local authorities, the Strategic Rail Authority, public transport operators and adjoining authorities should work together in identifying, prioritising and securing investment in support of the Region's strategic inter-urban public transport network, including roadside real-time information facilities.

8.4 REGIONAL TRANSPORT STRATEGY

8.4.1 The Regional Transport Strategy (RTS) for South East England was published by the Secretary of State in July 2004. The longer term regional framework for the development of the transport system in the region is presented; the RTS provides the context within which other relevant regional strategies, including those of the South East England Development Agency (SEEDA), the Highways Agency (HAg) and the rail industry, should be developed. It also provides the context within which Local Transport Authorities should produce their Local Transport Plans.

8.4.2 The transport strategy and policies are focused on a set of core principles :

- Managing and investing;
- The rural dimensions;
- Regional hubs and spokes;
- Communications technology;
- Mobility management;
- Road pricing and charging;
- The gateways, airports and ports;
- Freight.

8.4.3 The Gatwick Area Sub-Region is centred on Crawley/Gatwick and Horley. The vision for the sub-region is to provide an excellent quality of life for its communities including :

(i) maximising the value added by the sub-region's economy;

(ii) providing a high quality transportation system which meets the demands that will be placed on it;

(iii) providing adequate new housing and other development including affordable housing, designed and built to a high standard, in a way that enhances access to services and facilities.

8.5 LOCAL POLICY

West Sussex Structure Plan 2001 – 2016

8.5.1 The West Sussex Structure Plan was adopted on 25 October 2004. It sets out the West Sussex strategic planning framework and guides the way West Sussex will grow and develop during the years leading up to 2016 and beyond. The relevant policies in relation to public transport are included below :

Policy NE13 : (a) in order to manage successfully the anticipated growth in demand for communication and travel, proposals for development should be permitted provided that, where possible they : (1) widen travel choice and promote walking, cycling and passenger transport; (3) integrate with different types of transport and the various provisions of service to maximise the efficiency of transport systems.

8.5.2 Specifically in relation to passenger transport the policy states :

Policy NE15 : (a) the Strategic Passenger Transport Network, which is best able to cater for passenger trips within and between built up areas, should be protected. New or improved infrastructure which meets the needs of passenger transport users and operators should be permitted. (b) The following schemes will improve facilities for passenger transport and, where appropriate, will be added to the Strategic Passenger Transport Network when they are completed subject, where appropriate, to Government approval….(4) the Fastway integrated transport system; (5) high quality passenger transport proposals linking the Strategic Locations with adjoining urban areas and which are innovative and attractive to users; (c) passenger transport improvements in the Gatwick to Brighton corridor will be supported where they enable passenger transport to increase its share of total travel and provide a genuine choice of means of travel.

8.5.3 It is also recognised in the Structure Plan that effective interchange between different means of transport is essential to provide ease of access and use. This is equally true for interchange between car and passenger transport, as it is for transferring between passenger transport modes. Minimising waiting times and providing a pleasant and secure surrounding are important requirements.

Policy NE21 : (a) transport interchanges, including park and ride facilities, should be permitted providing they are part of an integrated approach to reducing car use, increasing the use of passenger transport and improving accessibility in built up areas. (b) The following schemes will improve integration of transport and will be completed, or at least started by 2016….(5) Interchange station west of Crawley;…(7) Gatwick Station*;….(11) Three Bridges Station*.

Crawley Borough's Local Development Framework – Draft Core Strategy

8.5.4 The Government has revised the system of development plan documents in order to speed up the preparation of plans and to make the planning process simpler and more flexible. The Local Development Framework will comprise a folder of documents at the heart of which sits a Core Strategy and vision for the future development of the town. The Core Strategy will help provide a picture of how the town will develop in spatial terms over the next 10 – 15 years. Other documents will interpret the detail of this into site allocations for development and policies.

8.5.5 The LDF documents including the Core Strategy will eventually replace Crawley Borough Local Plan 2000 which contains the current development proposals and planning policies for Crawley.

8.5.6 The Core Strategy of the Local Development Framework (LDF) contains an overall vision for the future development of the town up to 2018 and beyond. The 'Transport' chapter provides the following policy guidance in respect of sustainable transport and more specifically public transport.

8.5.7 "T2 : it is proposed that the Core Strategy contains policies which ensure that new development :

- *Makes best use of opportunities for sustainable transport modes within the context of meeting the access needs it generates;*
- *Contributes to sustainable transport either directly or through provision on site or through transport improvements secured through S106 agreements to Fastway, bus service provision, cycling, walking;*
- *Contributes to local road network improvements required to accommodate the scheme."*

8.5.8 In relation to Park and Ride it is recognised that this could plan an important part in the overall parking strategy for the town. It is therefore proposed that the Core Strategy contains the following policies :

T3 : it is proposed the Core Strategy contains policies which :

- *Make provision for the identification of land for and introduction of Park and Ride facilities, subject to the outcome of a feasibility study;*
- *Secure contributions to Park and Ride from developments which would depend in part on the system for meeting their travel demands.*

8.5.9 In order to ensure that new development maximises the opportunities for use of public transport, proposals should either be located on existing public transport networks to ensure that they are fully connected to the existing public transport network, particularly where appropriate, the Fastway system.

