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Project Management & Transport Infrastructure
Compass Centre
Chatham Maritime
Kent
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Client Scheme No.:
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Instruction No.: 9

**Gillingham Gate
Preliminary
Development Impact
Assessment Report
211194/IN09/TN011_Rev_k4**

November 2005

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1 Introduction

1.1 General

This report has been proposed by Mott MacDonald on behalf of Medway Council to examine the potential traffic impact of development in the area and specifically its effect on the A289 between Gillingham Gate and the Four Elms roundabout (A228 Wainscott Bypass junction) over the period to 2016. From this potential highway improvements and associated public transport strategies and measures have been identified to ameliorate the impacts. These have been also considered in the context of potential safety improvements that have been identified through a Safety Review and which may be implemented in the shorter term.

A parallel study, Transport for Medway (TfM), is currently examining potential Public Transport options for the area with scheduled reporting in 2005. Preliminary findings from the report have been reviewed in trying to maximise the opportunity for use of public transport in the area. In conjunction with appropriate parking management measures, this provides the potential to reduce the overall demand for private car usage. The preliminary findings of the TfM study also provide the outline of the PT strategy for the area and from this Gillingham Gate study a medium public transport scenario has been adopted with an assumption of up to 10 percent of trips normally made by car potentially transferring to use public transport.

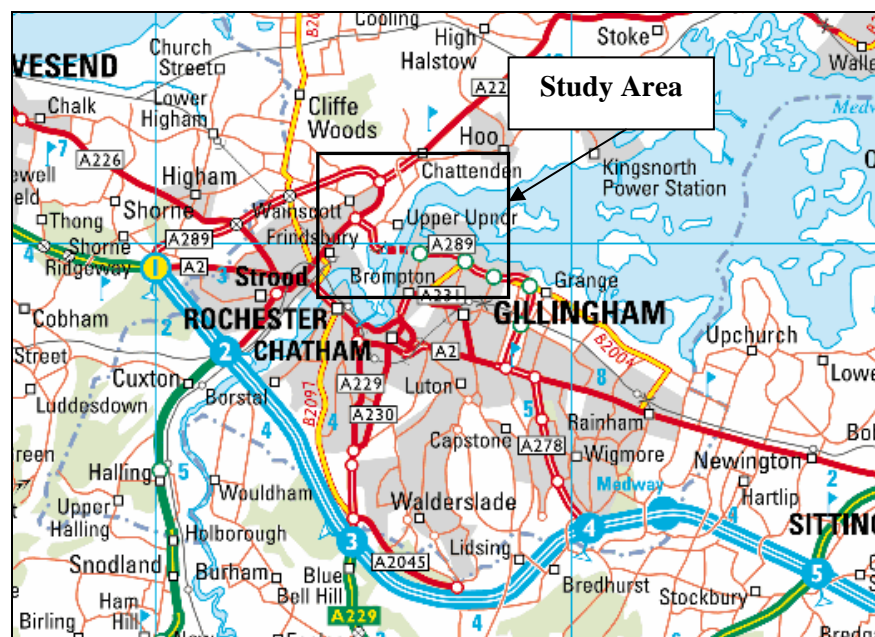


Figure 1.1: Study Area

This report broadly follows the guidelines set out in the IHT Guidelines for preparation of Transport Impact Assessments (1994), under the following Sections:

1. Introduction and Overview of Approach;
2. Policy Context;
3. Existing conditions;
4. Planned Development;
5. Potential Movement Strategies;
6. Development Scenarios, Highway and Safety Issues
7. Highway Capacity Sensitivity Assessments;
8. Longer Term Vision and Complementary Measures;
9. Summary and Recommendation.

As there are in excess of 20 development sites in the area (see fig 1.1) that have been identified for potential development any improvement needs to be considered in conjunction with other measures that may be proposed in conjunction with the other development sites.

The assessment of the development sites has been grouped according to the status within the Local Plan (LP) and whether planning consent has been granted as follows

- Local Plan
- Local plan + Other Identified Development (site 27, Gillingham Riverside)
- Local plan + Other Identified Development + Long Term Development

Site 27 was considered with committed development (other identified development) as the planning application has been submitted for this site and would therefore form a “material consideration” in planning terms. Further details are presented in chapter 4.

1.2 Overview of Trip Generation Methodology

To ascertain the potential impacts of development typical trip rates derived from a number of data sources have been used. This includes trip generation data from transport assessments for other developments planned in the area, and other database such as TRICS, LUTE and Generate. The 2001 census data has also been analysed to provide an indication of existing and potential modes of travel and for comparison with averages for the south east of England.

Trip generation and resultant network impacts are dependant on a number of factors including:

- Site development densities;
- Existing highway accesses, infrastructures and capacities;
- Existing PT accessibility and services;
- Existing walk and cycle network;
- Forecast vehicular trip generation;
- Existing and forecast public transport services; and
- The proportion of linked, pass-by and diverted trips.

The assessments have typically adopted a worse case impact scenario in terms of medium development densities with high vehicular trip generation and relatively low public transport utilisation in line with average modal trip rates for the area and with no reduction due to linked or pass-by trips. The preliminary assessment has considered a medium case public transport (pt) scenario. The assessment spreadsheets have been set up to allow the potential effect of a high public transport and linked trip scenario to be assessed at a later stage as a sensitivity test.

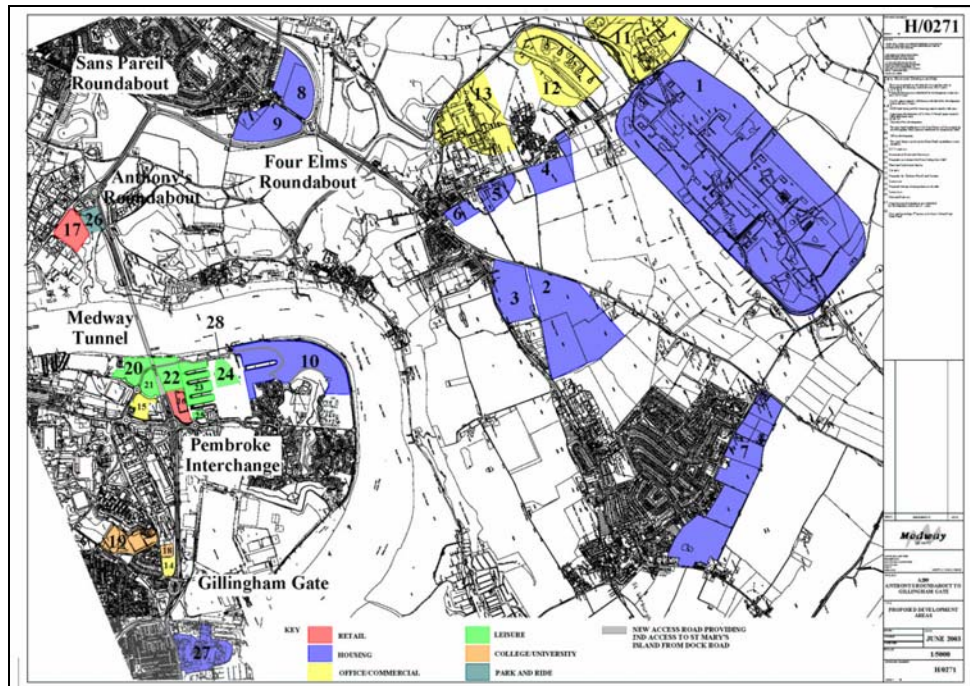


Figure 1.2: Proposed Development Sites

1.3 Safety Review 2004

As indicated previously as a first stage of the work a Safety Review has been undertaken to review the existing accident records and network operation and to identify potential safety measures that may be introduced in the short term. In order to prioritise the improvements comparison is made with average accident rates observed for each type of junction as identified in the Highways Economic Note 2002 (HEN). The Safety Review of the existing situation is summarised here in Section 6 and is examined in more detail in Technical Note TN13. The potential safety measures arising in the longer term after the impact of development in the area has been taken into account are examined in section 6.

2 Policy Context

2.1 Introduction

The development of the Gillingham Gate area is set within a broad policy framework ranging from central government directives to the Medway Local Plan.

This part of the report considers the main planning and transport policy issues which are required to be considered for development in the area to create an attractive environment in which to work and live.

2.2 Planning Policy Guidance 3 (PPG 3): Housing (March 2000)

The emphasis in PPG 3 is on the integration of land use and planning, for the creation of areas with good accessibility to the local town or district, or, allowing for good access to major nodes along good quality transport corridors. PPG3 gives particular reference for the need to develop imaginative ideas for the built environment, with an emphasis on design and lay out.

PPG3 states in paragraph 53 that local Authorities should seek greater intensity for such developments, whilst also maintaining a “design for quality” commitment ensuring a positive overall impact for the environment.

To realise the objectives of human habitation, environmental enhancement, and sustainability, higher density housing i.e. between 30 to 50 dwellings per hectare make for potentially more intensive land use, densities below this level are considered unlikely to represent an efficient use of land.

The advice in PPG3 also makes clear that councils, as the local planning authority, should pay particular attention to the reduction in dependence of private car use, whilst increasing the attractiveness of alternative transport modes, such as cycle routes and pedestrian routes especially within and between residential areas, and local amenities. The strengthening of public transport linkages between areas of employment and local services also makes this form of transport an attractive alternative to local residents.

For these assessments a housing density of 30 dwellings per hectare has been adopted as the central case.

2.3 Planning Policy Guidance 13 (PPG 13): Transport (October 2002)

PPG 13 draws attention to the need for greater sensitivity in the way that transport impacts of major developments should be accommodated, whilst providing guidance on factors that should be of influence to the location of any new development. The guidelines set out in PPG13 are part of the governments overall approach to reduce congestion and achieve better access to development facilities. Particular attention is also given to parking policy, and its role in promoting a sustainable environment by providing the appropriate number of spaces per dwelling.

The advice contained in the guidance notes further elaborates on the need for full integration of transport systems in conjunction with new developments, and prioritises the need for the diversion of transport modes away from car use to more sustainable transport methods such as safe pedestrian and cycle routes, and the need for public transport to be considered as a variable and attractive alternative.

2.4 Kent & Medway Structure Plan (2003)

All sites within the proposed development areas are required to adhere to the Kent and Medway structure plan and in conjunction with those policies laid down by central government. All sites are subject to the Local Planning Policies relating to the provision of local space, amenity protection, design and lay out. Local and central policy states that the extra demand any new development brings on the environment and local infrastructure should place no extra financial burden on the Local Authority in respect of meeting those additional needs. This policy includes such areas as Public open space, Highway improvements, and conservation measures.

The Structure Plan indicates that:

- (Policy S1) Local planning authorities are to seek an increasingly sustainable development through their planning function, which will in time reduce the need to travel and facilitate the conservation of the environment
- (policy S2) Development of an appropriate range and standard of facilities for sports and formal recreation will be provided for; such facilities will have to be well related to public transport and the pedestrian network.
- (Policy S6) that any new housing provision should enhance the quality, range and choice of housing and be concentrated within the urban areas.
- (Policy ENV15) The character and functioning of the built environment will be both conserved and enhanced. All development should be well designed in respect of its setting
- (Policy EN16) There is a need to make the best use of land in built up urban areas, while improving where possible, environmental quality. This is to include the protection of existing recreational space and amenity land, together with the provision of new areas where appropriate.

Contributions of a proportionate nature will be sought from any developer in order to meet these extra needs, taking into account the pattern of existing provision and capacity within the local area. This is considered further in section 2.8.

2.5 Medway Local Plan (2003)

Medway Council is committed to the principle of sustainable development, in order to avoid congestion and tackle social exclusion. The plan will permit development provided that the highway has adequate capacity to cater for the traffic that will be generated, and that the extra, generated traffic will not add to the risk of road accidents, furthermore the plan requires that the development will not result in traffic movement at unsociable hours.

The plan also considers the impact on any pedestrian and cycle movements, and any development will be carefully assessed by the council to ensure safe and attractive access is provided.

Medway transport criteria for any new development are further outlined in the Medway Local transport Plan extracts as listed below.

2.6 Medway Local Transport Plan (2000 – 2005)

The Medway Local transport plan covers a five year period having commenced in the year 2000, and covers the councils key transport policies, seen as being key to improving integration between land use and transport provision and infrastructure.

The main policy objectives are:

- New development is only permitted where adequate public transport links exist or can be improved.
- Ensure that development encourages the use of public transport, cycling and walking as alternatives to the car.
- Ensure traffic is managed to make the best use of available capacity and to improve road safety
- Seek to achieve a better relationship between land uses and to reduce the length and number of journeys to enable multi purpose trips to take place.

Each of these will influence the size and type of development and the associated means of access.

2.7 Medway Parking Standards (2003)

“Residential developments which do not sit 6.25 m above Ordnance Datum Newlyn (in line with the 1000 year tidal flood level) may accommodate car parking within their basement/ ground floor levels.

Car parking should not dominate the public realm. Where residential car parking is not already enclosed within the ground floors of buildings, they should be accommodated either within secure and overlooked rear courtyard areas, or within small on-street parking bays. On-street provision may also be more appropriate for visitor parking throughout the area. Disabled parking spaces for residents and visitors should be located for convenient access.”

Parking standards for new development are set out in the Medway Local Plan (adopted May 2003) and are summarised in the Table 2.1. A more detailed account including parking standards for people with disability is given in Appendix A.

Land Use Category	Parking Standards	
	Private car parking spaces	Cycle parking spaces
C3 Dwelling houses (Urban Area)	Average of 1.5 per dwelling across site	One per five dwellings
B1 Business	One per 30m2 GFA	One per 400m2 GFA for staff
A1 Food retail, including cold food take-away	One per 18m2 GFA	One per 250m2 GFA for staff/ customers

Table 2.1: Medway Parking Standards

2.8 Developer Obligations

In accordance with PPG 13 and Circular 12/ 97 developers are required to mitigate against the effect of development. Experience elsewhere in the UK has shown that the principal of Total Access Demand (TAD) is proving an acceptable mechanism for establishing the obligations that may be reasonably required of a developer. The Total Access Demand requirement is derived from a number of factors. This includes the number of employees that would be expected from the type of development proposed (eg industries, office), the level of parking to be provided on site (limited by a specified maximum). From this a levy is applied to each parking space provided (at £600 per space) and the remainder in the form of a Sustainable Access Contribution (at £ 300 per employee). For example a 10,000 sq m office development (at 21 sq m per employee) with 333 parking spaces (1 space per 30 sq m) would be expected to make an overall contribution of £242,700.

3 Existing Conditions

3.1 General

The Medway area is well connected to Central London and a number of key destinations including Heathrow, Gatwick and Stansted airports via good rail and motorway network. It also has deep water and other port facilities.

3.2 Existing Highway Network

The principal roads within the area under consideration are the A228 and A289. The A228 is the principal highway link between Rochester to the West and Grain to the East. The A228 provides a strategic link between the Hoo Peninsula, London and the south.

The northern section of the A289 (Wainscott Bypass) leads to junction 1 of the M2/ A2 to the west, and the southern section links North Gillingham to junction 4 of the M2 trunk road to the south and east. The opening of the Gillingham Northern Link in 1999 has reduced traffic considerably on residential roads and relieved congestion significantly. The road has also opened up redevelopment areas such as Chatham Maritime, Chatham Docks, Gillingham Marina and areas to the north.

However the study area still experiences congestion, particularly during morning peak due, in part, to the high level of “school run” traffic. Also the high volume of private car with low vehicle occupancy contributes to the traffic conditions during the peak hours. Reports indicate that in Medway during peak hours 77% of vehicles are single occupancy.

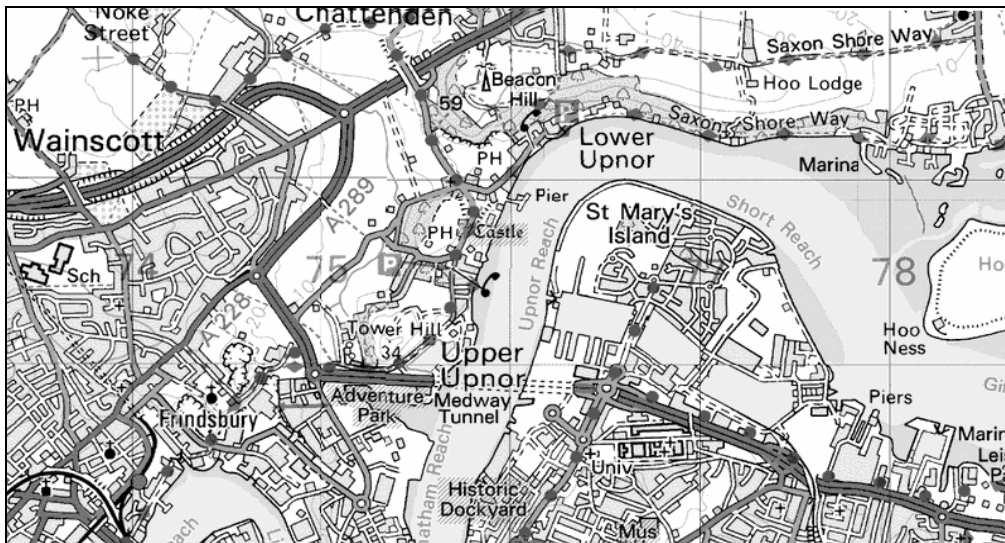


Figure 3.1: Existing Highway Network

Medway council is responsible for the provision and management of public off-street car parks. The council has Special Parking Area status since 2000, which enables it to enforce on-street parking regulations and charging regimes.

3.3 Rail Network

Gillingham and Chatham stations are to the south of the area being considered. Strood station is to the west, and Higham station to the north-west. Rochester station is to the west.

The services for Gillingham and Chatham stations run to London Victoria, London Cannon Street and London Blackfriars with the service to/from Victoria the predominant one. The stations are easily accessed by the 183 bus service or along local pedestrian and cycle routes that lead directly to the town centres. The peak hours services from/ to Chatham/ Gillingham to London are summaries in Table 3.1 below.

There is a proposed new station at Ebbsfleet and a new junction with the North Kent line at Northfleet on the Kent branch of the CTRL. When they are operational, these will enable faster services from Medway's railway stations to St Pancras.

Origin	Destination	Peak Hours Services (train/ hr)	
		AM Peak	PM Peak
Gillingham/ Chatham	London Victoria	6	4
Gillingham/ Chatham	London Cannon St	3	0
Gillingham/ Chatham	London Blackfriars	1	0
London Victoria	Gillingham/ Chatham	4	5
London Cannon St	Gillingham/ Chatham	0	3
London Blackfriars	Gillingham/ Chatham	0	1

Table 3.1: Peak Hours Train Frequency From/ To Gillingham/ Chatham

3.4 Bus Network

The majority of bus services in Chatham are provided by Arriva Medway Towns. The other bus operators serving the area are Amberlee UK, ASD Coaches, and Nu-Venture. Most of the operators run super low-floor accessible fleets, giving easy access to users.

There are many bus routes in operation within the area. Figure 3.2 shows existing bus routes in the area. The bus network serves numerous locations in the area including Chatham Maritime, St Mary's Island, Chatham Rail Station and Chatham Historic Dockyard. The bus facility at Chatham station provides a good interchange between rail and bus. The frequency of the services varies from 6 buses/ hr during peak hours to 1 bus/ hour for the rest of the day. There are also a number of services operate on school days only and are available to members of the public. A list of all the bus routes in the area and their frequency is given in Appendix B.

There is also a commuter coach services available, running from Monday to Friday during peak hours. The service is operated by The Kings Ferry and serves Chatham, St Mary's Island, Gillingham as well as Luton and Twydall. A Free Park and Ride service runs from Horsted to Rochester and Chatham. The service is available only on Saturdays and runs every 12 to 15 minutes between 9 am and 6 pm.

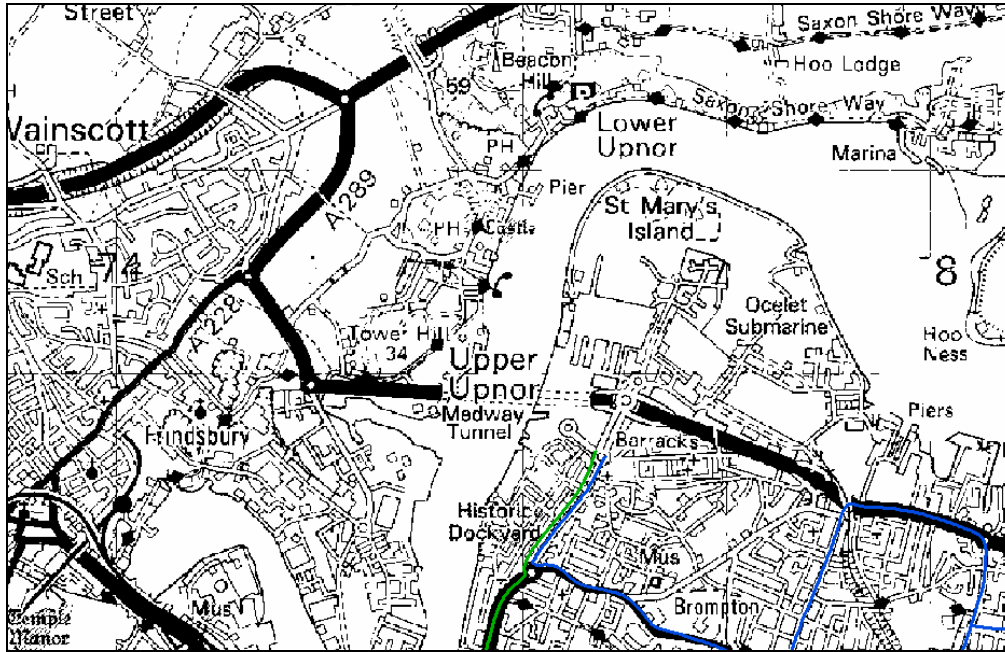


Figure 3.2: Existing Bus Network (Weekday Peak Hours)

3.5 Pedestrian and Cycle

There are many pedestrian routes within the area formed by footways along the existing roads, providing relatively safe pedestrian routes. Certain parts of the network have shared footways/cycleways. Toucan crossing facilities are provided at several points including along the A289 Pier Road.

There are several dedicated cycle routes within the area. The National Cycle Route 1 runs from the A231, Dock Road, Chatham Town Centre along the Gillingham Northern Link Road to Hempstead Valley Shopping Centre on the A278 near to junction 4 of the M2. The Sustrans Regional Route 18 has been linked with Route 1 of the Sustrans National Cycle Network to provide a circular cycle trail which links the villages of Higham, Cliffe, Cooling, High Halstow, Hoo and Upnor.

3.6 Accident Records & Safety Review

As mentioned in Section 1.3 Mott MacDonald has recently carried out a Safety Review of the A289, between Gillingham Gate and the Four Elms roundabout (A228 Wainscott Bypass junction). A summary of the findings is given below, please see TN13 for a more detailed report of the review.

