

Proposed Industrial Unit Bryn Lane, Wrexham Industrial Estate

On behalf of Kingmoor Park Properties Ltd.

Transport Assessment Addendum Report

January 2010

**[This ADDENDUM report should be read in conjunction with
the original Transport Assessment, September 2008]**



1. Background

- 1.1. Crowd Dynamics Ltd was appointed by Kingmoor Park Properties Ltd in April 2008 to provide transportation advice in relation to the development of a site on Bryn Lane, Wrexham Industrial Estate for industrial units for B2 and B8 usage.
- 1.2. Two planning applications were submitted for this development; P/2008/0992 and P/2008/0993. The area of the applications is shown in Figure 1 below;

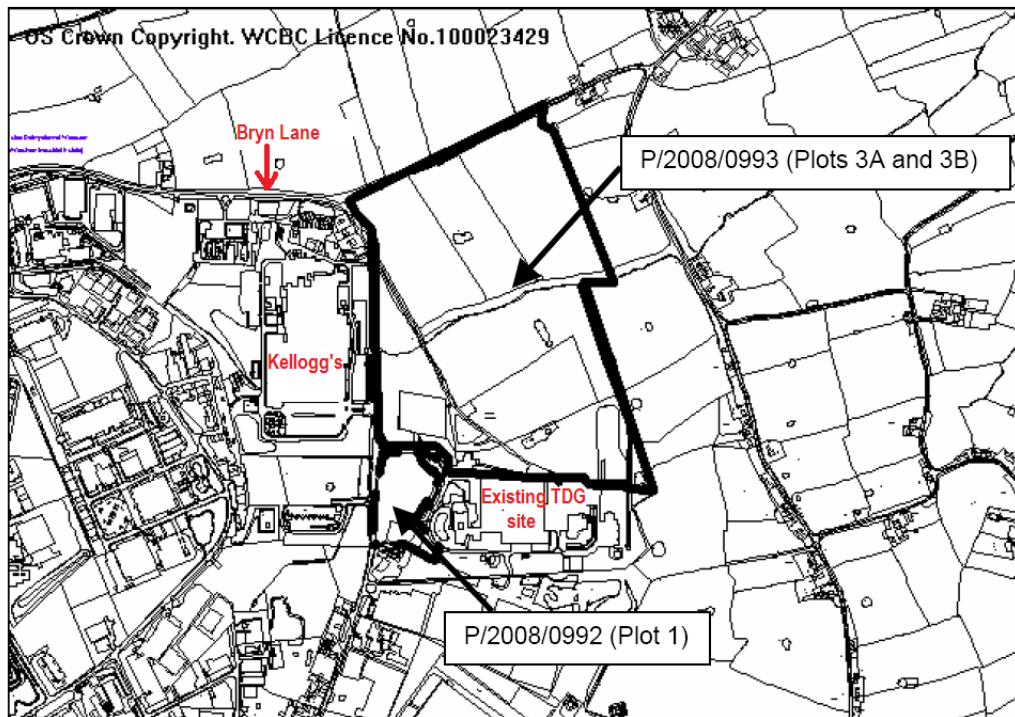


Figure 1: Location of Planning Applications submitted in 2008.

- 1.3. The proposed development, subject of the two applications, was for three specific areas, two of which had identified end users.
 - 1.3.1. The most southerly area was referred to as Plot 1. This site is located off the existing access to the TDG complex on the east side of Bryn Lane and to the south of the existing TDG access road. [Application – P/2008/0992]
 - 1.3.2. The other two areas formed part of the planning application –P/2008/0993.
 - Firstly a central unit for B8 warehousing unit which was to be constructed for TDG. This site is located off the existing access to the current TDG complex, to the north of the TDG access road.

- The second area forming part of application P/2008/0993 was a northerly unit of B2 / B8 development. This site would have a new highway access onto Bryn Lane.
- 1.4. A Transport Assessment, September 2008 was produced by Crowd Dynamics to support these applications.
 - 1.5. The highway authority comments reported to the WCBC Planning Committee dated 6 July 2009 were as follows:
 - 1.5.1. Application 2008/0992 *"No objection to the proposal, subject to conditions being placed on the decision. Developer to provide funding towards new bus service along Bryn Lane. Provide a Final Travel Plan and construct a footway along the frontage of the site."*
 - 1.5.2. Application 2008/0993 *"No objection to the proposal, Amended details have been submitted showing how parking standards are satisfied. Developer to provide funding towards new bus service along Bryn Lane, construct a footpath along the frontage of the site and fund implementation of a Traffic Regulation along Bryn Lane"*

2. Current Application

- 2.1. The current application is for the central unit of B8 warehousing for TDG only referred to as 1.3.2 above. It is one of the two elements that previously formed part of planning application/2008/ 0993.