T4 : it is proposed that the Core Strategy contains policies which ensure that major development proposals are either located along the main public transport network or can be linked into the network. The policies would emphasise the importance of Fastway and seek opportunities through new development to enhance the Fastway core network or services.

West Sussex Local Transport Plan 2006 – 2016

8.5.10 The key aim of the Transport Plan for West Sussex has the key aim of delivering safer, less congested and polluted roads offering better accessibility during the next decade.

8.5.11 There are several schemes they are looking to introduce in the very early stages of the 10 year plan period because of their potential to bring about significant benefits. These include initiatives to encourage a 'bus culture' and measures to reduce the impact of heavy lorries in towns. The plan is designed to build on existing work such as demand responsive buses in rural areas, encouraging cycling and walking, developing safer routes to schools and travel plans.

8.5.12 Within their Plan a number of bus patronage targets are included : *increase bus patronage in West Sussex to at least 23 million in 2016 (a 49% increase compared with 2001). The above target is based on : increasing bus use in Crawley to the same level as 2001 levels in Oxford (i.e. the % travelling to work by bus to increase from 6.26% in 2001 to an estimated 8.9% in 2011 and to 16% in 2016.*

8.5.13 Various schemes and proposals are detailed in the Plan to support the achievement of this target.

8.6 CONCLUSIONS

8.6.1 The proposed development offers an excellent opportunity to meet the sustainable transport objectives of PPG3 and PPG13 given its proximity to a range of local facilities and its good accessibility to modes of transport as a real alternative to the car. It has been demonstrated that the Crawley NES development proposals readily comply with current Government and local transport related policy criteria for residential and mixed use development.

9 Conclusions

9.1 INTRODUCTION

9.1.1 This section summarises the main conclusions from each section of the TA and gives an overall recommendation on the sustainability of the development proposals in complying with sustainable travel policies while mitigating the residual impact of travel by private car.

9.2 CONCLUSIONS

9.2.1 This Transport Assessment has been prepared to assess the transport implications of an outline planning application for mixed use development comprising residential, employment and ancillary uses on land known as North East Sector Crawley which is allocated within the Crawley Borough Local Plan for a new neighbourhood of around 2700 dwellings. This TA has assessed the impact of the transport requirements for the full Local Plan allocation of 2700 dwellings which will cover the original planning application for up to 2200 dwellings together with the balance of an additional 500 units considered as committed development and also the amended planning application for 1900 dwellings together with the balance of an additional 800 dwellings as committed development.

9.2.2 A detailed masterplan has been prepared for the NES development on which an Environmental Statement has been based.

9.2.3 The masterplan proposes 4 points of access to the NES development including two traffic signal controlled junctions off Balcombe Road, a traffic signal controlled junction off Steers Lane and the main traffic signal controlled access off Crawley Avenue.

9.2.4 The proposed internal footway/cycleway network which is incorporated within the Masterplan layout illustrated in Appendix I. It has been developed to optimise accessibility between residential areas and various other facilities including public transport.

9.2.5 The masterplan has been designed to accommodate buses and all elements of the development will be conveniently located to easily access public transport. No property will be more than 400 metres from a bus stop with the majority within 300m. The main streets that serve the two residential areas east and west of Balcombe Road will be designed to accommodate bus movements while maximising the number of dwellings within easy walking distance of the main streets. Bus shelters will be provided to a good standard and ready to accept real time information signs.

9.2.6 At the north and south access points to the site off Balcombe Road, it is proposed to introduce traffic signal control to demarcate the ends of the traffic calming scheme. For the section of Balcombe Road between the two accesses, it is proposed to introduce a mixture of traffic calming measures (e.g. raised tables, chicanes, narrowings etc.,) interspersed with signal controlled pedestrian/cycle crossings to fit in with masterplan footpath/cycleway network.

9.2.7 Crawley is ranked at number one in the South East Region for net in commuting, there being more people travelling into the area to work than travel out. An imbalance therefore exists in Crawley between the number of jobs and the number of residents. By virtue of the location of the NES site, it is therefore considered that the NES site has a significant potential to reduce both the number of journeys to work by car and also the length of journeys to work.

9.2.8 The NES development offers, given its accessible proximity to a significant and comprehensive mix of land uses, a high potential to meet the day to day travel needs of residents by sustainable modes and reduce the length of journeys. The location of the NES site will offer its residents the opportunity to travel by foot, cycle or bus to major destinations in Crawley including education, leisure, employment and the various town centre uses together with Gatwick Airport. The proposals for off-site pedestrian and cycle linkages will provide residents of the site with the opportunity to walk or cycle to the main local destinations.

9.2.9 With respect to the proposed public transport strategy, the NES development will provide a good level of public transport services to major local destinations while being financially viable in the long term. The proposed bus services provide an overall bus frequency within the site of 8 buses per hour on a Monday to Saturday and 4 buses per hour on a Sunday. This represents an excellent overall level of public transport provision for Crawley NES and serves the primary destinations of the site residents.