Figure 3.3 shows the locations of the accidents and their severity between June 2001 and May 2004. Three of the junctions assessed, namely Four Elms, Anthonys Way and Gillingham Gate have accident rates higher than the national average. Of these, Anthonys Way has had remedial measures carried out and is currently being monitored. The northbound slip road merge from Pembroke Roundabout also has a poor accident record, although because of the configuration it does not fall into one of the standard categories to allow accident rates to be compared as normal. In addition, the A289 link between Pembroke Roundabout and Anthonys Way Roundabout has a poor accident record.

The junctions at Sans Pareil and Pembroke Roundabout both have accident rates lower than the national average, whilst the remainder of length of the A289 has only 3 accidents in the three year study period.

It is evident that the junctions to consider as priority for safety improvements, should be Gillingham Gate, with an accident rate 2.18 times the national average and Four Elms with a rate of 1.5 times the national average. The slip road merge from Pembroke Roundabout and the A289 link should also be viewed as important safety issues.

As the junctions at Sans Pareil and Pembroke Roundabout do not have significant accident rates the recommended minor improvements should be given priority as part of the routine highway maintenance programme.

The accident records indicate that a more intense management of vehicle speeds through the area possibly in conjunction with traffic signal control could improve the accident record.

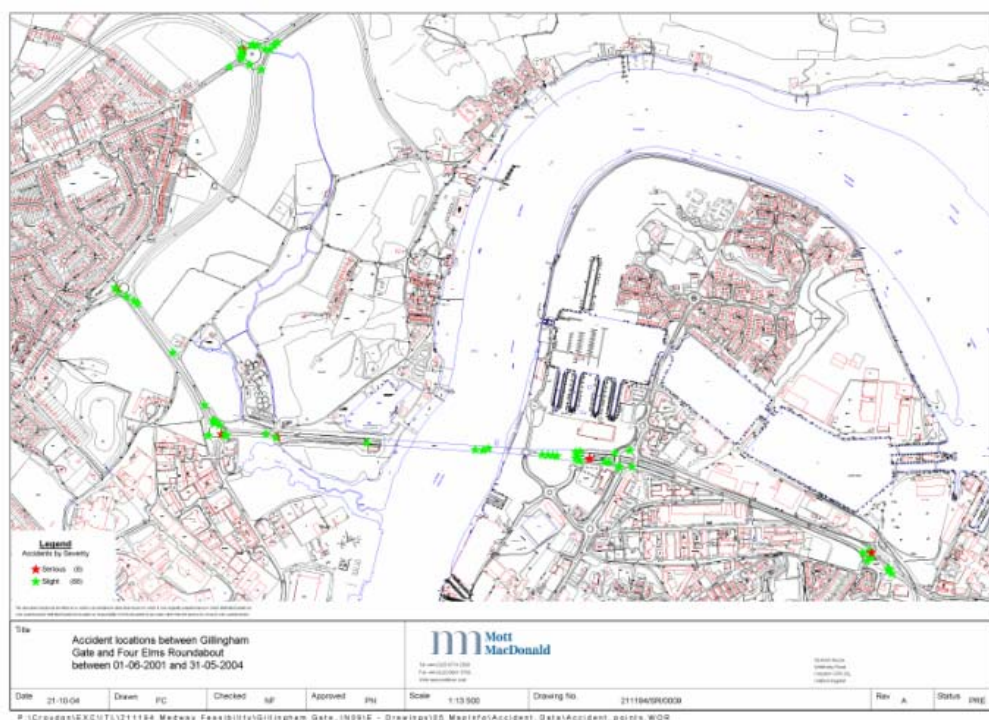


Figure 3.3: Accident Locations Between Gillingham Gate and Four Elms Roundabout

(see \05 MapInfo\ Accident_Data\Accident_Points.wor)

3.7 Existing (2003) Traffic Conditions

In recent years as part of the Medway traffic monitoring programme and various transport assessments, a number of traffic counts were undertaken in the area and therefore no new traffic count was undertaken specifically for this study. Traffic data used in this study were collected over the following period:

- September 2002;
- April 2003;

- September 2003; and
- November 2003.

Data collected in 2002 was converted to 2003 base by applying a 0.3% growth rate. The growth rate was derived from Temprow (version 4.2.3) and then was adjusted to reflect NRTF traffic growth rate. For consistency all the traffic counts were converted to PCUs by applying overall PCU factors. For AM peak 1.08 and for PM peak 1.04 overall PCU factors were used. These factors were derived using manual count data collected from a range of sources.

2003 peak hours traffic flow are shown in Figures 3.4 and 3.5. For this study it was assumed that the effect of seasonal variation is negligible.

From Figures 3.4 and 3.5 it can be seen that the Medway Tunnel experiences high volumes of traffic during both peak periods – 3750 pcu/ hr and 3300 pcu/ hr during the AM and the PM peak periods respectively. During the AM peak this is mainly made up of northbound traffic on the A289 travelling away from the study area towards London (1850 pcu/ hr). In the PM peak around 1700 pcu/ hr southbound traffic enters the network via the A289, and almost 95% of these travel east via the Tunnel.

The key junctions in the area are Gillingham Gate gyratory, Pembroke interchange, Anthony's roundabout, Sans Pareil roundabout and Four Elms roundabout. Under existing traffic condition all the junctions in the area generally operate within capacity, however during peak hours traffic there is limited queuing at these junctions although some blocking back does occur which interacts with these junctions.



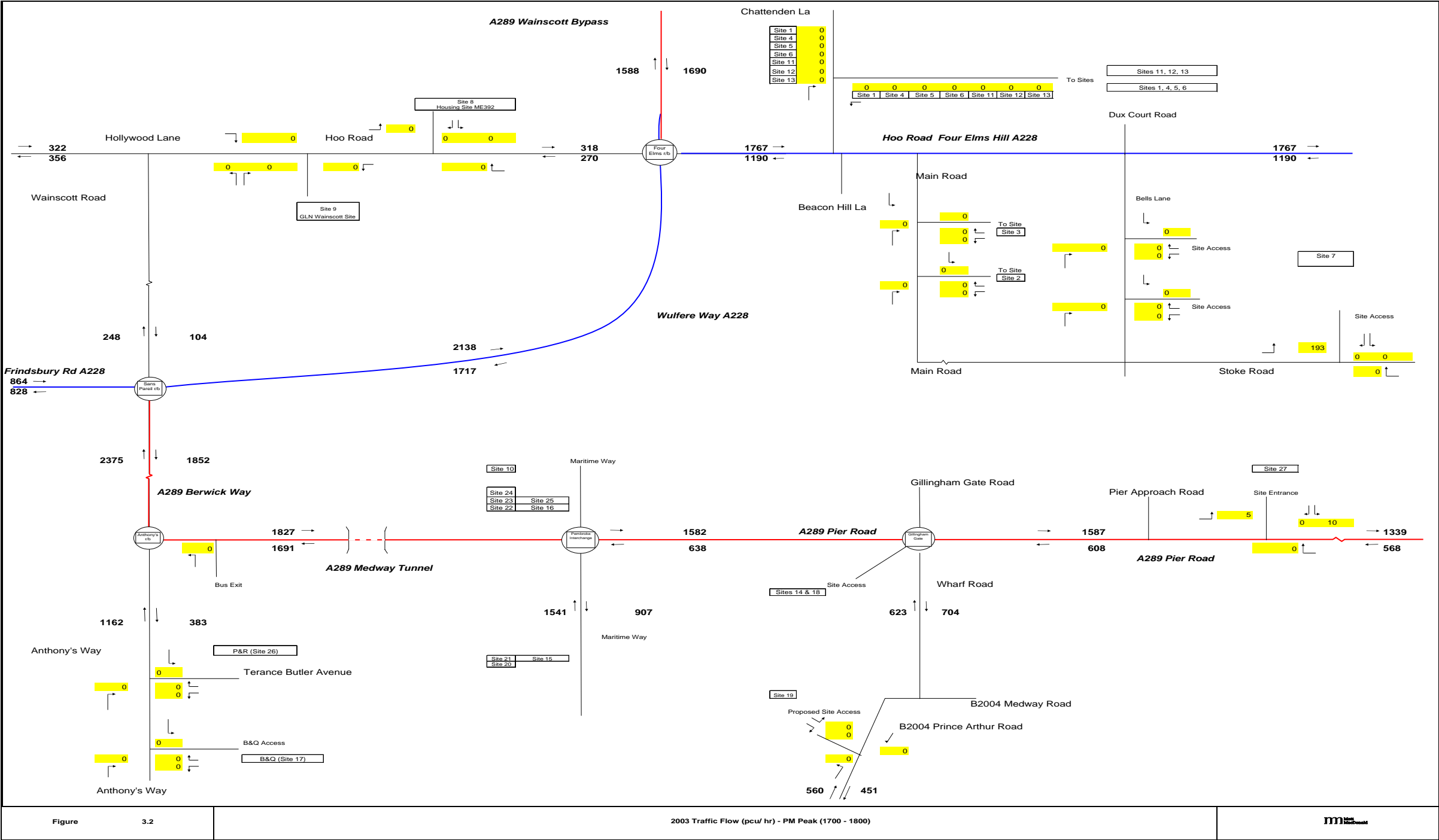


Figure 3.5: 2003 Traffic Flow (pcu/ hr) - PM Peak (1700 – 1800)

4 Planned Development

4.1 New Development

Since the opening of the Gillingham Northern Link Road the Chatham Maritime area has continued to develop. Currently there are 28 future development sites identified in the area, these sites are shown in Figure 4.1. Some of these developments are already included in the Medway Local Plan, others have been identified as longer term proposals and aspirations. A brief description of each development and their status (as at mid 2005) is given in Table 4.1.

Site no	Site	Description	Type of Development	Included in the LP
1	Chattenden barracks	There are proposals to develop the existing barracks at Chattenden for housing within the next 10-15 years.	Mainly Residential	No
2 - 6	5 housing sites in Broad Street, west of Hoo St Werburgh	Proposed housing sites scheduled for development within next 10-15 years.	Residential	No
7	LP housing site ME 390	22 hectares site for 650 houses scheduled for development within the next 5 years. The site is currently used for agricultural purposes.	Residential	Yes.
8	LP housing site ME 392	The site owned by the Defence Estate is scheduled to be developed by 2005 to accommodate 212 dwellings (2, 3 & 4-bedroom properties).	Residential	Yes
9	LP housing site ME 393	The site (6.4 hectares) owned by the Defence Estate is scheduled to be developed by 2005 to accommodate 132 residential units (mix sizes). The site will be a 'home zone' with a 20 mph speed limit, a recreational green area and a medical centre and Liftco scheme.	Residential	Yes
10, 15, 16, 19-25	Chatham Maritime	<p>The whole Chatham Maritime area (formerly the Chatham Naval Dockyards) is being redeveloped by SEEDA. The proposed development is to be progressed in three stages:</p> <p><u>Stage 1 (opening year 2003)</u></p> <ul style="list-style-type: none"> ➤ A factory outlet centre (14860 sq m GFA) ➤ University of Greenwich Chatham campus additional 1000 students (increase 5000 students by 2006) ➤ Re-let the unoccupied Colonial Mutual Building for approx 650 staff ➤ An office building (20000 sq ft) <p><u>Stage 2 (opening year 2005)</u></p> <ul style="list-style-type: none"> ➤ Dickens World Tourist Attraction (12084 sq m GFA) ➤ Quayside restaurant (4340 sq m GFA) and a residential development (1790 sq m GFA) and ➤ The Pembroke Court offices (8000 sq m GFA). <p><u>Stage 3 (opening year 2013)</u></p> <ul style="list-style-type: none"> ➤ A 1000 delegate conference centre with 300- 	Mixed use	Yes

Site no	Site	Description	Type of Development	Included in the LP
		bedroom hotel facility ➤ A Tropical Rainforest Centre (approx 200,000 visitors annually) ➤ An additional 1200 residential units on St. Mary's Island, ➤ An office building (40,000 sq ft) ➤ An additional 300 berths at the Marina ➤ An Exhibition centre at the Historic Dockyard (125000 sq ft) ➤ Student numbers to increase by 5000 at the university of Greenwich.		
11-13	3 business park development sites in Chattenden	Proposed business park development sites scheduled for development within next 10-15 years	Mainly Office	No
14 & 18	SEEDA sites D1 & D2	The site (80,000 ft ² GFA) is being currently developed as a new local headquarters for Kent Police, schedule for completion in 2006. The new police operation centre will have a custody suite (16,000 ft ² GFA) and could potentially employ up to 480 staff (mostly relocated).	Police Operations Centre	Yes
17	B&Q Site	DIY retail site	DIY Retail	Yes
26	Medway P&R site	The site is designed to accommodate 413 parking spaces.	Park & Ride site	Yes
27	Gillingham Riverside Development	Redevelopment of Gillingham Riverside as follow: <u>Residential</u> ➤ 1054 apartments ➤ 48 town houses ➤ 5 live/ work units ➤ 250 room student accommodation <u>Retail</u> ➤ 465.5 sq m supermarket (A1 use) ➤ 929 sq m other (A1 use) <u>Other</u> ➤ 232.3 sq m D1 use (Doctor's Surgery) ➤ 465.5 sq m restaurant (A3 use) ➤ 60 bed hotel and associated pub/ restaurant, ➤ 185.8 sq m Harbour Master/ Chandler.	Mixed Use	No
28	New Road	New road providing 2 nd access to St Mary's Island from Dock Road.	Not Applicable	Not Applicable

Table 4.1: List of Proposed Development Sites

Before looking at the potential land use development contributions and related trip generation it is useful to consider a range of strategies that will assist in providing a more sustainable overall transport system in the longer term.

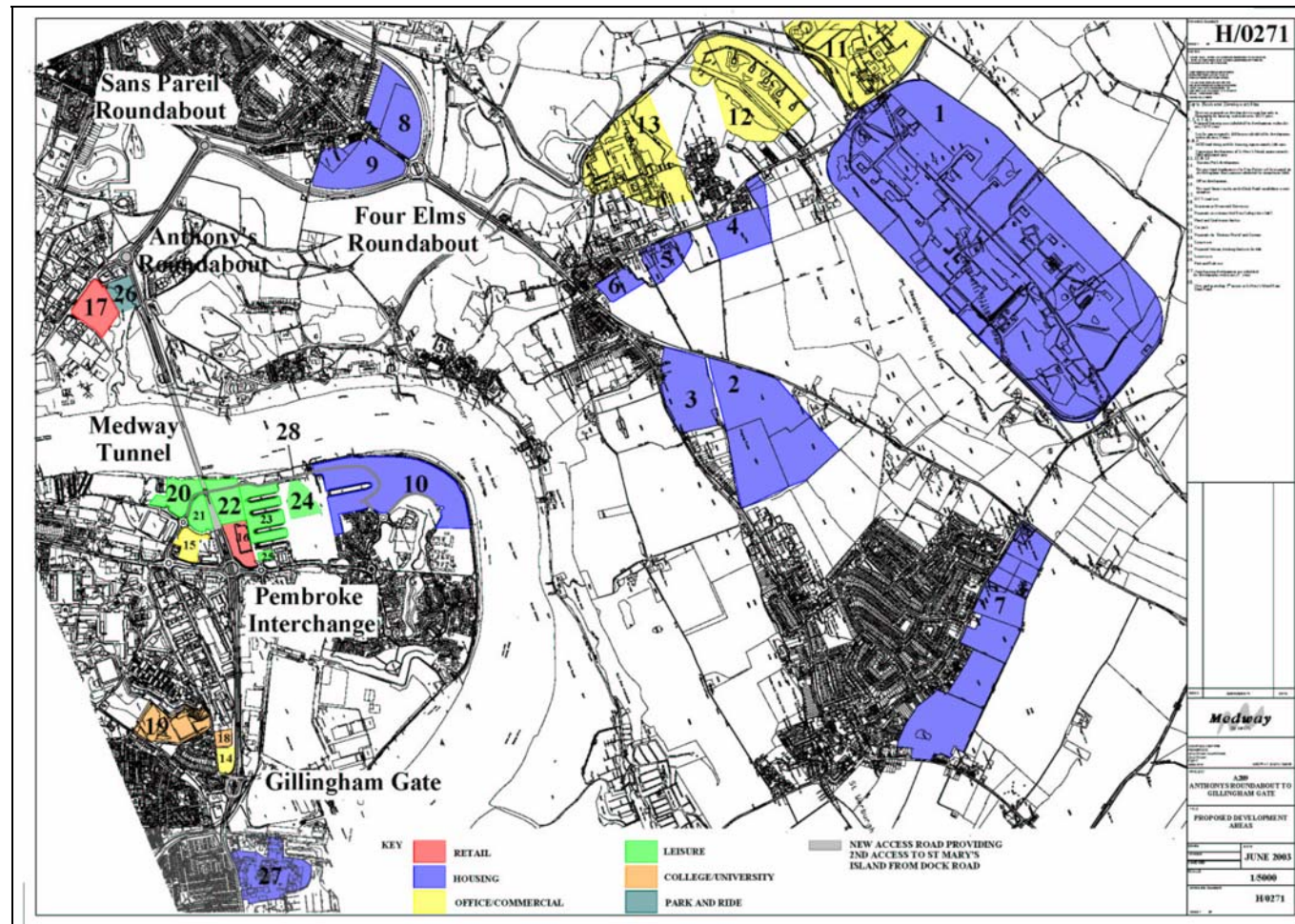


Figure 4.1: Proposed Development Sites

5 Potential Movement Strategies

5.1 Transport Projects

The above initiatives may be progressed in order to improve the environment in the study area, in combination with traffic flow management measures particularly in the peak hours, and with improvements in the public transport system and better pedestrian and cycle links. These would also be subject to detailed feasibility studies, and would complement the main land use and transport proposals, including proposed schemes in the area.

- Public Transport Information and Car Park Information Systems linked to P&R
- Demand Management (including traffic control systems)
- Parking Management Strategy
- Pedestrian and Cycle Route Improvements

These initiatives aim to make more efficient use of the transport system, whilst seeking an optimum balance between accessibility, necessary to (sustain economic growth) and quality of the environment.

In terms of the Public transport elements the area wide initiatives may include:

- New routes with higher frequency and quality of bus services
- Improved bus technology and information system (i.e. Countdown)
- Improved and safer access to the strategic road network
- Bus service improvements specifically on radial routes linking to Park and Ride sites.

These are considered further below.

5.1.1 Public Transport Information and Car Park Information Systems

Passenger information systems (e.g. including Countdown at bus stops) and initiatives such as through ticketing and Smartcards etc will further encourage people to switch to public transport. This will provide increased opportunity for people, both commuters and shoppers, to access facilities in the area by modes other than the private car.

It is also recognised that real time information relating to available of parking spaces in the area is limited. Comprehensive driver information on the main approaches to car parks may lead to more efficient use of the parking stock, including Park & Ride facilities.

5.1.2 Demand Management

In order to meet possible targets for reduction, demand management measures may also be introduced accordingly. However it is important that the constraint of movements within the area does not lead to traffic switching onto less appropriate routes, with a potential result overall increase in accident rates. Furthermore, in order to sustain economic growth the balance between overall accessibility and quality of the environment needs to be fully considered. In specific locations, if accessibility deteriorates

shoppers may choose to shop elsewhere. In order to achieve a high level of priority for public transport in some locations it may thus be necessary to consider roadspace reallocation to ensure buses and taxis are not unnecessarily delayed by other traffic. Within the central area the opportunity for pedestrianisation will also need to be reviewed with full consideration of movement by all modes.

5.1.3 Parking Management Strategy

It is likely that with an increase in shopping and leisure facilities in the area, as identified in the LP, the parking dwell times will increase and this by itself will require an increase in short term parking. Subject to more detail assessment, utilisation of some of the existing Private Non Residential (PNR) spaces close to the planned development may provide a means of limiting the overall growth in parking supply. Implicit within this is that some public and private off street long term spaces would change to short term parking. This will almost certainly also have car park revenue implications, and the balance between long stay spaces and short stay spaces with a higher parking turnover will need more detailed consideration.

5.1.4 Pedestrian and Cycle Route Improvements

Improvements in pedestrian linkages will include widening footpaths on the main pedestrian routes and giving higher priority to the more vulnerable road user at road crossings, particularly on approaches to public transport hubs. Measures such as additional pelican and toucan crossings are also likely to form key elements. Improved pedestrian links need to be provided to connect the main facilities within the area and to the car parks. Similarly it would be expected that on routes to other new developments pedestrian linkages would be improved. The opportunity for road space reallocation may be reviewed in some locations with the aim of introducing additional pedestrian crossings at a number of key locations to assist pedestrian and cyclist movement.

6 Development Scenarios, Highway and Safety Issue

6.1 Forecast Flows Without Development

Medway is situated within the Thames Gateway, one of Europe's largest regeneration areas. As a result no targets have been set for reduction in the level of road traffic or growth rate for the area, as

required under the Road Traffic Reduction Act 1997. In fact it is recognised that the traffic levels in Medway will undergo substantial growth.

In this study 28 developments in total were considered. Although there are no definite timescales set out for these developments, it is generally understood that they will take place in the next 10 - 15 years. If all 28 developments go ahead the traffic level during peak hours will increase by up to 150% at some locations. Considering this, and to minimize the potential for double counting, the base year (2003) traffic flows were factored up to 2008 level to derive background flows. The year 2008 was chosen as an intermediate year for planned development when the existing local plan will be at the end of the planning period. Temprow (version 4.2.3) / NRTF growth factors were used to derive local growth factor for the area (9.1% between 2003 to 2008). However it is recognised that part of this growth will be attributable to local developments and therefore a greater level of growth has been assessed as a worse case scenario.

6.2 Trip Generation Parameters

An overview of the methodology used to calculate trips from sites 1-6 and 11-13 are given in Section 1.2 and development parameters and trip rates used to calculate trip generation shown in Tables 6.1 and 6.2.

Parameter	Value Adopted
Developable Area	30% *
Non-Residential Development Density	80%
Residential Development Density	30 unit/ ha

* For non-residential area

Table 6.1: Development Parameters

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
Residential	0.19	0.67	0.51	0.20
Office/ Commercial	1.76	0.24	0.23	1.32

Table 6.2: Trip Rates

6.3 Development Scenarios

As indicated the 28 developments considered in this study have differing levels of planning status, some of them have been identified in the Local Plan (LP), others are long term aspiration. For assessment purpose developments with similar level of commitment were packaged together to form a scenario. In total four development scenarios were considered, these are listed below. Site 28 which includes to construction of a new link road to St Mary's Island was not considered in the assessment.

- Scenario A – Existing Conditions;
- Scenario B – Existing Conditions + Committed Developments

- Scenario C – Existing Conditions + Committed Developments + Other Identified Schemes Under Consideration
- Scenario D – Existing Conditions + Committed Developments + Other Identified Schemes Under Consideration + Long term Outlined Schemes

6.3.1 Development Scenario A: Do Minimum

Under this scenario it was assumed that no further development will take place in the study area. This is the Do-Minimum condition under which there is not expected to be substantial increase in the level of traffic other than background growth. However, all the junctions in the study area will be expected to experience increasing levels of congestion as traffic levels rise over time. The existing weekday AM and PM peak hour traffic flows on the network are shown in Figures 6.1 and 6.2.

6.3.2 Development Scenario B: A + Committed Developments

The developments considered under scenario B are sites 7-10 and 14-26. All these sites were identified in the Medway Local Plan (adopted in 2003) for future development, and therefore considered as committed developments. The sites include a mixture of residential, office, education, retail and leisure facilities. Although none of the sites were deemed to be generating traffic under existing condition (Scenario A), some of the sites are planned to accommodate relocated developments, these are:

- Site 14 & 18: The new Kent police headquarters will be replacing stations at Rochester, Chatham and Rainham.
- Site 19: Relocation of Mid Kent College

To some extent this will include diverted trips from elsewhere on the wider network.

6.3.3 Development Scenario C: Committed Development (B) + Other Identified Development

Scenario C includes all the developments considered under scenario B plus redevelopment of Gillingham Riverside (site 27). In the local plan the site is designated as employment land, assuming continuous operation of the Akzo Nobel chemical plant. With the closure of the plant the site has been put forward to redevelop as a high quality residential/ employment development. A more detailed list of proposed land use for the site is given in Table 4.1.

6.3.4 Development Traffic Scenario D: Committed Development (B) + Other Identified Development + Long Term Development

Scenario D includes all the developments considered under scenario C plus long term sites; these are sites 1-6 and 11-13, as shown in fig 4.1. Medway Council has not allocated definitive land uses for these sites. For this study, following discussions with MC, it was thus assumed that sites 1-6 will be residential and sites 11-13 will be office/ business park development, and a range of development mixes has been considered further within the sensitivity tests set out in section 7.

6.4 Traffic Flows

6.4.1 Scenario B (Committed Development)

Trip generation, distribution and assignment of development traffic on the network were derived and assessed using the information from the transport assessment reports including observed turning proportion at junctions, as appropriate. Existing trip generation rates from all the sites were deemed to be effectively zero. Development traffic flows for scenario B are shown in Figures 6.3 and 6.4, the resultant traffic flows (background + development flow) are shown in Figures 6.5 and 6.6 for the AM and PM peak periods.

The committed development is expected to add 12% to 13% extra flow per direction on the Wainscott Bypass during morning peak, and a slightly higher percentage for the evening peak (14-16%). The level of increase in traffic flow is higher on the Medway Tunnel – for the AM peak it is around 18% increase in each direction, for the PM peak a 27% increase in the eastbound traffic and a 35% increase in the westbound traffic. The worst effected part of the road network will be the A289 Pier Road, east of Pembroke Interchange. This is not surprising as the access/ egress to the largest committed development (Chatham Maritime) is via the Pembroke Interchange. The busiest section of the Pier Road could experience an increase of 670 pcu/ hr (42% increase) in the eastbound and 470 pcu/ hr (77% increase) in the westbound traffic during the PM peak.

6.4.2 Scenario C

Development traffic flows for scenario C are shown in Figures 6.7 and 6.8, existing trip generation are shown in Figures 6.9 and 6.10, and the resultant traffic flows (background + development flow) are shown in Figures 6.11 and 6.12.

Development site 27 is expected to add around 550 extra trips on the network during peak hours as a worse case scenario, with a high proportion of this traffic expected use the Tunnel to access/ exit the site. During the morning peak this will add some 10% extra traffic on the Tunnel travelling west. During the evening peak the main increase will be in the eastbound traffic and equating to some 15%.

6.4.3 Scenario D

Development traffic flows for scenario D are shown in Figures 6.13 and 6.14, and the resultant traffic flows (background + development flow) are shown in Figures 6.15 and 6.16.

As can be seen from the diagrams, if the long term developments (sites 1-6 and 11-3) go ahead under a high development scenario, they could add over 7500 pcu/hr during AM peak and 6200 pcu/hr during PM peak on the A228 Hoo Road. Considering the location of the sites, it was assumed that the traffic will access/ egress the developments via the Four Elms roundabout. The roundabout is currently operating with very little spare capacity in the peak hours and it is clear that it will not be able to cope with such volume of extra traffic in its current layout. All these developments are more of an aspiration at this stage and will require further study including land use, development density, parking, mode choice and access to the highway network, and potential highway improvements and a new links.

6.5 Summary of Overall Highway Assessment

The overall impact of each scenario on the five main junctions in the area are summarised in Tables 6.3 and 6.4 below; Table 6.3 shows expected increase at each junction per scenario and Table 6.4 shows the highest ratio of flow to capacity (RFC) of all arms for each junction.

If no further developments are to take place in the study area (Scenario A), only Pembroke Interchange and Gillingham Gate will operate under capacity. Anthony's roundabout will be just over capacity during the AM peak, and four Elms and Sans Pareil roundabouts will be over capacity during the PM peak. Under scenario B all these three roundabouts will be over capacity during both peak periods. The Pembroke Interchange will experience the highest level of increase in traffic flow in scenario B and will operate over capacity during AM peak. Under scenario C and D none of the junctions assessed will perform satisfactorily if they are to operate in their existing layouts. From Table 6.4, although Pembroke Interchange will operate at 90% capacity during PM peak, it should be remembered that the major increase will be in the through traffic which runs currently as free flow through the grade separated junction.

Under scenario B and C, with progression mainly of committed development plans for the area, the Pembroke Interchange experiences the most significant increases. With scenario D the level of increase is more significant on junctions providing access to those less developed areas to the east with resulting impacts, in particular on the Four Elms roundabout (i.e. 131%).

Junction	Traffic Flow (pcu/ hr)							
	Existing (2003)	Scenario A	Scenario B	% Change from B/G with Scenario B	Scenario C	% Change from B/G with Scenario C	Scenario D	% Change from B/G with Scenario D
AM Peak								
Four Elms Roundabout	5254	5732	6160	7%	6257	9%	13225	131%
Sans Pareil Roundabout	4974	5427	5759	6%	5887	8%	9370	73%
Anthony's Roundabout	4981	5434	5981	10%	6184	14%	9165	69%
Pembroke Interchange	4938	5388	6639	23%	6842	27%	9033	68%
Gillingham Gate	3293	3592	4135	15%	4447	24%	6598	84%
PM Peak								
Four Elms Roundabout	5336	5822	6421	10%	6594	13%	12091	108%
Sans Pareil Roundabout	5061	5521	6083	10%	6314	14%	9062	64%
Anthony's Roundabout	4320	4713	5834	24%	6113	30%	8394	78%
Pembroke Interchange	4448	4853	6901	42%	7180	48%	8768	81%
Gillingham Gate	2969	3239	4236	31%	4590	42%	6139	90%

Table 6.3: Peak Hours Overall Traffic Flow at Key Junctions (total junction flow)

(note: B/G refers to background growth)

Junction	Existing Junction Type	Ratio of Flow to Capacity (RFC)			
		Scenario A	Scenario B	Scenario C	Scenario D
AM Peak					
Four Elms Roundabout	Roundabout	0.94	1.09	1.14	3.33
Sans Pareil Roundabout	Roundabout	0.90	1.14	1.24	1.92
Anthony's Roundabout	Roundabout	1.05	1.33	1.33	1.91
Pembroke Interchange	Signalised Interchange	0.76	1.11	1.11	1.14
Gillingham Gate	Signalised Gyratory	0.93	0.97	1.33	1.50
PM Peak					
Four Elms Roundabout	Roundabout	1.11	1.29	1.34	2.77
Sans Pareil Roundabout	Roundabout	1.30	1.82	1.91	2.00
Anthony's Roundabout	Roundabout	0.88	1.41	1.46	1.75
Pembroke Interchange	Signalised Interchange	0.70	0.90	0.90	0.90
Gillingham Gate	Signalised Gyratory	0.47	0.86	1.58	1.60

Key

	RFC < 0.90
	RFC = 0.90 to 1.0
	RFC > 1.0

Table 6.4: Impact of Development Traffic on Key Junctions' Performances (Ratio of Flow to Capacity RFC highest of all arms)

6.6 Effect of Individual Sites

Table 6.5 below shows the impact of each development site on the five main junctions in the area. As mentioned in Section 1.2, the potential demand for movement for long term development sites 1-6 and 11-13 was calculated assuming worst case. It was assumed that sites 1-6 and 11-13 will be developed as single-use. It was further assumed that these 9 sites will not attract any pass-by trips and that all vehicular trips will impact on the external network ie with minimal internal trips.

Of all the five junctions, the planned development will have the biggest impact on Four Elms roundabout. This junction will experience a very high level of increase in traffic flow. As can be seen from Table 6.5, site 11 alone will increase flow at Four Elms roundabout by 2450 pcu/ hr during the morning peak (46.8%) and by 1900 pcu/ hr during the evening peak (35.7%). After site 11, site 12 is the biggest generator of traffic and may add over 1750 extra trips during the AM peak (33.7%) and over 1350 extra trips during the PM peak (25.7%) at Four Elms roundabout. Site 1, which is the largest site in the area in terms of plot size, will potentially increase morning and evening peak flow at Four Elms roundabout by 1150 pcu/ hr (22%) and 950 pcu/ hr (17.9%) respectively. The other development sites will have less significant impact on the junction and the contributions of sites 3-6, 8, 9, 14, 17, 18, 26 & 27 are less than 5%.

The development site 11 is also responsible for the biggest increase in traffic flow at Sans Pareil and Anthony's roundabout. This development will increase the AM peak flow at these two junctions by around 1250 (24.7%) and 1050 pcu/ hr (21.4%) respectively. The corresponding increase in the PM peak flows are 950 pcu/ hr (18.8%) and 780 pcu/ hr (18%).

Chatham Maritime's trip generation is responsible for the biggest increase in traffic flow at Pembroke Interchange (AM peak -1600 pcu/ hr, PM peak - 2100 pcu/ hr) and Gillingham Gate gyratory (AM peak -680 pcu/ hr, PM peak - 850 pcu/ hr).

6.7 Potential Junction Improvements

A number of potential junction improvements have been identified ranging from signalising and enlarging the existing roundabouts through to complete reconfiguration of the junctions to provide signalised crossroads. This has the advantage of providing increased capacity within the same overall area, whilst also providing the potential for increased priority for buses at the junctions with bus lanes and selective vehicle detection. However the removal of roundabouts may reduce the opportunity for landscaping and will often provide lower delay to traffic outside normal peak hour periods.

The following summarises each of the 5 main junction improvements identified as short term schemes. Additional more extensive work may be required at a later stage as more information on specific requirement becomes available. Fuller details can be found in Technical Note TN013: Safety Review.

Four Elms Roundabout

Four Elms is a large, four arm at grade roundabout, with three arms being dual carriageway and one single. The national speed limit applies on all roads. There is a dedicated left turn on one arm and the existing layout with indicative road markings is shown on drawing 211194/SR/008 in Appendix D.

Nineteen accidents have been recorded in the three year study period, with crossover/lane change collisions on the circulatory carriageway and rear end collisions on the Hoo Road approach being the most common. Additionally two accidents involved vehicles traversing the central island. The accident rate for the junction is 6.33 per annum compared with the national average of 4.18 per annum.

Site observations and discussions with Medway Council reveal that one of the main problems is the lack of opportunity for vehicles to exit Hoo Road due to the volume of other circulating traffic and this probably contributes to high proportion of accidents in this area of the roundabout.

Possible solutions to the accident issues at Four Elms Roundabout are summarised below:

- Enhance the landscaping on the central island to provide a contrast with the surroundings.
- Provide additional chevron signage with yellow backing boards on the central island, together with larger turn left arrow signs.
- Consider the use of yellow bar markings to give advance warning of the junction. The general signage on the approaches is adequate.
- Investigate the street lighting to ensure sufficient levels of illumination are provided.
- Make the outside kerb line of the dedicated left turn lane more visible, possibly by the use of single chevron signs or block paving.
- Consider the use of spiral markings and widening the single lane exit to two to 3 lanes as shown on drawing 211194/SR/008 (Appendix D). Spiral markings can only safely be implemented if this widening is implemented.
- Consider the limited use of part-time traffic signals to allow traffic to exit Hoo Road (Refer to drawing 211194/SR/009 in Appendix D)
- Renew anti-skid surfacing as necessary.

The major causes of accidents at this junction appear due to the problems of exit from Hoo Road and the lane changing around the circulatory carriageway. The two main improvements to consider are the part-time signalisation of the Hoo Road node and the spiral markings to regulate lane usage. These

two improvement measures should be considered as part of a package to improve the safety and operation of the roundabout and if possible implemented at the same time. Recommendations therefore are:

- i. Carry out preliminary design and undertake traffic assessments to determine the viability of part-time signals on the roundabout at the Hoo Road node of the junction, with a view to developing a scheme for implementation.
- ii. Carry out design and implementation of the spiral markings shown on drawing 211194/SR/008.

Sans Pareil Roundabout

This is a four arm at grade roundabout, two arms of which are dual carriageways, one with a 50mph speed limit and the other subject to the national speed limit. The two remaining arms have a 30mph speed limit.

There have been eight accidents in the three year study period all varying in type. This accident rate of 2.67 per annum is below the national averages of both 4.06 for speeds over 40mph, and 3.72 for speeds up to 40mph.

Although the accident figures are below the national average and suggest the roundabout is operating safely, Medway Council have indicated that there is a perceived problem with the Anthonys Way southbound merge, between the traffic using the dedicated left lane and the vehicles turning right from Frinsbury Hill, however, the accident data shows only two incidents in the three year study period.

Each turning flow has a separate lane for around 60m southbound from the roundabout, before the road markings change from hatching to conventional lane markings. In addition, a temporary black and yellow sign has been erected on a lamp column indicating that traffic should 'Give Way to traffic merging from right'. Approximately 100m further south from the end of the hatching, the taper begins for the left turn into Upnor Road.

The nature of the problem includes:

- Vehicles also use the lane to the right of the hatching to make the left turn onto Anthonys Way.
- Vehicles use the left lane on Anthonys Way northbound to turn right onto the A289.
- Signage and landscaping are generally of a good standard.
- Some road markings are worn

It is therefore proposed that the following measures to Sans Pareil Roundabout be further considered prior to upgrading road markings and signage:

- i. Undertake the video survey to determine the nature and extent of the problem with the dedicated left merge.
- ii. Analyse video survey to confirm requirements for improved road markings and signage. Ensure that during implementation all worn road markings not dealt with as part of the works are renewed.

A drawing (211194/SR/0005) shows the existing layout of Sani Pareil Roundabout is included in Appendix D.

Anthonys Way Roundabout

Discussions with Medway Council determined that remedial measures have taken place at this junction and are the subject of 12 months monitoring, which is ongoing. The accident rate, prior to these works was 3.33 per annum, against the national average of 2.2 per annum for this type of junction.

The current layout with indicative road markings can be seen on drawing 211194/SR/006 in Appendix D.

There are two minor items of work, which should be carried out as soon as possible. These are:-

- The removal of vegetation on the roundabout central island, to provide adequate forward visibility around the circulatory carriageway.
- The completion of road markings on the circulatory carriageway to correct their lack of consistency/continuity.

Additional improvements that may be considered to augment the recent remedial works should problems continue include:-

- Lane discipline signs on the approaches to the roundabout on Anthonys Way southbound and Vanguard Way westbound to complement the road markings.
- Yellow bar markings on the high speed approaches.
- Countdown signs to diagram 823, 824 and 825 of the TSRGD

It is therefore recommend the following mitigation measures to Anthonys Way Roundabout are considered further:

- i. Ensure the removal of vegetation and the completion of road markings are carried out as soon as possible.
- ii. Continue to monitor the junction and if problems persist implement the improvements in paragraph 6.1.

Pembroke Interchange

Pembroke Interchange is a fully signalised four arm grade separated junction adjacent to the eastern portal of the Medway Tunnel. The slip roads are subject to a 50mph limit with the roundabout circulatory carriageway and Maritime Way approaches having a 30mph limit.

The existing layout with indicative road markings is shown on drawing 211194/SR/007 in Appendix D.

There have been seven accidents at the junction of varying types with no apparent common factor. The accident rate for the three year study period is 2.33 per annum compared to the 3.72 national average for this type of junction with speeds up to 40mph.

Although the accident rate is below the national average there are a number of issues that could be addressed. These include:-

- Circulatory visibility is slightly sub-standard due to a hedge on the roundabout island.
- There is no anti-skid on eastbound slip road to roundabout. The cause of one accident here was skidding.
- The road markings are generally worn.
- Where there is anti-skid it is worn.

There is also a very short merge at the top of the westbound on slip, where both the roundabout traffic and vehicles on Maritime Way get a simultaneous green light. However, discussions with Medway Council reveal that there are no accident problems of note at this location due to the merging traffic.

These preventative measures are essentially part of the routine maintenance of the highway and include:-

- Provide anti-skid on eastbound off slip approach and renew elsewhere as necessary.
- Re-mark road markings to ensure reflectivity and conspicuity.
- Prune the hedge as necessary to ensure visibility is not compromised any further. There is no evidence that the hedge has been a factor in any accidents to date even though the forward visibility around the roundabout is reduced from the desirable 50m to around 35m.

Gillingham Gate

Gillingham Gate is a signalised five arm gyratory junction and is shown with indicative road markings on drawing 211194/SR/0001 (Appendix D). The A289 bisects the junction and is subject to a 40mph speed limit. Medway Road joins from the south east, the Docks from the north and a proposed access to the new development from the south west. These are either private roads or subject to a 30mph speed limit.

Of the eleven accidents over the three year accident analysis period, eight were the result of drivers misunderstanding the traffic signals.

On site observations noted the following:-

- The junction layout is confusing for some manoeuvres, for example Medway Road left turn to tunnel. Also, there appears to be more lanes than necessary on some approaches, for example two right turning lanes from Medway Road to the Docks.
- The signal layout/signal heads are confusing, for example there are a large number of signal heads, some of which are difficult to see, such as the right turn from the Docks.
- The signage and road markings are difficult to understand.
- The road markings are generally worn.

- The anti skid surfacing is showing signs of wear.

From discussions with the Signals Management department at Medway Council it has been determined that the junction operates satisfactorily in terms of capacity.

The accident rate for the three year study period is 3.6 per annum compared to the 1.65 national average for this type of junction with speeds up to 40mph.

The following mitigation measures are therefore proposed:

- To review the existing road markings to determine current lane usage and demand. Re-mark all road markings to meet the current demand requirements and provide adequate reflectivity and clear markings.
- The current lane discipline signage is not easy to read and may need to be simplified in conjunction with the above review of the road markings.
- Assess the skid resistance of the anti-skid surfacing and carry out remedial measures as necessary.

Minor modifications to kerb lines with some reduction in lane numbers and relocation of signal heads would provide a more compact and less confusing layout, which can be seen on drawing number 211194/SR/0002 in Appendix D, however this would be subjected to a more detailed traffic capacity assessment.

Associated road markings and signage will need to be amended and existing remaining markings re-marked. Anti-skid surfacing to be assessed and remedial measures carried out as necessary.

The junction could be completely modified to provide a four arm signalised crossroad and a three arm signalised T junction within the existing highway boundary constraints. These junctions would be linked by a section of either a two lane dual carriageway or a three lane dual carriageway approximately 50 metres in length.

The layout would be easy for drivers to understand with simple road markings and signage, and would provide pedestrian access similar to the current layout.

Further detailed capacity assessments will be required to determine if the solution above is viable and will be subject to other development proposals.

Future Safety Issues

From the main safety assessment and analysis reported previously three of the junctions assessed, namely Four Elms, Anthonys Way and Gillingham Gate have accident rates higher than the national average. Of these, Anthonys Way has had remedial measures carried out and is currently being monitored. The northbound slip road merge from Pembroke Roundabout also has a poor accident record, although this does not fall directly into one of the standard assessment categories, to allow accident rates to be compared easily. In addition, the A289 link between Pembroke Roundabout and Anthonys Way Roundabout has a poor accident record.

The junctions at Sans Pareil and Pembroke Roundabout both have accident rates lower than the national average, whilst the remainder of length of the A289 has only 3 accidents in the three year study period.

It is evident that the junctions to consider as priority for safety improvements, should be Gillingham Gate, with an accident rate 2.18 times the national average and Four Elms with a rate of 1.5 times the national average. The slip road merge from Pembroke Roundabout and the A289 link should also be viewed as important safety issues.

As the junctions at Sans Pareil and Pembroke Roundabout do not have significant accident rates the recommended minor improvements should be given priority as part of the routine highway maintenance programme.

With the potential increase in traffic flows that could arise as part of the identified development scenarios, major improvements of the junctions could be required. However it is also important to recognise that the connecting roads onto these sections will also be expected to experience significant increases in traffic levels and appropriate facilities for pedestrians and measures to ensure adequate bus priority will also need to be properly considered.