9.2.10 With regard to residential development, arrangements will be put in place to provide each new occupier with a locally tailored travel information pack giving details of all local facilities and the range of destinations accessible by non-car modes as part of a Community Travel Plan to be prepared as a condition once permission has been granted.

9.2.11 It is evident from the conclusions of the historic traffic flow assessment that peak hour traffic growth has generally not occurred in Crawley and therefore the use of unrestrained background traffic growth needs to be treated with extreme caution to avoid over-prediction of traffic.

9.2.12 Detailed traffic flow calculations have been undertaken to fully assess the impact of the residual net change in traffic flows arising from the development proposals. The traffic flow predictions include background traffic growth for the 2018 and 2025 assessment years.

9.2.13 The proposed methodology for preparation of the traffic flow predictions was set out in the scoping assessment submitted to the highway authorities prior to preparation of this TA. Within the TA, two alternative traffic growth scenarios have been considered namely unrestrained and target growth.

9.2.14 Given the low historic traffic growth trends in Crawley and on the M23, it is considered that target growth is more likely and that unrestrained growth will result in an over-prediction of traffic.

9.2.15 On this basis, where junction improvements are identified to be necessary in the TA, the improvements have been designed on the basis of accommodating target traffic growth only on a nil-detriment basis; however, the improvements are also tested for unrestrained growth as a sensitivity scenario.

9.2.16 The traffic flow predictions have been used to identify where the traffic arising from the NES development has a material effect on the highway network. Where this is the case, junction improvements, where appropriate, have been prepared on a nil detriment basis, that is the junction performance with the NES development and highway improvement is no worse than with the existing junction but without the NES development. Where improvements have been prepared which identify a solution to resolve any remaining congestion beyond the nil detriment requirement, it is not implicit that the NES development is responsible for funding the full improvement. The morning

and evening peak traffic flow predictions have been used to assess the performance of the existing junctions and, where appropriate, the effect of improvements to the junctions.

9.2.17 The junction operational assessments have predicted that the following junctions will be able to accommodate the NES development traffic without any junction improvement works :

- Gatwick Road/Fleming Way;
- Balcombe Road/Steers Lane;
- Balcombe Road/Copthorne Road/Worth Park Avenue;
- Gatwick Road/Manor Royal.

9.2.18 New junctions are proposed at the four site accesses and also improvements at the Radford Road railway bridge. The site access junction at Crawley Avenue will replace the slip roads between Crawley Avenue and Balcombe Road. The proposed junctions all operate satisfactorily in the future year with NES development traffic flow scenarios.

9.2.19 The SUSTRANS cycleway proposed from the north of the site towards Gatwick Road needs to pass over the railway at the Radford Road railway bridge; however, the bridge is not of sufficient width to accommodate two traffic lanes and a 3m footway cycleway. It is proposed that tidal flow signals be introduced at the bridge to accommodate the needs of both motorists and cyclists. The proposed layout of the traffic signals at the bridge and the associated highway works is shown on Drawing No. 0560/SK/122 contained in Appendix 30. The modelling assessments have shown that the proposed shuttle working will operate within capacity.

9.2.20 The junction operational assessments have also identified a number of junctions requiring improvement works to accommodate either traffic growth, the NES development or both. These junctions are :

- Hazelwick Roundabout – proposed signalised roundabout
- Balcombe Road/Radford Road – proposed traffic signal junction and banned right turn
- Balcombe Road/Antlands Lane - proposed traffic signal junction
- Radford Road/Steers Lane - proposed traffic signal junction
- Radford Road Railway Bridge - proposed tidal flow traffic signals
- Gatwick Road/Radford Road/ James Watt Way - proposed roundabout entry widening

9.2.21 The modelling undertaken predicts that the existing local highway network with the off site highway works listed above will be able to accommodate the traffic arising from the proposed development at the NES site.

9.2.22 The TRANSYT modelling of the proposed improvement to Junction 10 predicts that the junction will have adequate capacity on all approaches in both the morning and evening peak hours in the “2025”with unrestrained background growth and development

traffic scenario. The proposed improvement provides a much better nil detriment improvement.

9.2.23 An assessment has been undertaken of the merges and diverges at Junction 10. This assessment has concluded that no improvements are required to either merges or diverges as a result of traffic movements arising from the NES development.

9.2.24 The proposed development offers an excellent opportunity to meet the sustainable transport objectives of PPG3 and PPG13 given its proximity to a range of local facilities and its good accessibility to modes of transport as a real alternative to the car. It has been demonstrated that the Crawley NES development proposals readily comply with current Government and local transport related policy criteria for residential and mixed use development.

9.3 OVERALL CONCLUSION

9.3.1 This Transport Assessment has concluded that the proposed NES development will offer residents real alternatives to travel by walking, cycling and public transport while demonstrating that the impact of the residual travel by car will not be materially detrimental to the local area.

Appendices, Figures & Tables

Appendices

Figures