Table 6.5: Traffic Flow Generated By Each Development (total junction flow) - Peak Hours

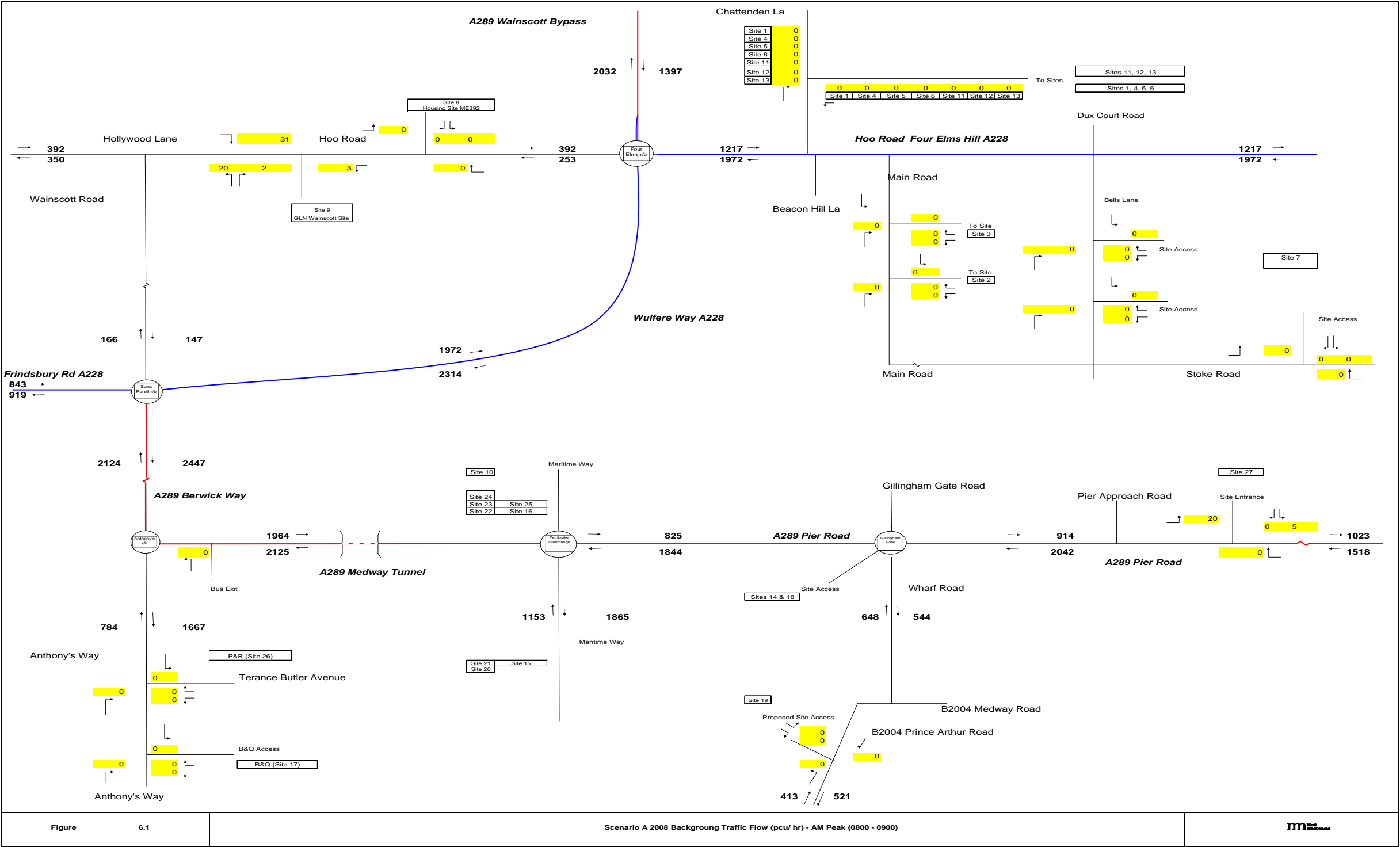


Figure 6.1: Scenario A Background Traffic Flow – AM Peak (0800 – 0900)

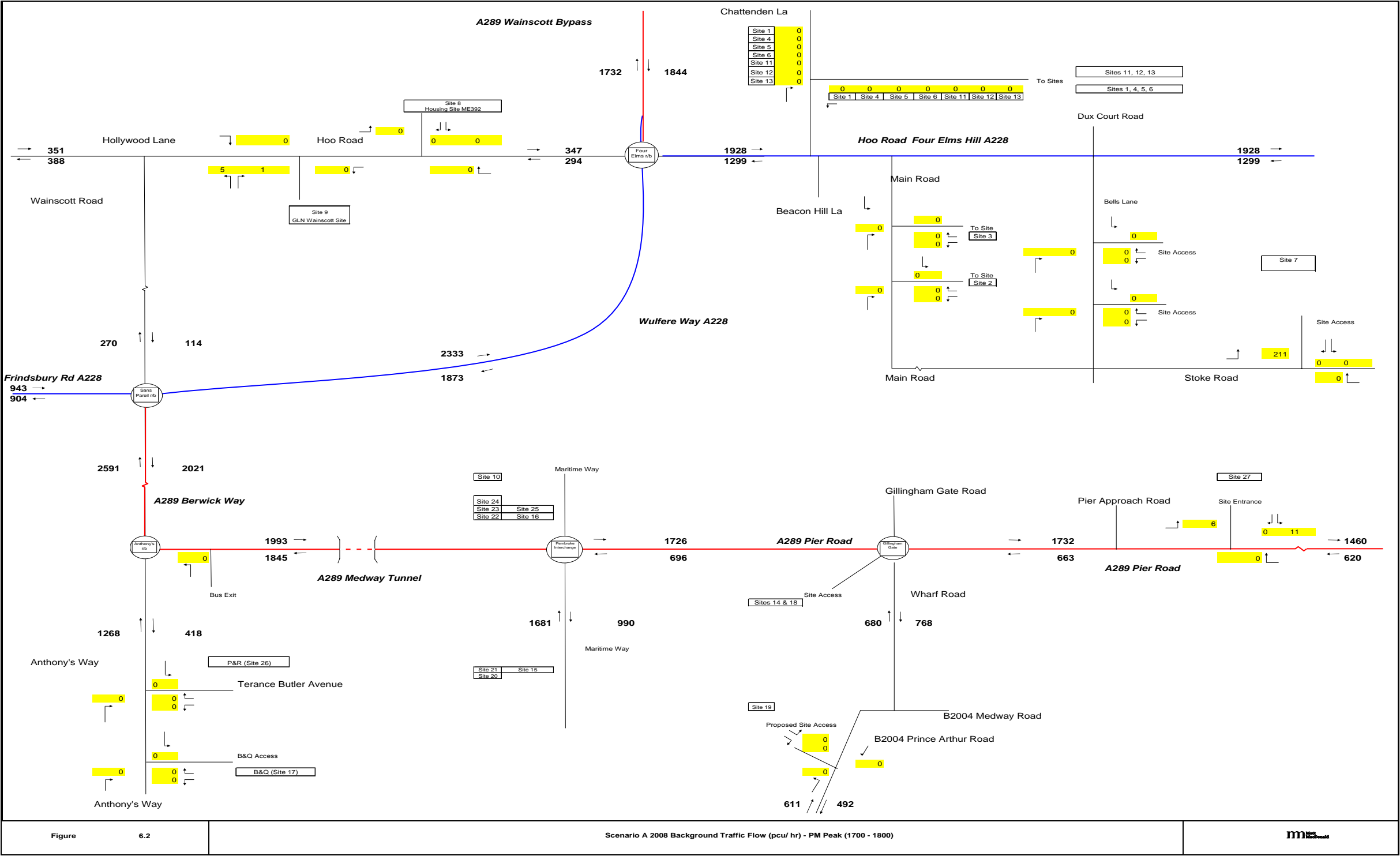


Figure 6.2:Scenario A Background Traffic Flow – PM Peak (1700 – 1800)

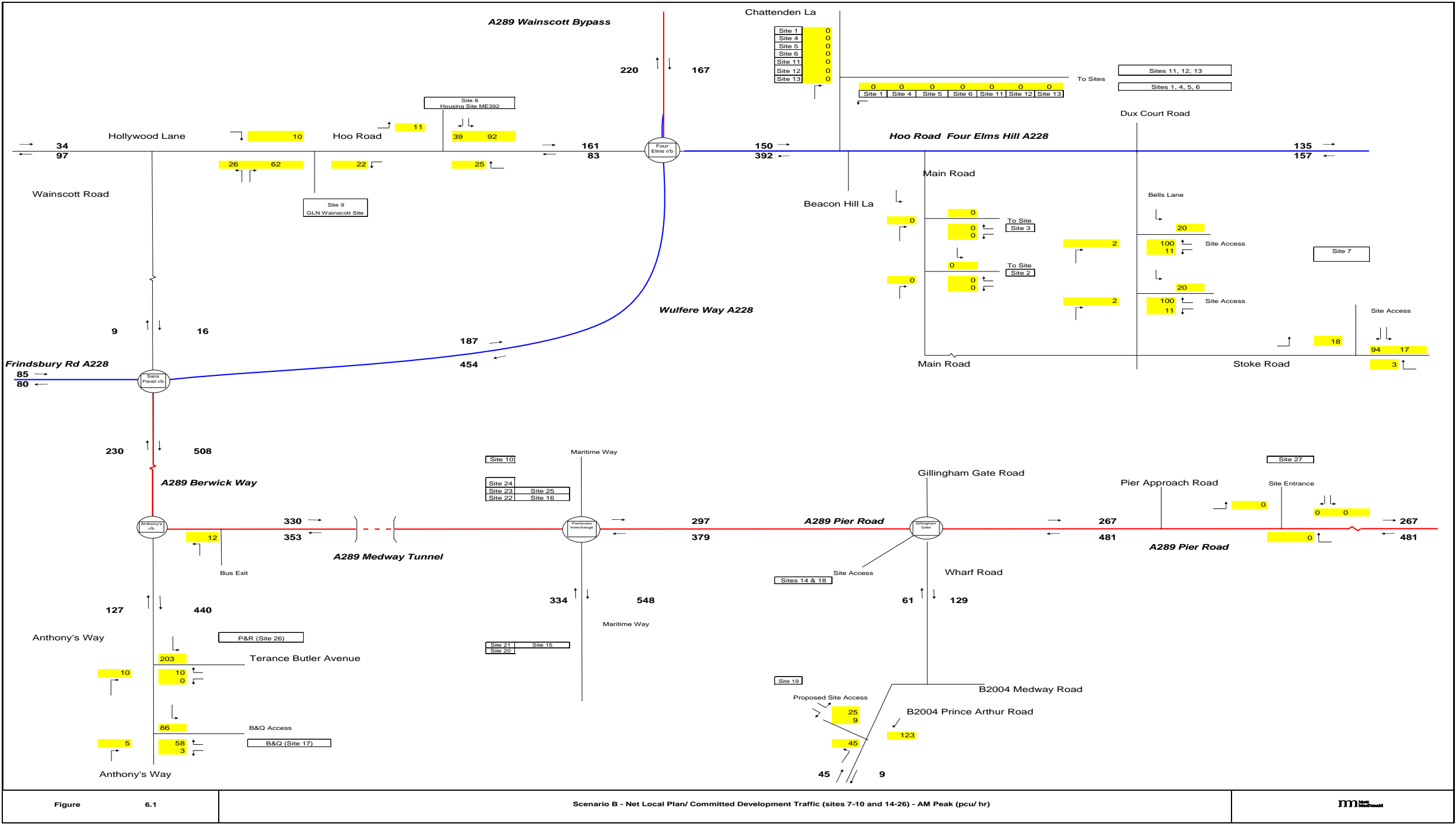
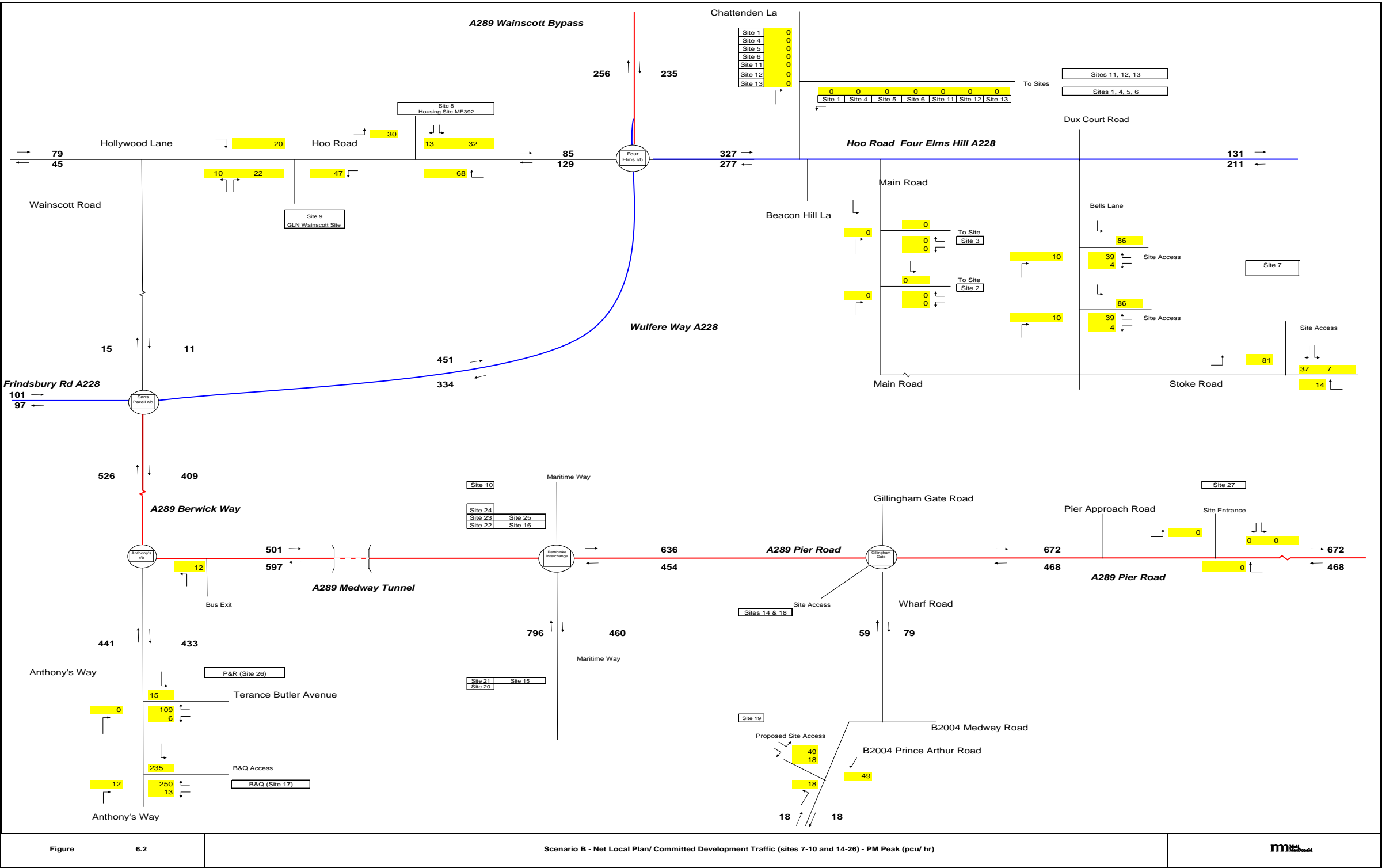


Figure 6.3:Scenario B (Committed Development) Traffic Flow – AM Peak (0800 – 0900)



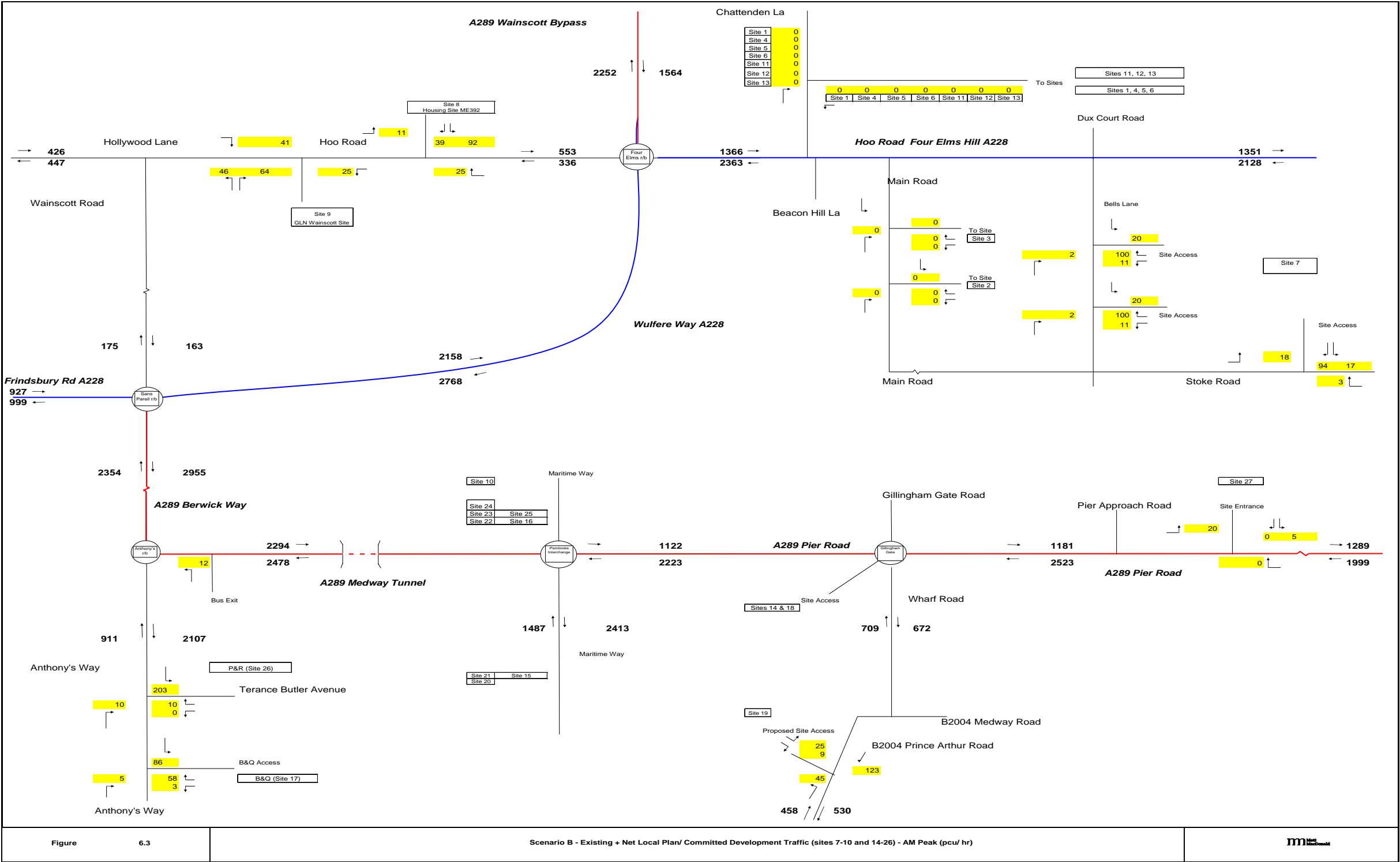


Figure 6.5:Scenario B Resultant Traffic Flow – AM Peak (0800 – 0900)

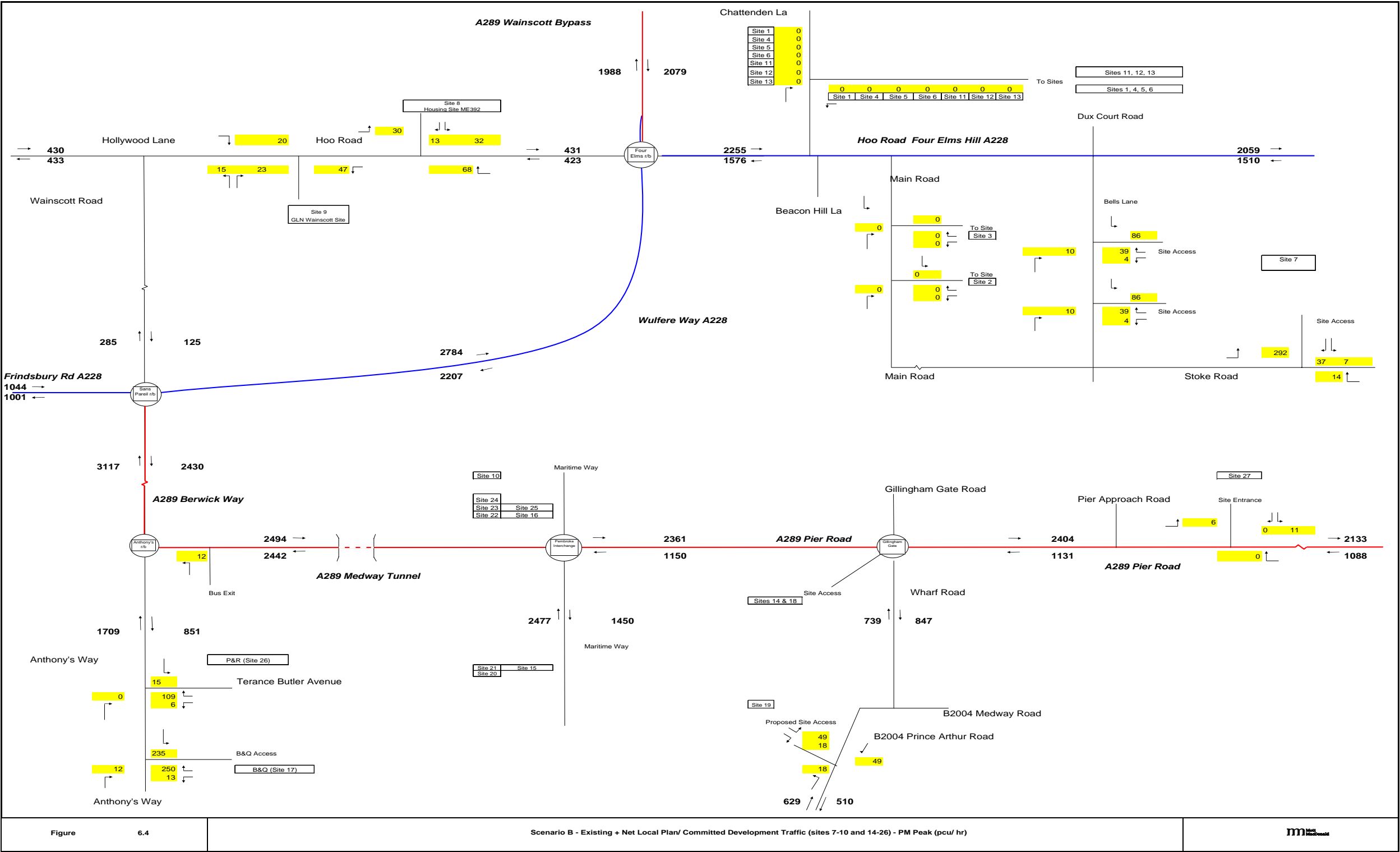


Figure 6.6:Scenario B Resultant Traffic Flow – PM Peak (1700 – 1800)

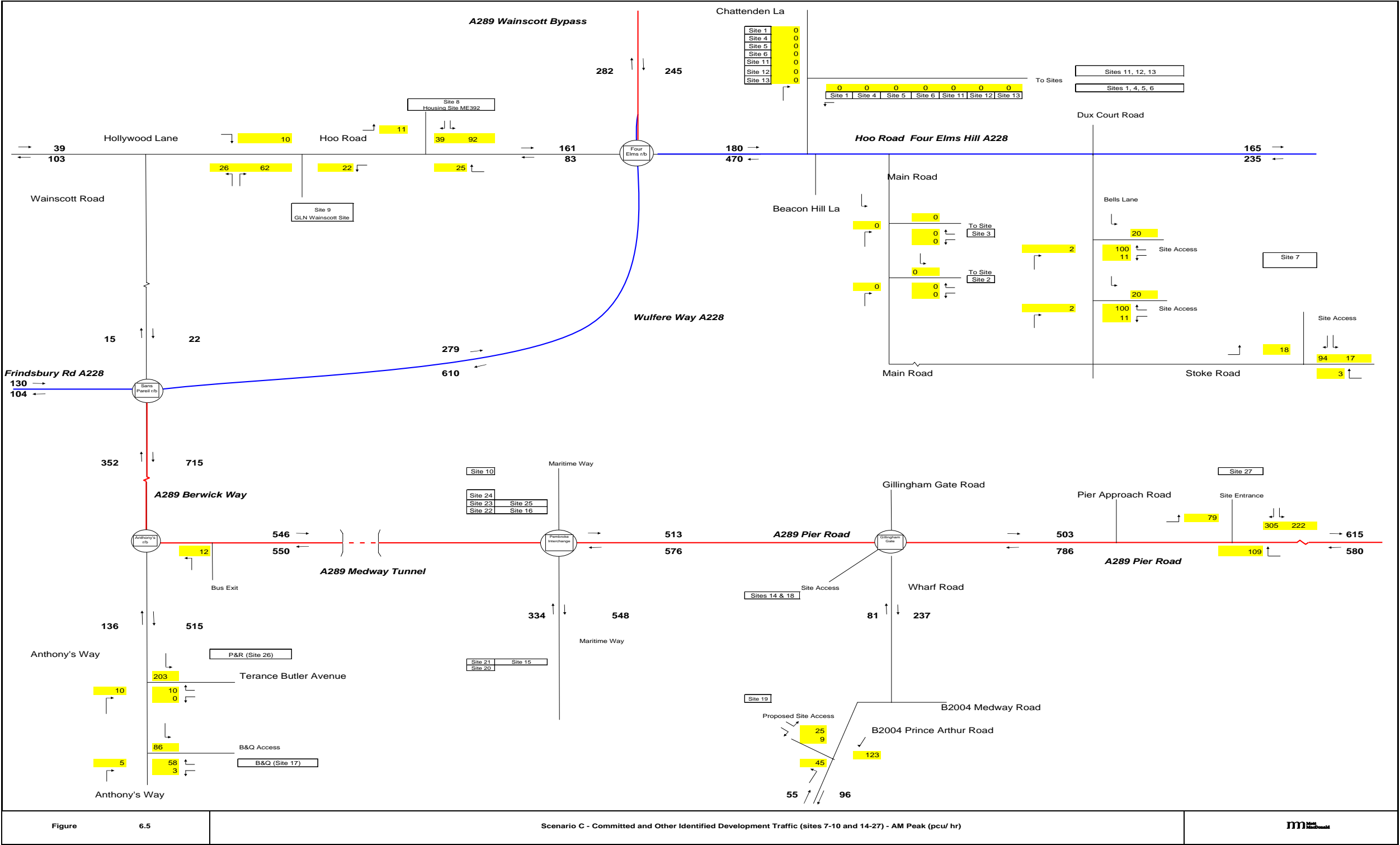


Figure 6.7:Scenario C Development Traffic Flow – AM Peak (0800 – 0900)

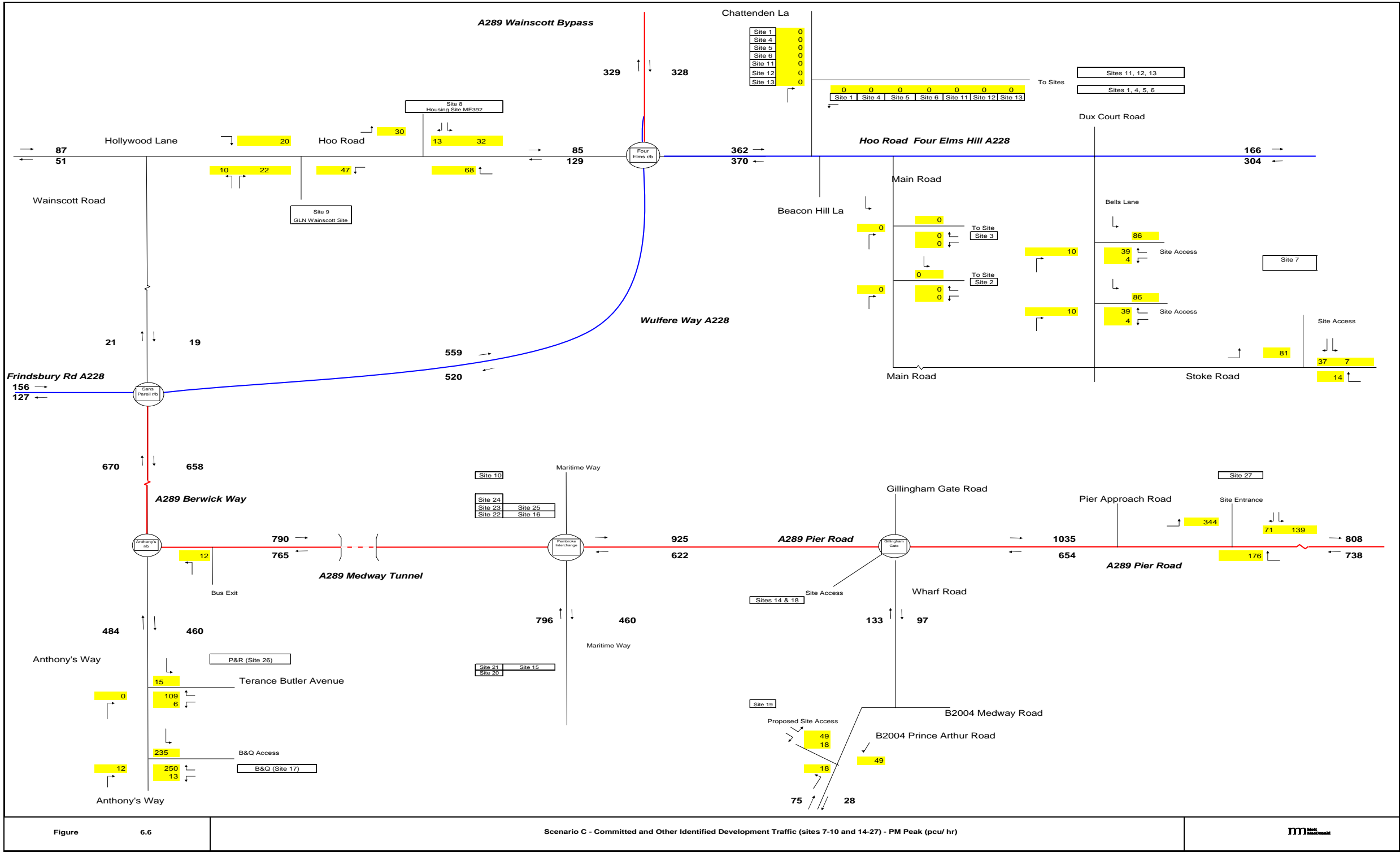


Figure 6.8:Scenario C Development Traffic Flow – PM Peak (1700 – 1800)

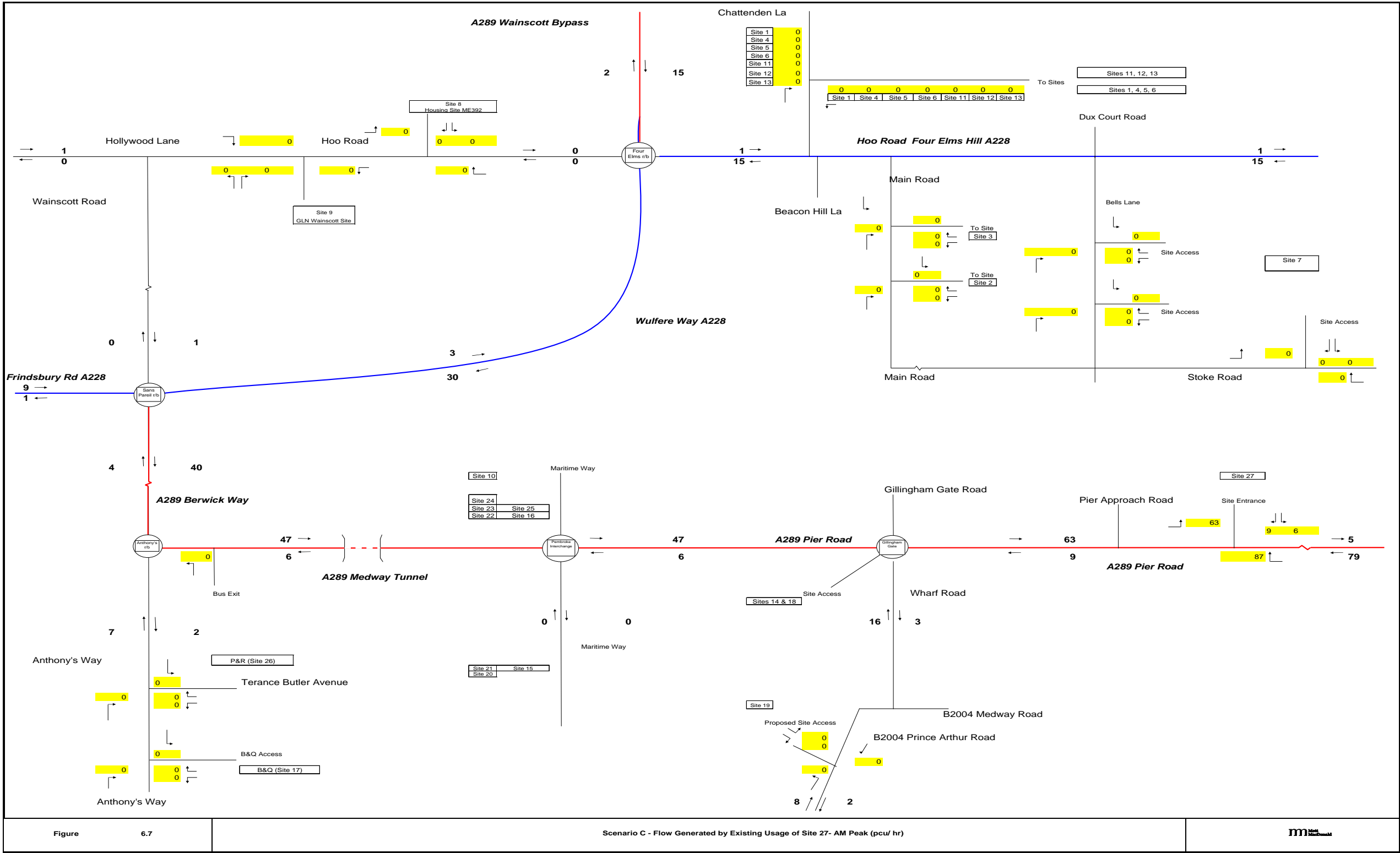


Figure 6.9:Flow Generated by Existing Usages of Site 27 – AM Peak (0800 – 0900)



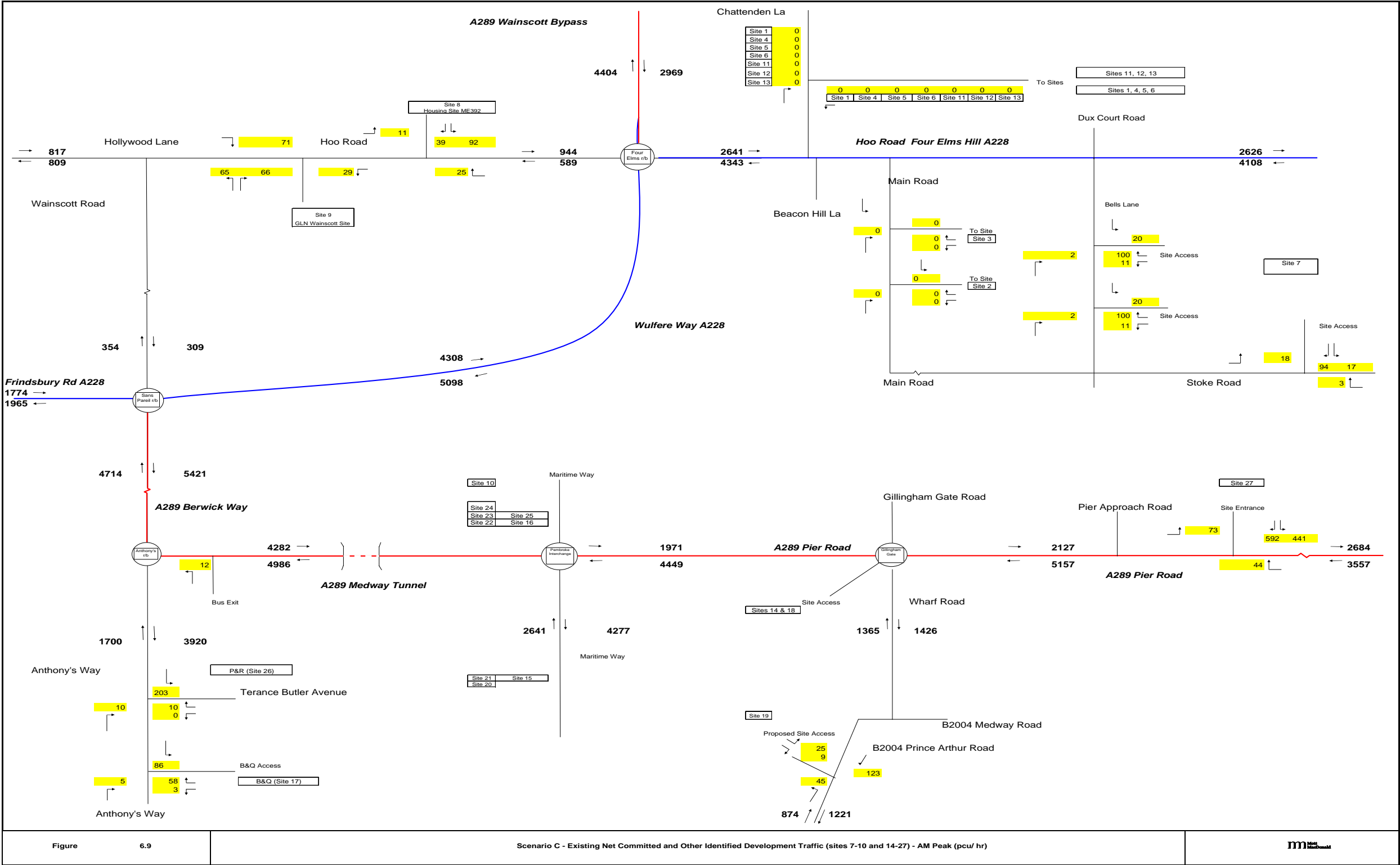


Figure 6.11: Scenario C Resultant Traffic Flow – AM Peak (0800 – 0900)

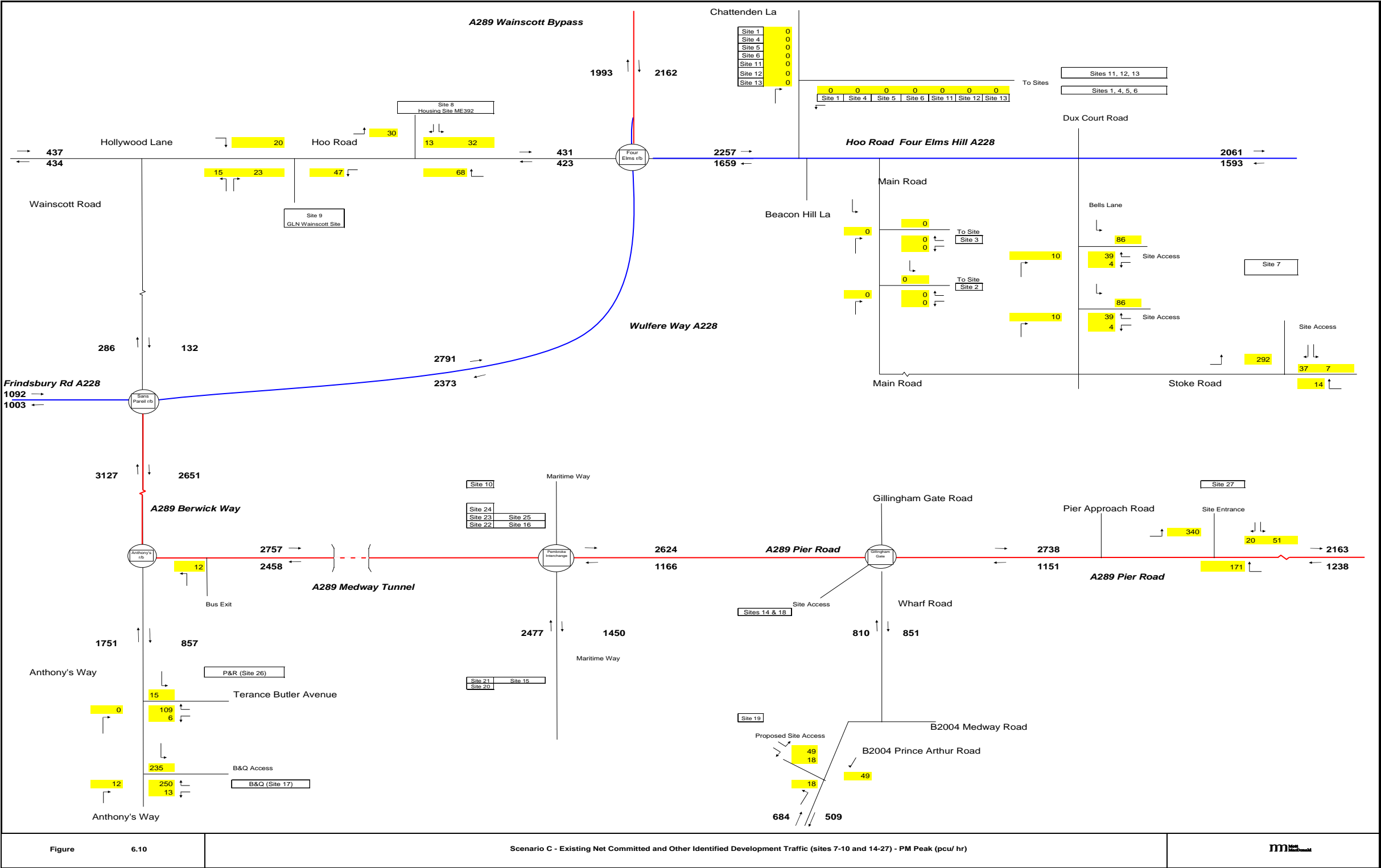


Figure 6.12: Scenario C Resultant Traffic Flow – PM Peak (1700 – 1800)



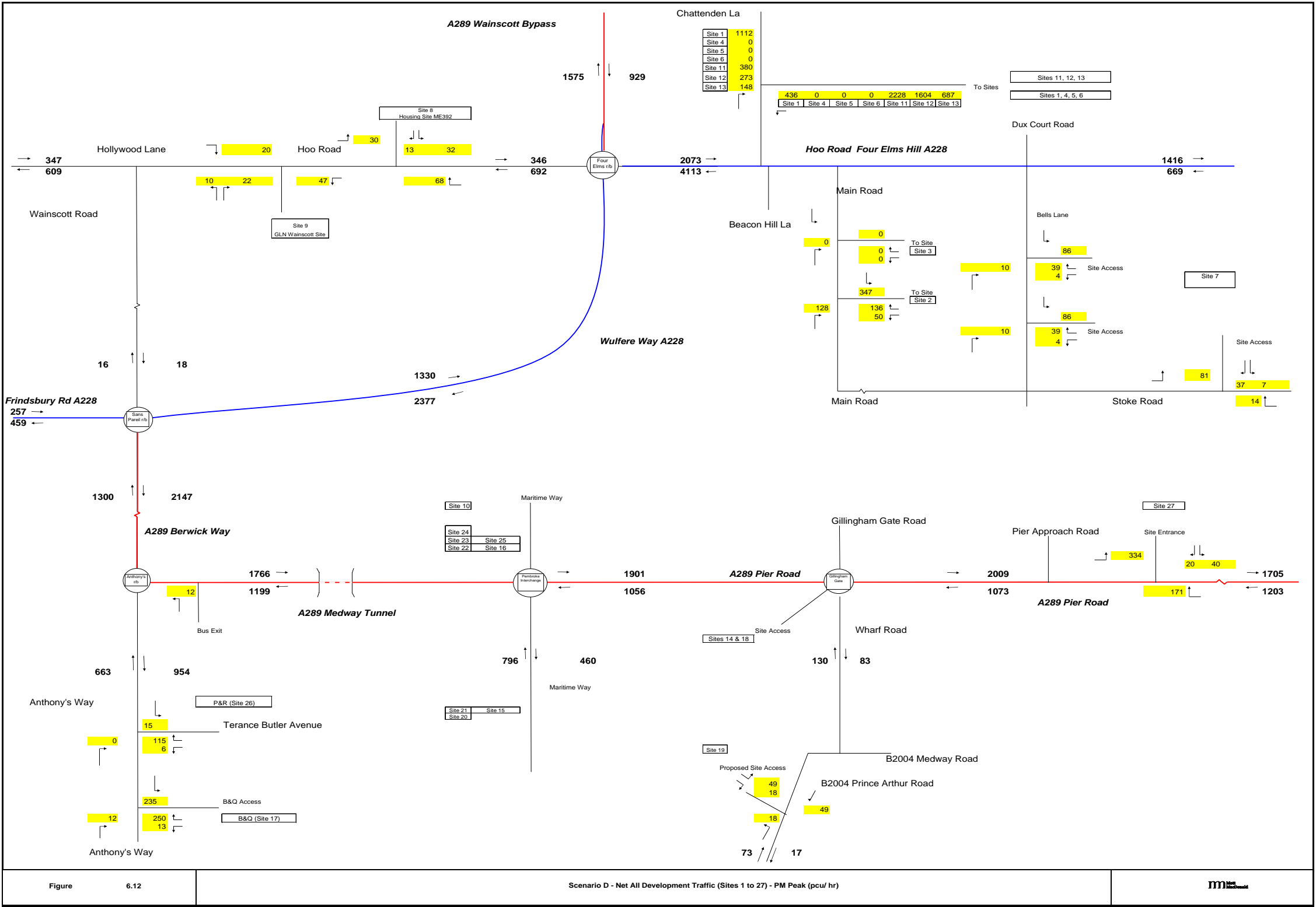


Figure 6.14: Scenario D Development Traffic Flow – PM Peak (1700 – 1800)

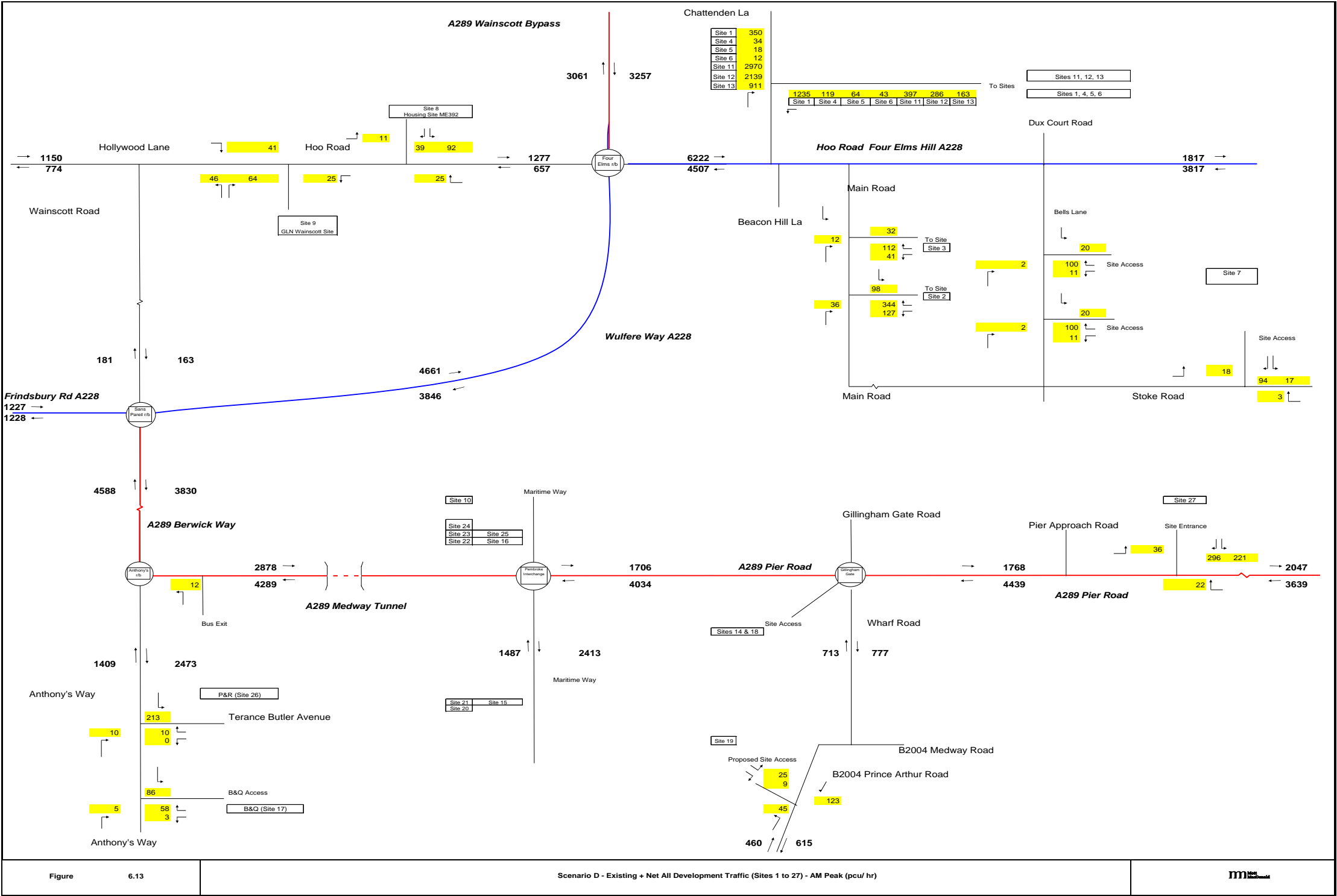


Figure 6.15: Scenario D Resultant Traffic Flow – AM Peak (0800 – 0900)



7 Highway Capacity Sensitivity Assessment

This section further expands on the operation of the main network links and the assessments are based on the tests derived from earlier scenario D. This highway capacity sensitivity assessment has examined four scenarios each comprising a number of predefined fixed development sites (mainly representing consented schemes) and a number of variable development (representing potential development sites). The fixed sites are 7-10, while the variable sites are 1-6 and 11-13. The scenarios are these:

- High Density of Development - DH
- Medium Density of Development (Low Residential) DM
- Medium Density Variant 1 (Low Commercial) DM1
- Low Density of Development DL

The fixed developments are set out in Table 7.1 below.

Table 7.1: Summary of Fixed Developments Included in the Analysis

Site	Land Use/ Type of Development	No of Units/ GFA (assumed for development)		Trip Rates				No of Trips				
				AM Peak		PM Peak		AM Peak		PM Peak		
				In	Out	In	Out	In	Out	In	Out	
7	Residential	650	units	0.1	0.51	0.44	0.2	66	333	285	130	
8	Residential	212	units	0.17	0.62	0.46	0.21	36	131	98	45	
9	Residential	132	units	0.19	0.67	0.51	0.2	26	88	67	26	
Chatham Maritime (10, 15, 16, 18-25)	Mixed Use	75849	sq m (GFA)					948	909	1109	1104	
		1503	units	0.22	0.52							
		5000	Students									
		300	Beds									
		300	berths									
		650	staff									
14	Police Operations Centre	80000	sq ft					78	13	20	63	
17	B&Q							91	61	247	263	
26	P&R							213	22	27	113	
27	Mixed Use							188	527	520	210	
ref tn19_c- 11/10/05								Total	1646	2084	2373	1954

The fixed sites are combined with the variable sites as detailed in Appendix A and summarised in Table 7.2 below. It should be noted that the High (100%) residential development density represents 30 dwellings per hectare. High Commercial development represents GFA at approximately 50% of development area.

Table 7.2: Summary of Development Density, Areas and Trip Generation for the Four Variable Tested Scenarios

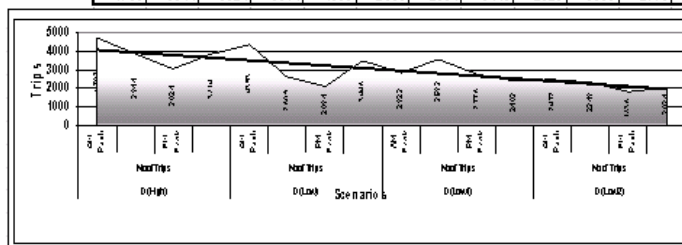
Site	Land Use/ Type of Development	Area (sq.m)	Scenario											
			D (High)			D (Medium)			D (Medium1)			D (Low)		
			Developable Area	Development Density	Dwelling or (GFA)	Developable Area	Development Density	Dwelling or (GFA)	Developable Area	Development Density	Dwelling or (GFA)	Developable Area	Development Density	Dwelling or (GFA)
1	Residential	1229000	100%	100%	3687	100%	50%	1844	100%	100%	3687	100%	50%	1844
2	Residential	234500	100%	100%	704	100%	100%	704	100%	100%	704	100%	100%	704
3	Residential	76310	100%	100%	229	100%	100%	229	100%	100%	229	100%	100%	229
4	Residential	58960	100%	100%	177	100%	100%	177	100%	100%	177	100%	100%	177
5	Residential	32090	100%	100%	96	100%	100%	96	100%	100%	96	100%	100%	96
6	Residential	21400	100%	100%	64	100%	100%	64	100%	100%	64	100%	100%	64
11	Office/ business park/ commercial	234400	30%	50%	0 (105,480)	30%	50%	0 (105,480)	30%	25%	0 (52,740)	30%	25%	0 (52,740)
12	Office/ business park/ commercial	168800	30%	50%	0 (75,960)	30%	50%	0 (25,320)	30%	25%	0 (12,660)	30%	25%	0 (12,660)
13	Residential (25%)Office/ Business Park/ Commercial (75%)	157700	30%	50%	35 (35,483)	30%	50%	35 (11,828)	30%	25%	18 (5,914)	30%	25%	18 (5,914)
Total Number of Trip Generation			AM			PM			Total			Total		
			8547			6962			6405			4820		
			6838			5530			5179			3871		
Ref: TN0019-e3-011205			15385			12492			11584			8691		

A summary of the trip generation from the four variable scenarios is included in Table 7.3 below.

Table 7.3: Summary of the Trip Generation From the Four Variable Scenarios

Scenario		D (High)				D (Medium)				D (Medium1)				D (Low)			
Site	Land Use/ Type of Development	No of Trips				No of Trips				No of Trips				No of Trips			
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
		In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
1	Residential	701	2470	1880	737	350	1235	940	369	701	2470	1880	737	350	1235	940	369
2	Residential	134	472	359	141	134	472	359	141	134	472	359	141	134	472	359	141
3	Residential	44	153	117	46	44	153	117	46	44	153	117	46	44	153	117	46
4	Residential	34	119	90	35	34	119	90	35	34	119	90	35	34	119	90	35
5	Residential	18	64	49	19	18	64	49	19	18	64	49	19	18	64	49	19
6	Residential	12	43	33	13	12	43	33	13	12	43	33	13	12	43	33	13
11	Office/business park/ commercial	1856	248	237	1392	1856	248	237	1392	928	124	119	696	928	124	119	696
12	Office/business park/ commercial	1337	179	171	1003	1337	179	171	1003	668	89	85	501	668	89	85	501
13	Residential (25%)Office/ Business Park/ Commercial (75%)	568	96	88	428	568	96	88	428	284	48	44	214	284	48	44	214
		4703	3844	3024	3814	4353	2609	2084	3446	2823	3583	2776	2403	2472	2348	1836	2034

Scenario	AM Peak	PM Peak
D(High)	4703	3844
D(Low)	3024	3814
D(Med)	4353	2609
D(Low1)	2084	3446



Ref: TN19-e3-01/12/05

The flows arising from the fixed and variable components have then been added and manually assigned in accordance with the methodology previously described and the resultant analysis of link flows compared to the capacities identified in TA 79/99 (Traffic Capacity of

Urban Roads) are shown in Tables 7.4 and 7.5 below, and for illustration purposes the resultant flows for scenario DM (AM peak period) are shown in Figure 7.1.

The resulting assigned flows shown in table 7.4 include base traffic, plus trip generation for the fixed development sites, and the assignment of the trip generation for the variable sites.

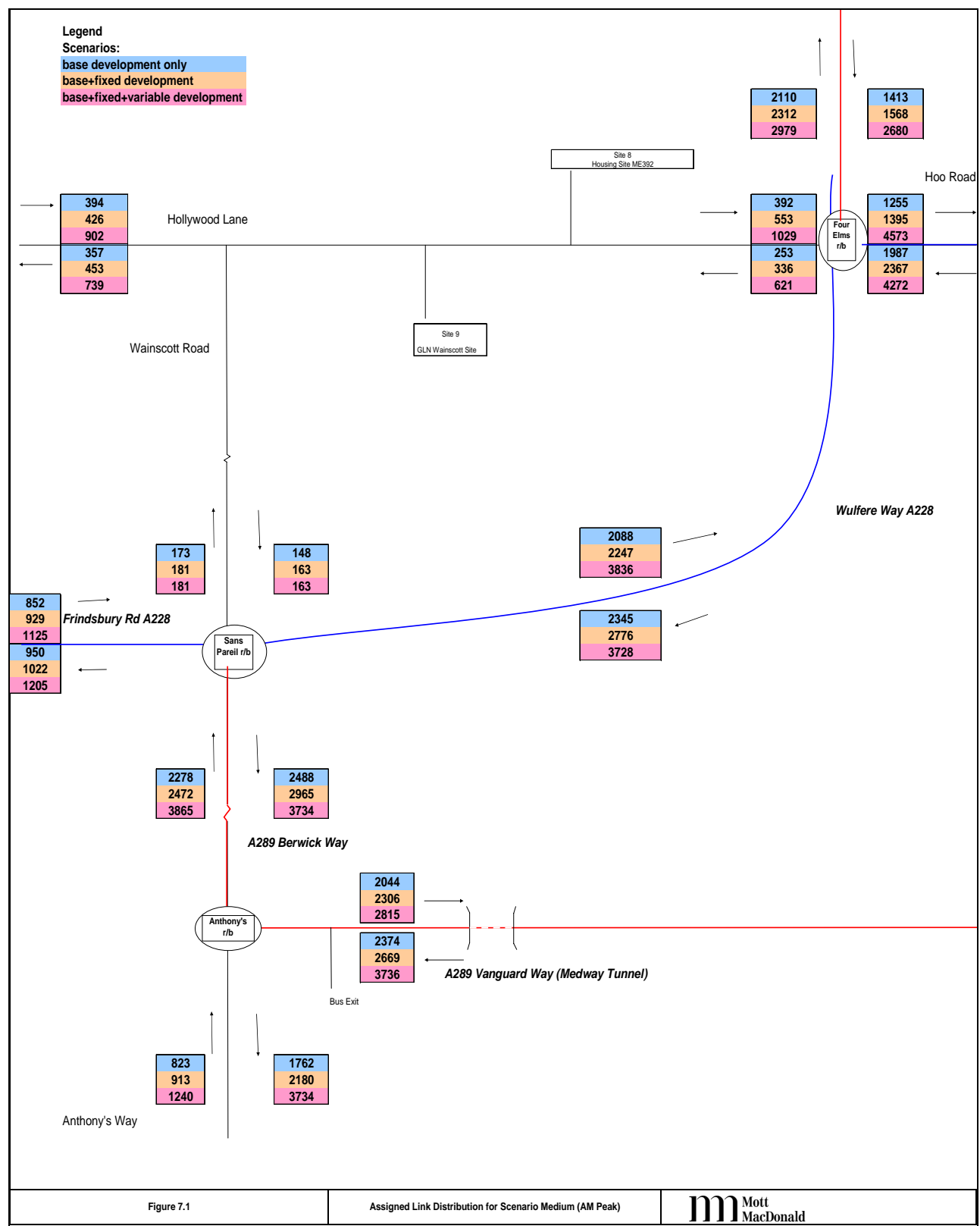
Table 7.4: Link analysis for the four tested scenarios

Links Analysis							DH		DM		DM1		DL		
	Link	Direction of Travel	Width (m)	Dual / Single	Number of Lanes	Road Type	Capacity (vehicles / Hour) *	Projected number of vehicles AM PEAK	Projected number of vehicles (PM PEAK)	Projected number of vehicles (AM PEAK)	Projected number of vehicles (PM PEAK)	Projected number of vehicles (AM PEAK)	Projected number of vehicles (PM PEAK)	Projected number of vehicles (Scenario DL 2 AM PEAK)	Projected number of vehicles (Scenario DL2PM PEAK)
1	Hoo Road (East)	Eastbound	10	Dual	2	UAP1	3600	4829	4465	4573	3779	3456	4284	4081	3598
		Westbound					3600	5173	4443	4272	4174	4983	3413	3200	3144
2	Hasted Road	Southbound	10	Dual	2	UAP1	3600	2770	2935	2680	2694	2289	2871	2200	2631
		Northbound					3600	3294	2968	2979	2874	3227	2607	2912	2513
3	Wulfere Way	Southbound	10	Dual	2	UAP1	3600	4179	3765	3728	3631	4083	3250	3633	3115
		Northbound					3600	3964	3894	3863	3551	3278	3804	3150	3461
4	Hoo Road (West)	Eastbound	5	Signle	1	UAP1	1020	1068	763	1029	660	862	735	823	633
		Westbound					1020	757	841	621	801	728	687	593	646
5	Frindsbury Hill	Eastbound	7.5	Dual	2	UAP1	1590	1141	1228	1125	1186	1056	1217	1040	1175
		Westbound					1590	1292	1270	1205	1244	1273	1171	1187	1146
6	Berwick Way	Southbound	11.5	Dual	2	UAP1	3600	4099	3776	3734	3667	4022	3360	3657	3251
		Northbound					3600	3977	4095	3865	3794	3375	4015	3263	3714
7	Vanguard Way (Tunnel)	Eastbound	8.5	Dual	2	UAP1	3600	3055	3501	2814	3429	3005	3225	2764	3154
		Westbound					3600	3821	3199	3735	2969	3361	3138	3275	2908
		Total					27353	26332	25719	24932	25043	24602	23385	23203	
Notes: * Capacity has been derived from the TA 79/99 Amendment No1, Traffic Capacity of Urban Roads, document ref tn19_d- 19/10/05															
	Links Operating over capacity														

Table 7.5: Percentage of over saturation on the affected links

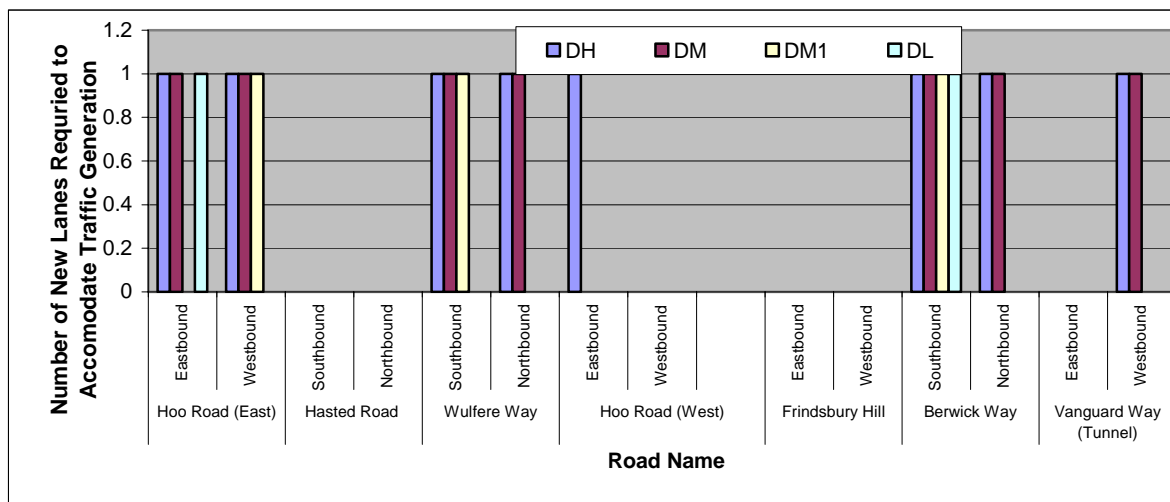
Links Analysis							DH		DM		DM1		DL		
Link	Direction of Travel	Width (m)	Dual / Single	Number of Lanes	Road Type	Capacity (vehicles / Hour) *	% Over Saturation		% Over Saturation		% Over Saturation		% Over Saturation		
							AM	PM	AM	PM	AM	PM	AM	PM	
1	Hoo Road (East)	Eastbound	10	Dual	2	UAP1	3600	34	24	27	5		19	13	
		Westbound					3600	44	23	19	16	38			
2	Hasted Road	Southbound	10	Dual	2	UAP1	3600								
		Northbound					3600								
3	Wulfere Way	Southbound	10	Dual	2	UAP1	3600	16	5	4		13			
		Northbound					3600	10	8	7			6		
4	Hoo Road (West)	Eastbound	5	Signle	1	UAP1	1020	5							
		Westbound					1020								
5	Frindsbury Hill	Eastbound	7.5	Dual	2	UAP1	1590								
		Westbound					1590								
6	Berwick Way	Southbound	11.5	Dual	2	UAP1	3600	14	5	4	2	12		2	
		Northbound					3600	10	14	7	5		12		3
7	Vanguard Way (Tunnel)	Eastbound	8.5	Dual	2	UAP1	3600								
		Westbound					3600	6		4					
ref tn19_d- 19/10/05															
Links Operating over Capacity															

Figure 7.1: Assigned links and distribution (for scenario DM, AM peak period only)



Based on the information shown in Table 7.5 above, the number of additional lanes required for each scenario has been determined, as shown in Figure 7.2 below and also referenced in Figure 7.3.

Figure 7.2: Number of Additional Lanes Required for Each Scenario



Re: tn019-Rev d

The following section examines the effect of the trip generation for the variable development sites considered within the sensitivity tests. The assumptions for different development scenarios are summarised in Table 7.6-7.9.

Scenario DH

Scenario DH is estimated to generate an additional 8547 vehicles from the variable sites, in the AM peak and 6838 vehicles in the PM peak, on the road network. As can be seen from Table 7.4 above, most of the listed links will require upgrading by year 2008 with a substantial reformation of the existing infrastructure. The most affected links will be Hoo Road east (both direction), Hoo Road west (eastbound only) Wulfere Way (both direction), Berwick Way (both direction) and Vanguard Way (Tunnel) (westbound only). All of these links will require an additional lane to accommodate the traffic generation from the development density in Scenario DH.

Scenario DM

In scenario DM there will be an additional 6962 vehicles and 5530 vehicles in the AM peak and PM peak respectively, on the road network. This equates to a 19% less traffic compared with Scenario DH. However, this scenario will have a similar impact on the same links as Scenario DH where an additional lane will still be required on Hoo Road east (both direction), Wulfere Way (both direction), Berwick Way (both direction) and Vanguard Way (Tunnel) (westbound only). Hoo Road west (eastbound) will operate very close to capacity under this scenario.

Scenario DM1

Scenario DM1 will generate an additional 6406 vehicles in the AM peak and 5179 vehicles in the PM peak, on the road network. As can be seen from Table 7.4 above, the situation starts to improve with this scenario and the impact on the links starts to be less critical than Scenario DH. This is a result of reduction in development density the Office, Commercial and Business Park land uses. This scenario generates 25% less traffic than scenario DH in both the AM and PM peaks. As can be seen from Table 7.4 above, an additional link will be required on Hoo Road east and west (both direction), Wulfere Way (both direction) and Berwick Way (both direction). No improvements to Hoo Road west or to Vanguard Way (Tunnel) is considered necessary with this scenario.

Scenario DL

As can be seen from Table 7.4 above, this scenario will have the lowest impact on the existing road network, when comparing it with the other three scenarios. A reduction of approximately 44% in traffic generation will occur in this scenario when comparing it with Scenario DH. The total number of additional trip generation on the road network will be 4820 vehicles in the AM peak and 3870 vehicles in the PM peak. Although Hoo Road east and Berwick Way are still shown to operate over capacity, this scenario gives a balance between the size (density) of developments and the size of the infrastructure work required to accommodate traffic generation. An additional link will still be required on Hoo Road east (eastbound only), and Berwick Way (both directions).

Summary

The highway capacity sensitivity tests have taken background traffic flows and to these added traffic generated by those sites with committed development (“fixed” sites) and a variable element based around the main scenario D. The assessment takes no explicit account of the extent of linked trips and all schemes would be expected to be subject to transport impact scoping assessments and subsequently more detailed Transport Assessments.



Figure 7.3: Key Network Sections

Table 7.6: Scenario DH

Scenario D (High)

Site	Land Use/ Type of Development	Site Size (sq m)	% Developable Area	Development Density	Area per Dwelling/Unit	Units	Office/ business park/ commercial	Shopping Centre/ Retail	GFA (assumed for development)	No of Trips			
										AM Peak		PM Peak	
										In	Out	In	Out
1	Residential	1229000	100%	100%	333	3687	3	2	- units	701	2470	1880	737
2	Residential	234500	100%	100%	333	704	3	2	- units	134	472	359	141
3	Residential	76310	100%	100%	333	229	3	2	- units	44	153	117	46
4	Residential	58960	100%	100%	333	177	3	2	- units	34	119	90	35
5	Residential	32090	100%	100%	333	96	3	2	- units	18	64	49	19
6	Residential	21400	100%	100%	333	64	3	2	- units	12	43	33	13
11	Office/ business park/ commercial	234400	30%	50%	-	0	3	2	105480 sq m	1856	248	237	1392
12	Office/ business park/ commercial	168800	30%	50%	-	0	3	2	75960 sq m	1337	179	171	1003
13	Residential (25%)Office/ Business Park/ Commercial (75%)	157700	30%	50%	333	35	3	2	35483 sq m	568	96	88	428
Ref: TN007-F-11oc-05 (/High)										4703	3844	3024	3814

Table 7.7: Scenario DM

Scenario D (Medium)

Site	Land Use/ Type of Development	Site Size (sq m)	% Developable Area	Development Density	Area per Dwelling/Unit	Units	Office/ business park/ commercial	Shopping Centre/ Retail	GFA (assumed for development)		No of Trips			
											AM Peak		PM Peak	
											In	Out	In	Out
1	Residential	1229000	100%	50%	333	1844	3	2	-	units	350	1235	940	369
2	Residential	234500	100%	100%	333	704	3	2	-	units	134	472	359	141
3	Residential	76310	100%	100%	333	229	3	2	-	units	44	153	117	46
4	Residential	58960	100%	100%	333	177	3	2	-	units	34	119	90	35
5	Residential	32090	100%	100%	333	96	3	2	-	units	18	64	49	19
6	Residential	21400	100%	100%	333	64	3	2	-	units	12	43	33	13
11	Office/ business park/ commercial	234400	30%	50%	-	-	3	2	105480	sq m	1856	248	237	1392
12	Office/ business park/ commercial	168800	30%	50%	-	-	3	2	25320	sq m	1337	179	171	1003
13	Residential (25%)Office/ Business Park/ Commercial (75%)	157700	30%	50%	333	35	3	2	11828	sq m	568	96	88	428
Ref: TN007-G-11oc-05 (Medium_prevLow)											4353	2609	2084	3446

Table 7.8: Scenario DM1

Scenario D (Medium1)

Site	Land Use/ Type of Development	Site Size (sq m)	% Developable Area	Development Density	Area per Dwelling/Unit	Units	Office/ business park/ commercial	Shopping Centre/ Retail	GFA (assumed for development)		No of Trips			
											AM Peak		PM Peak	
											In	Out	In	Out
1	Residential	122900	100%	100%	333	3687	3	2	-	units	701	2470	1880	737
2	Residential	234500	100%	100%	333	704	3	2	-	units	134	472	359	141
3	Residential	76310	100%	100%	333	229	3	2	-	units	44	153	117	46
4	Residential	58960	100%	100%	333	177	3	2	-	units	34	119	90	35
5	Residential	32090	100%	100%	333	96	3	2	-	units	18	64	49	19
6	Residential	21400	100%	100%	333	64	3	2	-	units	12	43	33	13
11	Office/ business park/ commercial	234400	30%	25%	-	-	3	2	52740	sq m	928	124	119	696
12	Office/ business park/ commercial	168800	30%	25%	-	-	3	2	12660	sq m	668	89	85	501
13	Residential (25%)Office/ Business Park/ Commercial (75%)	157700	30%	25%	333	18	3	2	5913.8	sq m	284	48	44	214
Ref: TN007-G-11oc-05 (Medium1_prevLow1)											2823	3583	2776	2403

Table 7.9: Scenario DL

Scenario D (Low)

Scenario D (Low)														
Site	Land Use/ Type of Development	Site Size (sq m)	% Developable Area	Development Density	Area per Dwelling/Unit	Units	Office/ business park/ commercial	Shopping Centre/ Retail	GFA (assumed for development)		No of Trips			
											AM Peak		PM Peak	
											In	Out	In	Out
1	Residential	122900	100%	50%	333	1844	3	2	-	units	350	1235	940	369
2	Residential	234500	100%	100%	333	704	3	2	-	units	134	472	359	141
3	Residential	76310	100%	100%	333	229	3	2	-	units	44	153	117	46
4	Residential	58960	100%	100%	333	177	3	2	-	units	34	119	90	35
5	Residential	32090	100%	100%	333	96	3	2	-	units	18	64	49	19
6	Residential	21400	100%	100%	333	64	3	2	-	units	12	43	33	13
11	Office/ business park/ commercial	234400	30%	25%	-	-	3	2	52740	sq m	928	124	119	696
12	Office/ business park/ commercial	168800	30%	25%	-	-	3	2	12660	sq m	668	89	85	501
13	Residential (25%)Office/ Business Park/ Commercial (75%)	157700	30%	25%	333	18	3	2	5913.8	sq m	284	48	44	214
											247	234	183	203
											2	8	6	4
Ref: TN007-RevG-11Oct05-(LOW_prevLow2)														

Ref: TN007-RevG-11Oct05-(LOW_prevLow2)

8 Longer Term Vision and Complimentary Measure

8.1 Overall Transport network

The assessments undertaken have been used to derive an initial understanding of the factors affecting the future operation of the transport network in the area and the potential scale of these impacts.

Whilst a worse case scenario has been considered and there may be some opportunity to reduce total trip generation, it is apparent that major improvements will be required to be made to some of the principal links and junctions in the area in conjunction with the timely introduction of measures to better manage the overall demand for movement.

8.2 Transport Projects

A number of key initiatives may be progressed in order to improve the environment in the study area through a combination of better managed traffic flows in the peak hours, improvements in the public transport system and better pedestrian links, and the main projects are described further below.

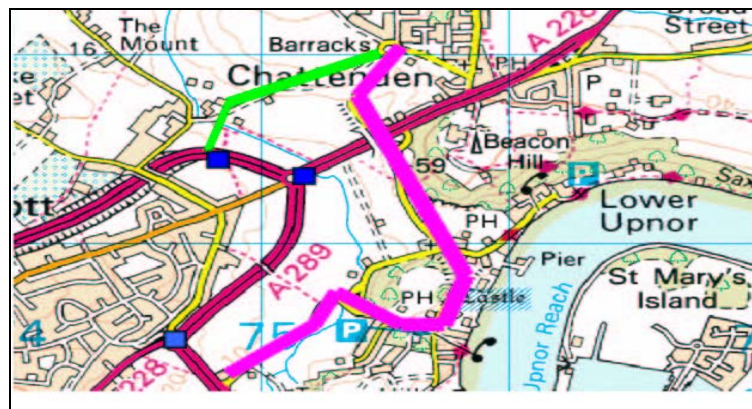


Figure 8.1: Potential Bus (purple) and new highway links (green) (conceptual only)

In the longer term because of the significant potential traffic loads on the A228 east of Four Elms roundabout, an additional link may be required north of the A228 with associated public transport links as shown in Figure 8.1. These would also be subject to detailed feasibility studies, and would complement the main land use and transport proposals, including proposed schemes in the area.

Some of the key initiatives that may be progressed are:

- New highway links with associated main highway connections.
- Public Transport Information and Car Park Information Systems
- Demand Management and Parking Management Strategy

- Pedestrian and Cycle Route Improvements

These initiatives will aim to make better use of the transport system overall, whilst seeking an optimum balance between accessibility, necessary to sustain economic growth and quality of the environment. A potential public transport scheme connecting the proposed developments with the main urban area is shown in Figure 8.2. It is anticipated that such a scheme will promote sustainable economic growth in the area. At this stage the proposed PT scheme is conceptual only and will need to be looked at in more details, particularly in conjunction with Transport for Medway (TfM) study.

The area wide public transport initiatives previously identified include:

- New and improved bus routes with increased frequency and quality of bus services
- Improved bus technology and information system (i.e. Countdown)
- Improved and safer access to strategic road network
- Bus service improvements on radial routes.

These are discussed further below. It should be noted that all transport infrastructure and service improvement strategies would be subject to detailed feasibility and assessment considered in conjunction with planning land use policies for the area. A more detailed drawing of the new A228 is shown in Appendix E.

8.2.1 Public Transport Information and Car Park Information Systems

Passenger information systems (e.g. including Countdown at bus stops) and initiatives such as through ticketing and Smartcards etc will further encourage people to switch to public transport. This will provide increased opportunity for people, both commuters and shoppers, to access facilities in the area by modes other than the private car.

It is also recognised that real time information relating to available of parking spaces in the area is limited. Driver information on the main approaches to car parks may lead to more efficient use of the parking stock.

8.2.2 Demand Management

In order to meet possible targets for reduction, demand management measures may also be introduced accordingly. However it is important that the constraint of movements within the area does not lead to traffic switching onto less appropriate routes, with a potential result overall increase in accident rates. Furthermore, in order to sustain economic growth the balance between overall accessibility and quality of the environment needs to be fully considered. If accessibility deteriorates shoppers may choose to shop elsewhere. In order to achieve a high level of priority for public transport in some locations it may be necessary to consider roadspace reallocation to ensure buses and taxis are not unnecessarily delayed by other traffic. Within the central areas the opportunity for pedestrianisation will also need to be reviewed with full consideration of movement by all modes.

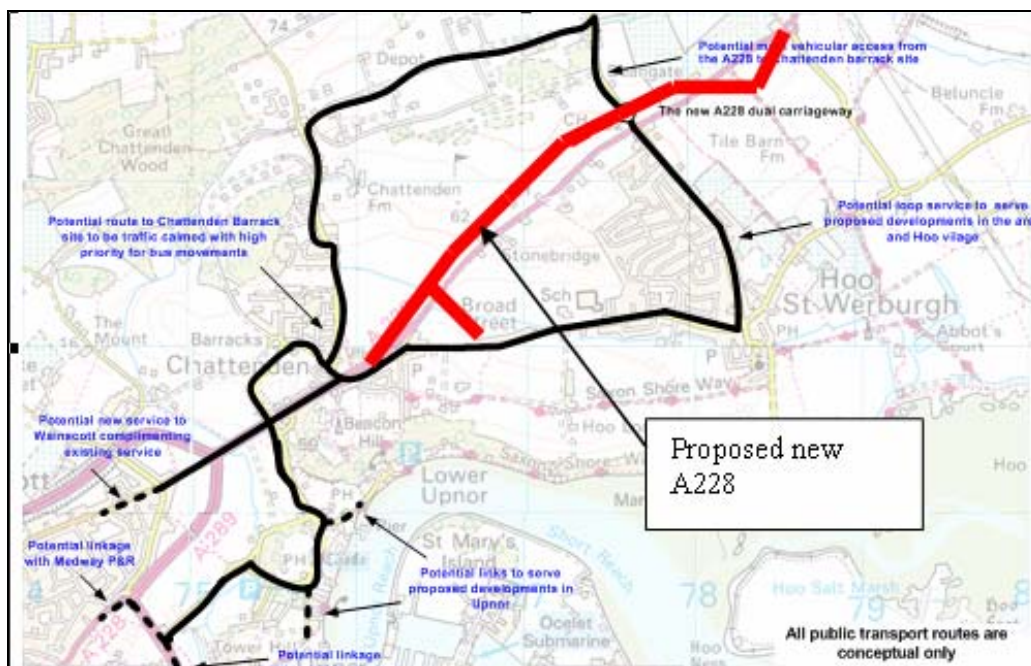


Figure 8.2: Potential Bus Route (shown by black line)

8.2.3 Parking Management Strategy

It is likely that with an increase in shopping and leisure facilities in the area, as identified in the LP, the duration of stay for parking will increase and this by itself will require an increase in short term parking. Subject to more detail assessment, utilisation of some of the existing Private Non Residential (PNR) spaces close to the planned development may provide a means of limiting the overall growth in parking supply. Implicit within this is that some public and private off street long term spaces would change to short term parking. This will almost certainly have car park revenue implications, and the balance between long stay spaces and short stay spaces with a higher parking turnover will need more detailed consideration.

8.2.4 Pedestrian and Cycle Route Improvements

Improvements in pedestrian linkages will include widening footpaths on the main pedestrian routes and giving higher priority to the more vulnerable road user at road crossings, particularly on approaches to public transport hubs. Measures such as additional pelican and toucan crossings are also likely to form key elements. Improved pedestrian links need to be provided to connect the main facilities within the area and to the car parks. Similarly it would be expected that on routes to other new developments pedestrian linkages would be improved. The opportunity for road space reallocation will need to be further reviewed with the aim of introducing at grade pedestrian crossings at a number of key locations.

9 Conclusion and Recommendations

The assessments undertaken have been used to derive a preliminary understanding of the factors affecting the future operation of the transport network in the area, and a worse case scenario has been considered. There may be some opportunity to reduce total trip generation and it is apparent that major improvements will be required to be made to some of the principal links and junctions in the area in conjunction with the timely introduction of measures to better manage the overall demand for movement.

The highway capacity sensitivity tests have examined a range of development land uses on site principally to the east of Four Elms junctions. These indicate that effectively all the development scenarios will add significant traffic pressure to the west section of the main A228 Hoo Road, and connecting links, and consideration should be given to a potential new link onto the A289 connecting to the southern part of the development area.

Any scheme proposals should carefully consider both highway and complimentary public transport, bus, cycle and walk modes in order to provide an environmentally acceptable access solution.

The highway capacity sensitivity tests have examined the potential infrastructure implications of a range of development scenarios. All development scheme proposals would be expected to include a transport scoping and detailed transport assessment with safety audit at the appropriate stage.

Appendix A: Parking Standards

Parking standards for people with a disability

“Parking for people with a disability must be additional to maximum private car parking provision. Development proposals should provide adequate parking for disabled motorists, in terms of numbers and design (see Traffic Advice Leaflet 5/95, Parking for Disabled People). A guide to the number of parking spaces for disabled motorists is given in the table below (based on TA 5/95), further details are available in “Reducing Mobility Handicaps” (IHT, London, 1991).

Minimum number of parking spaces for motorists with a disability		
Land use category	Car park size	
	Up to 200 spaces	Over 200 spaces
Business premises & employees and visitors	Individual space for each registered disabled employee plus two spaces or 5% of the max. private car standard whichever is the greater for visitors	Six bays plus 2% of the max. private car standard
Shopping and recreation	Three spaces or 6% of the max. private car standard whichever is greater	Four spaces or 4% of the max. private car standard whichever is greater
Hotels with specially designed rooms	One space for each specially designed room	

Parking standards for new development

The following table details Medway Council’s adopted parking standards for new development, including private vehicles, commercial vehicles and cycles. An indication is also given of the threshold for transport assessment.

Land use category:	Parking standards			
A1, A2, A3	Private car parking spaces	Commercial vehicle parking spaces	Cycle parking spaces	Threshold for transport assessment
Standard type	Maximum permitted	Minimum requirement	Minimum requirement	
A1 retail				
Food retail, including cold food take-away	One per 18m2 GFA	One per 500m2 GFA	One per 250m2 GFA for staff/ customers (Refer	1000m2

			to note 6)	
Non food retail warehouses	One per 20m2 GFA	One per 500m2 GFA	(Refer to note 8)	
Garden centres	One per 10m2 of area open to public	(Refer to note 1)		(Refer to note 3)
A2 Financial and professional services				
Accountants, betting office, Bank or Building Society, Solicitors, etc.	One per 18m2 GFA plus staff parking (Refer to note 12)	Nil	One per 400m2 GFA for staff (Refer to note 6)	(Refer to note 3)
A3 Food and drink				
Public houses and licensed bars	One per 4m2 GFA, plus one per 8m2 GFA for off-licence	(Refer to note 1)	One per 250m2 GFA for staff and customers	(Refer to note 3)
Restaurants, cafes and banqueting halls	One per 6m2 GFA, plus staff parking (Refer to note 12)		(Refer to note 6)	
Transport cafes	(Refer to note 8)	One per 5m2 GFA	(Refer to note 8)	
Hot food take-aways	Six per unit (Refer to note 4)	Nil		

Appendix B: Bus Services

M Service or journeys running at these times are operated on behalf of Medway Council.

LF Most journeys on this route are operated by super low-floor accessible vehicles.

Service number		Service description	Approximate frequency		Sunday	Operator
			Monday to Saturday	Monday to Saturday		
			Daytime	Evening		
1	M LF	Universities at Medway/ Chatham Maritime - Gillingham - Twydall	Two buses a day			Amberlee UK
2	M LF	(St Mary's Island) - Universities at Medway / Chatham Maritime - Chatham Rail Station (- Rochester - Strood - Medway Valley Park)	Every 10 minutes in peaks, 2/3 buses an hour to Chatham Rail Station, 4 buses a day to Medway Valley Park, University termtime only. University holidays/Saturdays: hourly St Mary's Island to Chatham Rail Station			Amberlee UK
3	M LF	Pier Road - Grange Road - Twydall - Gillingham Business Park - Twydall - Grange Road - Pier Road - Gillingham - Chatham Maritime/ Universities at Medway	Peaks			Amberlee UK
4	M LF	(Lordswood) - Weedswood - Luton - White Road Estate - Chatham - Chatham Maritime / Universities at Medway - Gillingham Business Park	Peaks			Amberlee UK
100		Chatham Rail Station – Chatham Maritime/ Chatham Historic Dockyard/ Universities at Medway – Dockside Outlet Centre – St Mary's Island	Mon-Fri morning peak, see 2 at other times	See 151	See 151	Arriva Medway Towns
101 (&102 early am)	LF	(Twydall evenings + Sundays) - Gillingham – Chatham Historic Dockyard - Chatham - Chatham Rail Station - Huntsmans Corner – Davis Estate - Bridgewood - Springfield – Maidstone (102 operates via Ringlestone)	20mins	Hourly M	Hourly	Arriva Medway Towns
105		Chatham - Chatham Rail Station – Ordnance Street – Huntsmans Corner - Davis Estate	30 mins			Arriva Medway Towns
110		Gillingham – Chatham Maritime / Chatham Historic Dockyard/ Universities at Medway- Dockside Outlet Centre	One journey peaks		One journey am and pm	ASD Coaches
113	M	Chatham - Gillingham - Darland Estate - Wigmore - Hempstead Valley - Hempstead - Luton – Chatham	Hourly			Nu-Venture
114	M	Chatham - Luton - Hempstead – Hempstead Valley – Wigmore - Darland Estate - Gillingham – Chatham	Hourly			Nu-Venture
132	LF	(Chatham Rail Station) - Chatham - Rainham - Parkwood – Hempstead Valley	10 mins	Hourly M	Hourly M	Arriva Medway Towns (Amberlee UK Sundays)
133	LF	Chatham - Chatham Rail Station – Rochester - Strood - Cliffe Woods – Cliffe	30 mins (hourly to Cliffe)	2 journeys Fri	See service 193	Arriva Medway Towns (ASD Coaches Fri eve)
136	LF	Gravesend – Chalk - Higham - Strood - Rochester - Chatham Rail Station - Chatham – Chatham Historic Dockyard - Gillingham	30 mins			Arriva Medway Towns

Service number		Service description	Approximate frequency		Sunday	Operator
			Monday to Saturday	Monday to Saturday		
			Daytime	Evening		
		- Medway Maritime Hospital - Wigmore - Parkwood - Hempstead Valley - (Hempstead peaks only)				
139	M	Medway Maritime Hospital - Rainham/Hempstead Valley (Demand Responsive)	See 136/326/327	3 journeys	See 132	Arriva Medway Towns
140	LF	Marlowe Park - Earl Estate - Strood - Rochester - Chatham Rail Station – Chatham - Chatham Historic Dockyard / Chatham Maritime / Universities at Medway – Dockside Outlet Centre	10 mins	See service 141	Hourly M	Arriva Medway Towns (Amberlee UK Sundays)
141	LF	Earl Estate - Marlowe Park - Strood - Rochester - Chatham Rail Station – Chatham - Chatham Historic Dockyard/ Chatham Maritime / Universities at Medway – Dockside Outlet Centre	10 mins	Hourly M	Hourly Chatham to Dockside Outlet only - otherwise see service 140	Arriva Medway Towns
151	M LF	(Chatham Maritime, Chatham Historic Dockyard, Universities at Medway evenings / Sundays) – Chatham - Chatham Rail Station – Rochester – Strood - Cuxton - Halling - Snodland – West Malling and Kings Hill	Hourly	Hourly to Halling	2 hourly to West Malling	Arriva Medway Towns (Amberlee UK eves)
166	LF	(Chatham Rail Station) - Chatham - Luton – Princes Avenue - Lords Wood	10 mins	Hourly	See services 167, 181	Arriva Medway Towns
167	M	Chatham Rail Station - Chatham - Luton - Princes Park - Lords Wood	See services 166, 186	See services 166, 186	Hourly	Arriva Medway Towns
172	M	Chatham - Chatham Rail Station - Rochester - Strood - Salters Cross - Earl Estate	Hourly (2 hourly Sat)			Amberlee UK
173	M	Chatham - Chatham Rail Station - Rochester - Strood - Frindsbury - Salters Cross – Earl Estate	Hourly (2 hourly Sat)			Amberlee UK (2 journeys am Arriva)
176	LF	Walderslade – Weeds Wood – Poachers Pocket – Huntsmans Corner – Chatham Railway Station – Chatham - Medway Maritime Hospital – Gillingham – Pier Road – Grange Road	15 mins	Hourly M	See service 181	Arriva Medway Towns
181	LF	(Chatham Rail Station) - Chatham - Luton - Wayfield - Poachers Pocket - Weeds Wood (Sundays - Walderslade – Alexandra Hospital – Lordswood)	20 mins	Hourly M	Hourly M	Arriva Medway Towns
182	LF	Chatham – Chatham Historic Dockyard - Gillingham – Twydall	10 mins	See service 101	See service 101	Arriva Medway Towns
184	LF	Chatham - Chatham Rail Station – Huntsmans Corner - Poachers Pocket - Walderslade - Alexandra Hospital	30 mins peak (off peak see services 181, 186)	See service 181	See service 181	Arriva Medway Towns
185	M LF	Chatham - Chatham Rail Station – Ordnance Street – Mid-Kent College - Davis Estate - (Bluebell Hill Village) - Walderslade – Lords Wood - Princes Avenue	Peak			Arriva Medway Towns
186	M	(Chatham Rail Station) - Chatham - Luton - Princes Park	Hourly	See services 167, 181	See services 167, 181	Arriva Medway Towns (ASD Coaches early

Service number		Service description	Approximate frequency		Sunday	Operator
			Monday to Saturday	Monday to Saturday		
			Daytime	Evening		
						Sat a.m., Nu-venture some journeys Mon-Fri evenings)
191	LF	Gillingham – Medway Maritime Hospital) - Chatham – Chatham Rail Station - Rochester - Strood –(- High Halstow - Allhallows - Lower Stoke - Grain) Wainscott - Chattenden - Hoo Marina) (also 190, 192, 198)	Every 15 minutes (every 20 mins Sat)	Hourly M	See services 193,194	Arriva Medway Towns/ Nu-Venture (ASD Coaches eves, Amberlee UK Sundays)
192		Chatham – Chatham Rail Station - Rochester - Strood - Wainscott - Lodge Hill - Chattenden – Hoo	Hourly	See service 191	See services 193/194	Nu-Venture
193		Chatham - Chatham Rail Station - Rochester - Strood - Wainscott - Chattenden - Hoo - High Halstow - Cliffe Woods – Cliffe			2 hourly M	Amberlee UK
196		Chatham Railway Station - Chatham - Chatham Maritime / Chatham Historic Dockyard / Universities at Medway – Dockside Outlet Centre - Neptune Estate - Chattenden – Hoo	Hourly Mon - Fri			Arriva Medway Towns peaks, Nu-venture off-peak
197	M	(Medway Maritime Hospital – Chatham Historic Dockyard) - Chatham - Chatham Rail Station - Rochester - Strood - (Riverside Business Estate / Neptune Estate) - Lower Upnor - Lodge Hill (Tues and Fri only: - Hoo - Middle Stoke - Lower Stoke)	4 journeys			ASD Coaches
326	LF	Chatham – Chatham Historic Dockyard - Gillingham - Medway Maritime Hospital - Rainham - Newington - Sittingbourne (see also 327)	2 hourly		See service 327	Arriva Medway Towns
327	LF	Chatham – Chatham Historic Dockyard - Gillingham - Medway Maritime Hospital - Rainham - Upchurch - Lower Halstow - Newington – Sittingbourne	2 hourly		2 hourly M	Arriva Medway Towns (Jaycrest Suns)

The following services operate on school days only but may be used by other members of the public:

Service number	Service description	Operator
A	Impton Lane – Tunbury Avenue – Blue Bell Hill Village – Ringlestone - Aylesford School	Farleigh Coaches
B	Lordswood - Walderslade – Aylesford School	Farleigh Coaches
E	Wouldham – Rochester - Strood – Earl Estate - Cuxton - Holmesdale School	Farleigh Coaches
152	Cuxton - Strood (Chapter & Temple schools) - Medway City Estate	ASD Coaches
161	Chatham - Medway Community College - Walderslade Schools - Lords Wood (pm only)	Amberlee UK Ltd
171	Rainham – Rainham Mark – Twydall – Livingstone Circus – Medway Tunnel – Frindsbury – Temple School – Chapter School	ASD Coaches
175	Lords Wood - Walderslade - Walderslade Schools - Chatham	Red Route
177	Rainham - Rainham Mark - Fort Pitt Grammar School - Rochester - Strood - Chapter School - Temple School	ASD Coaches
187	Gillingham - Grange Road - Twydall (Rainham Mark High School) - Rainham Grammar Schools	Amberlee UK Ltd
632	Hempstead Valley - Parkwood - Rainham - Rainham Mark - Chatham - Chatham Rail Station - Rochester (Fort Pitt Grammar School) - Strood - Chapter School - Frindsbury - Wainscott - Chattenden - Hoo (am only)	Arriva Medway Towns
633	Cliffe - Cliffe Woods - Temple School - Strood - Rochester - Rochester Grammar Schools	Arriva Medway Towns

Service number	Service description	Operator
638	Borstal - Warren Wood (Thomas Aveling School)	Arriva Medway Towns
653	Halling - Upper Halling - Cuxton - Bridgewood - Rochester Grammar Schools - Thomas Aveling School - Huntsman's Corner schools	Arriva Medway Towns
657	Rainham Mark - Parkwood - Hempstead Valley - Hempstead - Princes Avenue – Lords Wood - Poachers Pocket - Huntsman's Corner schools - Rochester grammar schools	Arriva Medway Towns
658	Lords Wood - Princes Avenue - Poachers Pocket - Huntsmans Corner schools - Mid Kent College - Thomas Aveling School - Rochester grammar schools	Arriva Medway Towns
659	Wigmore - Parkwood - Hempstead Valley - Hempstead - Luton - Princes Avenue - Walderslade - Rochester Grammar Schools (does not serve Walderslade pm)	Arriva Medway Towns
660	Walderslade - Fostington Wood - Lordswood - Walderslade – Mid Kent College - Thomas Aveling School - Rochester Grammar Schools	Arriva Medway Towns
668	Chalk - Shorne - Higham - Salters Cross – Strood - Rochester - Rochester Grammar Schools	Arriva Medway Towns
673	Marlowe Park - Earl Estate - Chapter/Temple Schools - Strood - Rochester - Chatham (am only)	Arriva Medway Towns
675	Lords Wood - Walderslade Schools - Medway Community College (am only)	Arriva Medway Towns
676	Chatham - Weedswood - Walderslade - Lords Wood (pm only)	Arriva Medway Towns
689	Chatham - Chatham Rail Station - Rochester - Strood - Earl Estate - Salters Cross - Frindsbury - Wainscott - Chattenden - Hundred of Hoo School (pm - returns only as far as Strood)	Arriva Medway Towns
692	Lower Stoke - Allhallows - High Halstow - Hoo - Chattenden - Wainscott - Strood - Rochester - Rochester Grammar Schools	Arriva Medway Towns

Appendix C: Site 1 Initial Appraisal

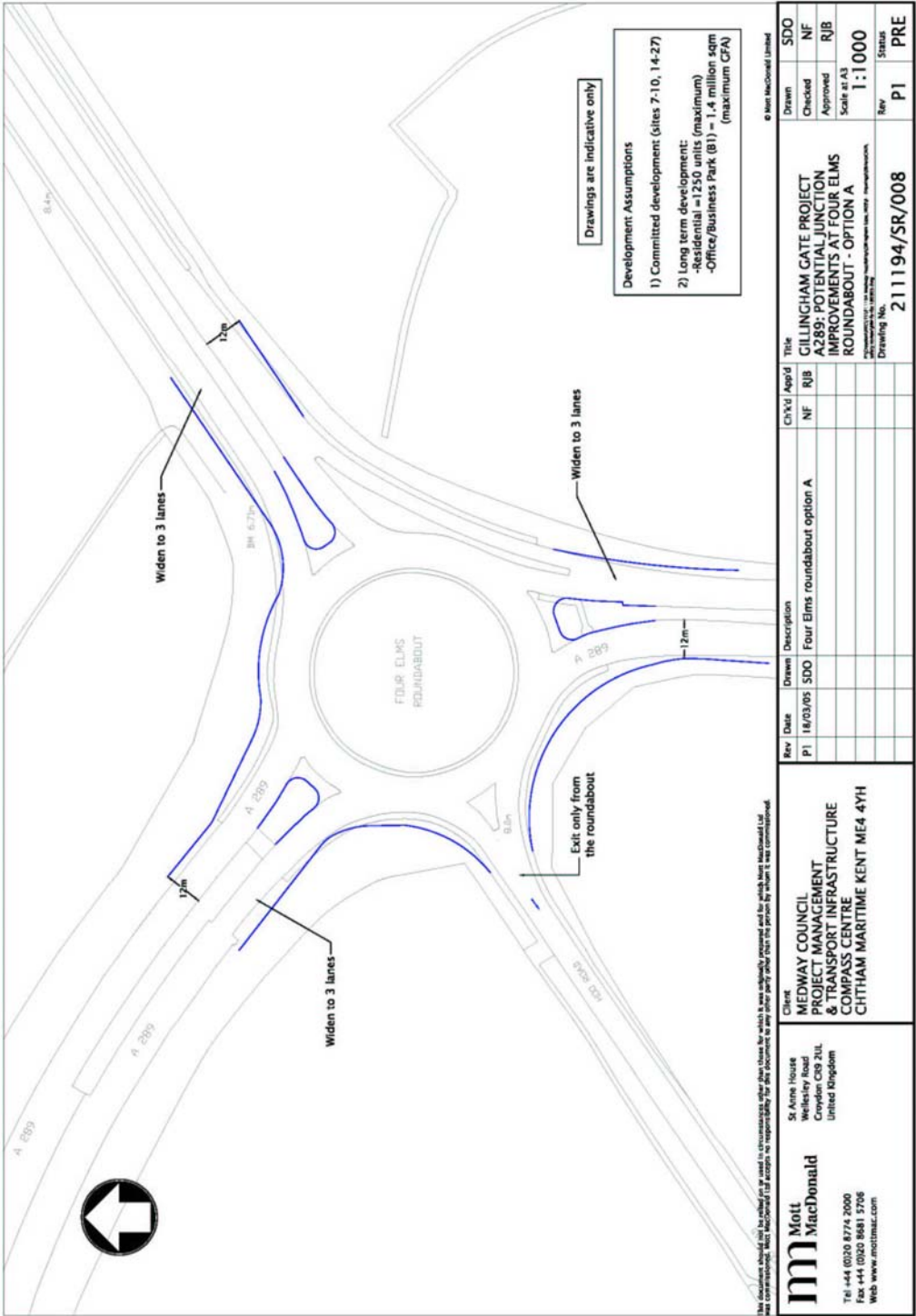
The potential development scenarios for site 1 (Chattenden Barracks site) has been assessed. On the limited information available it is confirmed that if the site is to include more than 1200-1500 dwellings plus identified development on the adjacent sites this is expected to involve more extensive junction improvements than simple signalisation within the existing highway boundary. A broad brush preliminary analysis indicates that an additional highway connection from the A289 to Woodfield Road, or similar, would be required as identified in our draft report tn0011_rev A Dec 04 fig 8.1a.

The signalised and the roundabout layout that could be contained within the existing highway boundary are as shown in drawing 211194/SR/009 and 211194/SR/008. It is recommended that any developers prepare scoping TA assessments for schemes before preparing detailed TA's.

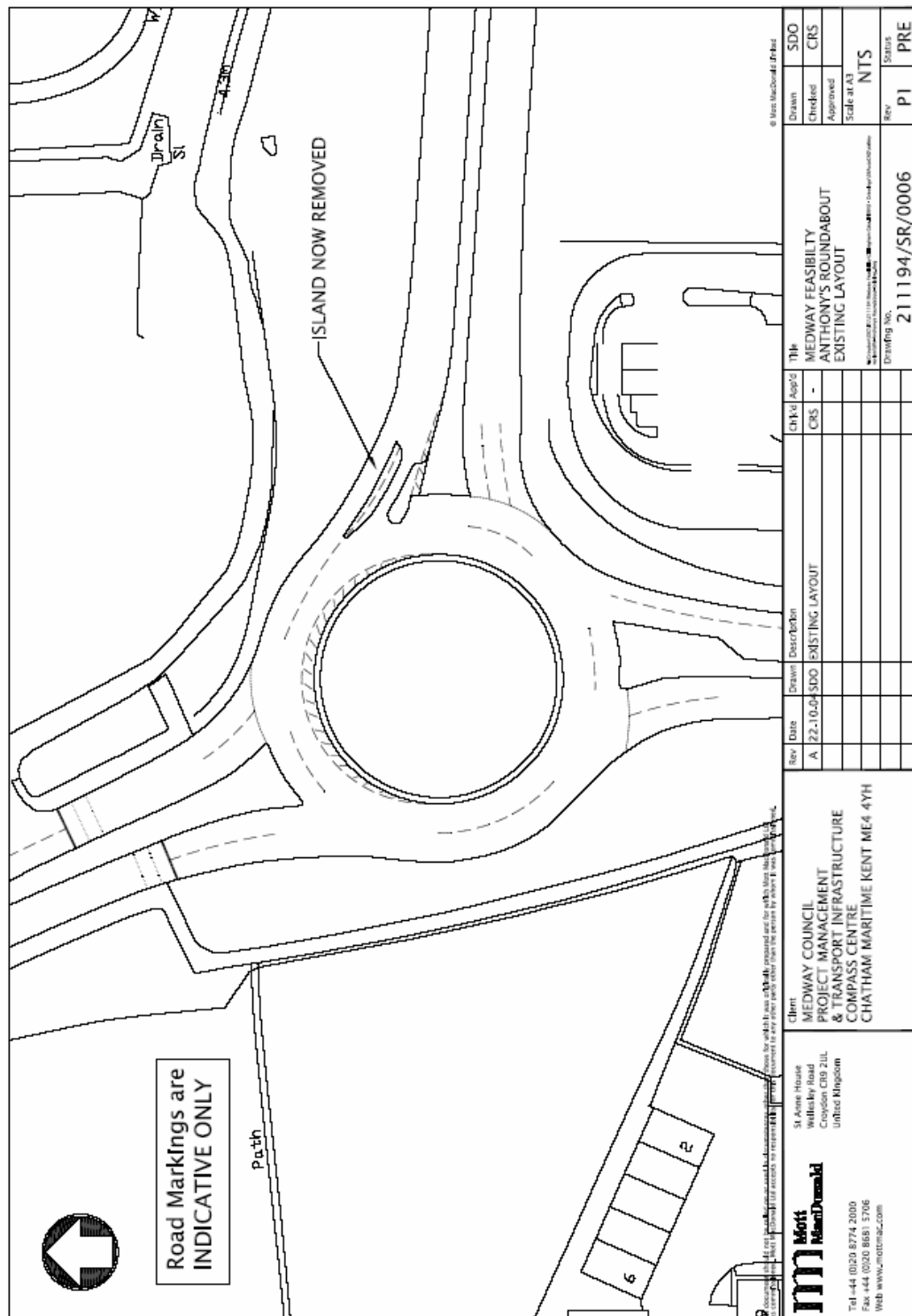
Appendix D

- 1. Four Elms Roundabout improvements (Spiral marking)**
- 2. Four Elms Roundabout improvements (Part time signal)**
- 3. Sani Pareil Junction (existing)**
- 4. Anthonys Way Roundabout (Existing)**
- 5. Pembroke Roundabout (Existing layout)**
- 6. Gillingham Gate (Existing layout)**
- 7. Gillingham Gate (Do minimum scenario)**

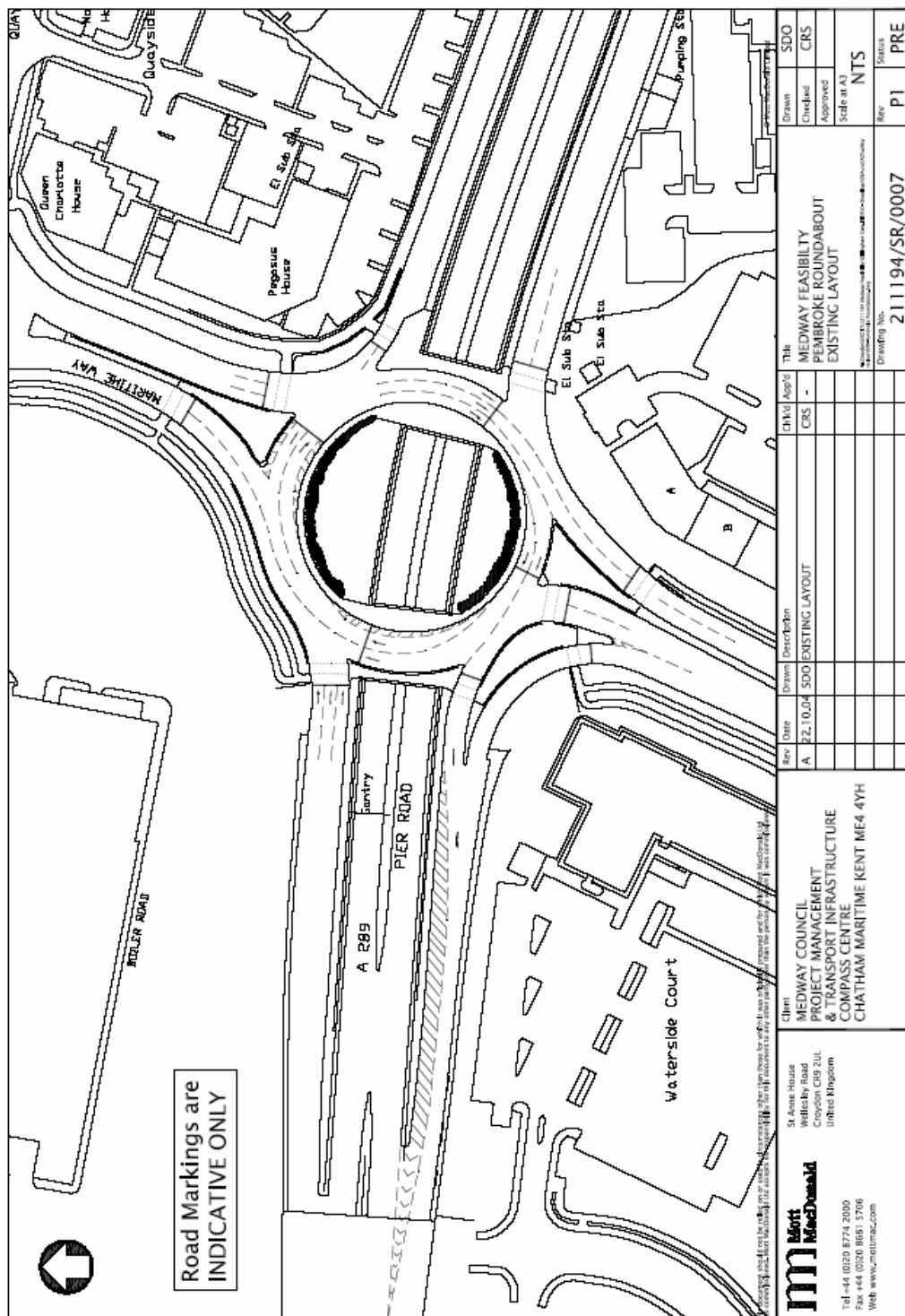
1. Four Elms Roundabout improvements (Spiral marking)



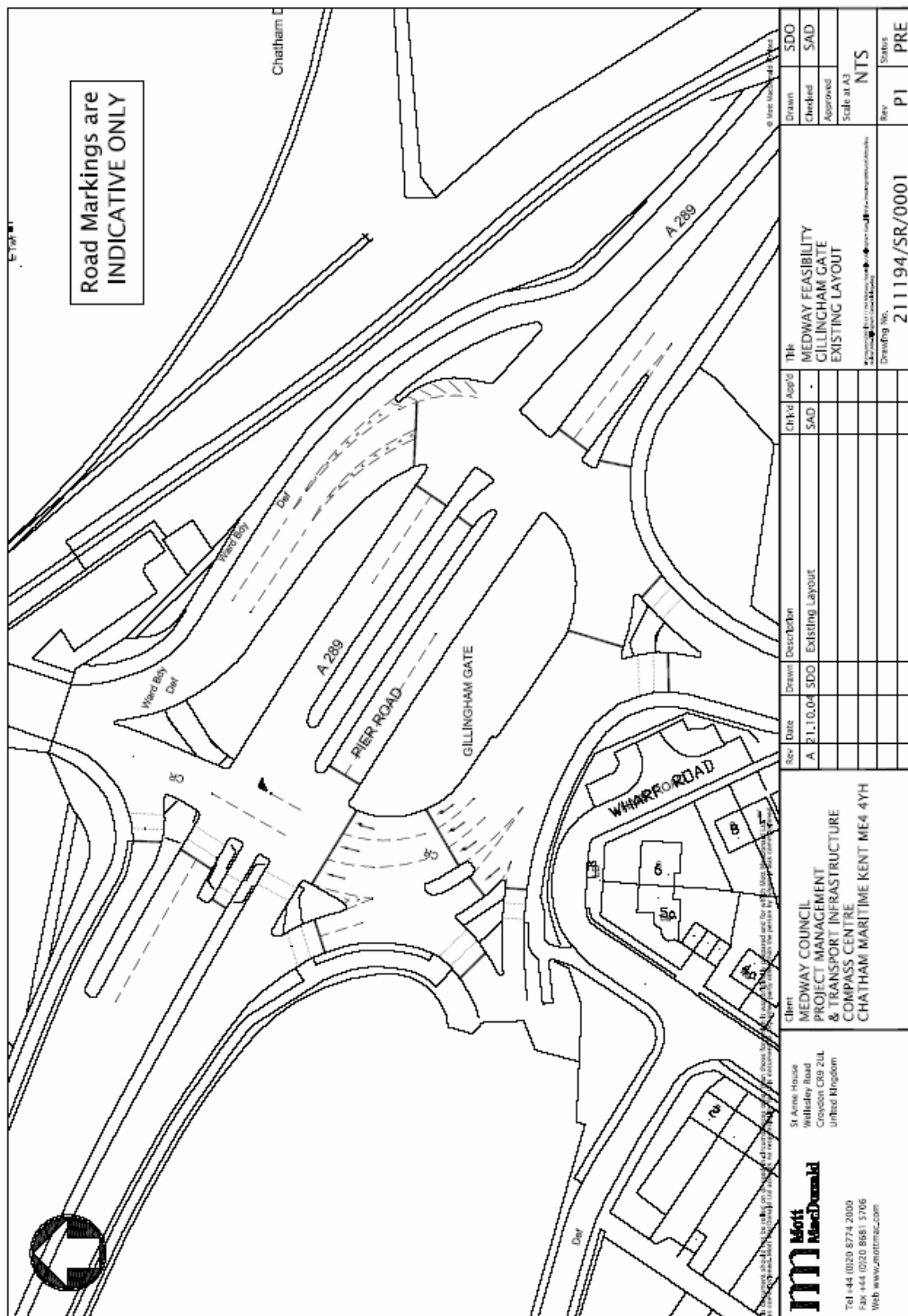
4. Anthonys Way Roundabout (Existing)



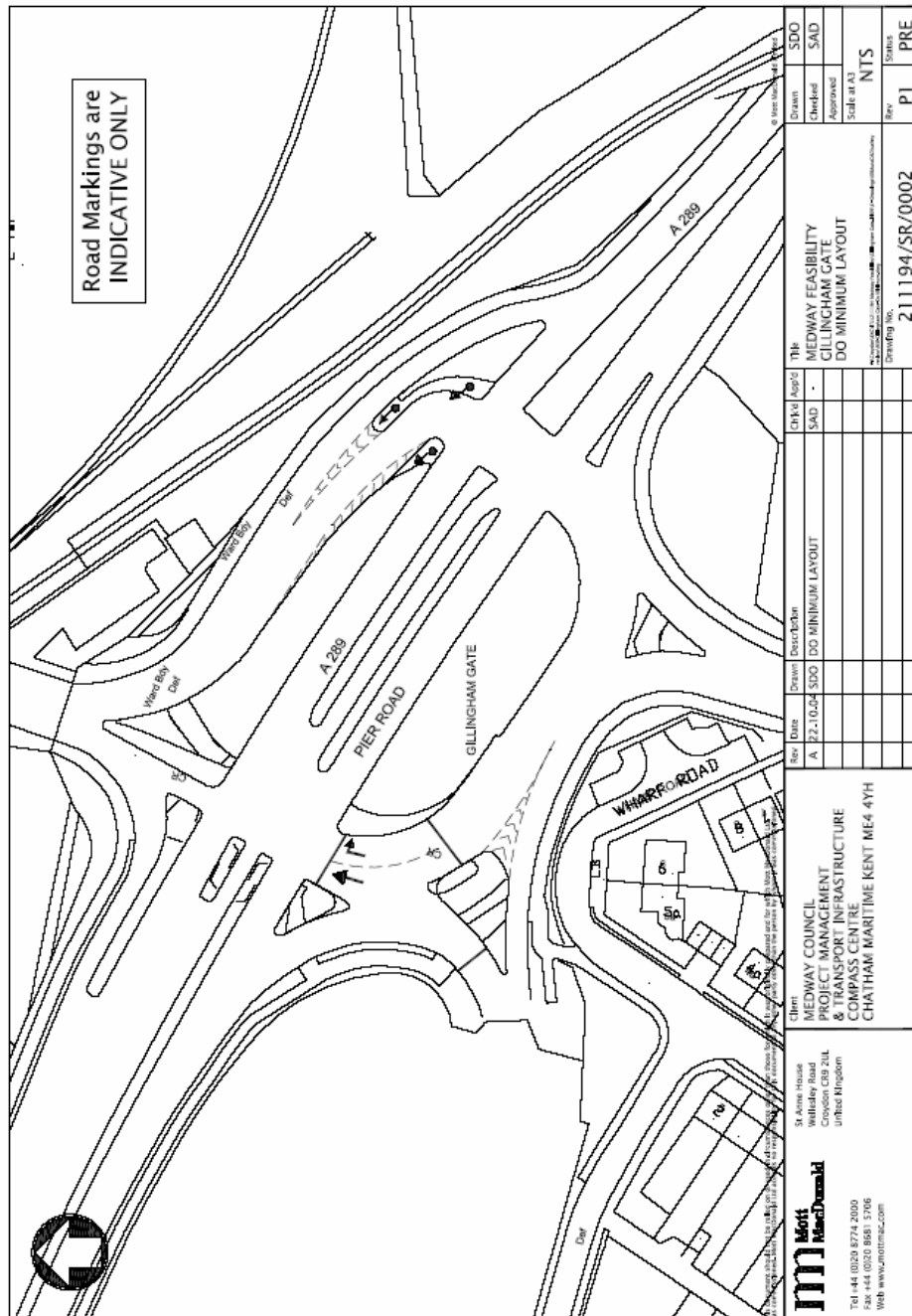
5. Pembroke Interchange (Existing layout)



6. Gillingham Gate (Existing layout)



7. Gillingham Gate (Do minimum scenario)



Appendix E: Route of A228 Dualling