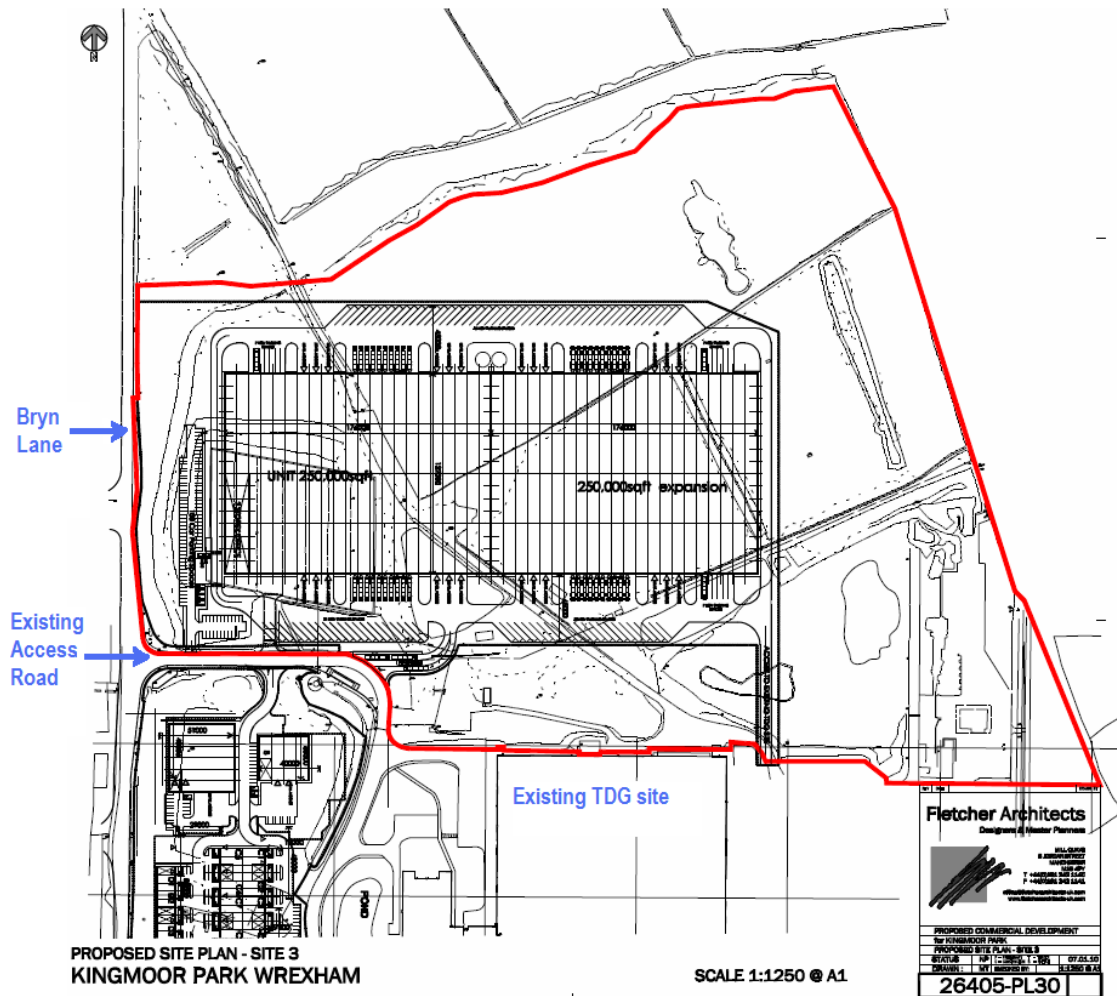


Figure 2: Proposed development

- 2.2. Appendix 1 contains relevant extracts from the original TA dated Sept 2008. This highlights that the traffic generated from this proposal at critical times is very limited, amounting to only four additional vehicles on Bryn Lane in the PM peak period.
- 2.3. Discussions have been held with the highway authority. They confirm that they have no objection to the current proposal but have requested that the following measures are taken;
- 2.3.1. A footway is provide from the site access on the north side of the existing TDG access road in a westerly direction to Bryn Lane and then extending northwards on Bryn Lane to the existing lay-by. [Note: This lay-by would be used as a bus lay-by for future bus services.]

2.3.2. Roadmarking alterations are undertaken at the junction of the TDG access road with Bryn Lane to provide a right turning lane from the south. The roadmarkings are to tie in with the right turn lane markings to the WCBC Recycling Centre immediately to the south.

2.3.3. A contribution of £5,000 to fund the provision of a bus shelter on Bryn Lane. This contribution would be time limited to 5 years.

2.4. The developer has agreed to all these requests. Items 2.3.1 and 2.3.2 are shown in Figure 3 below.

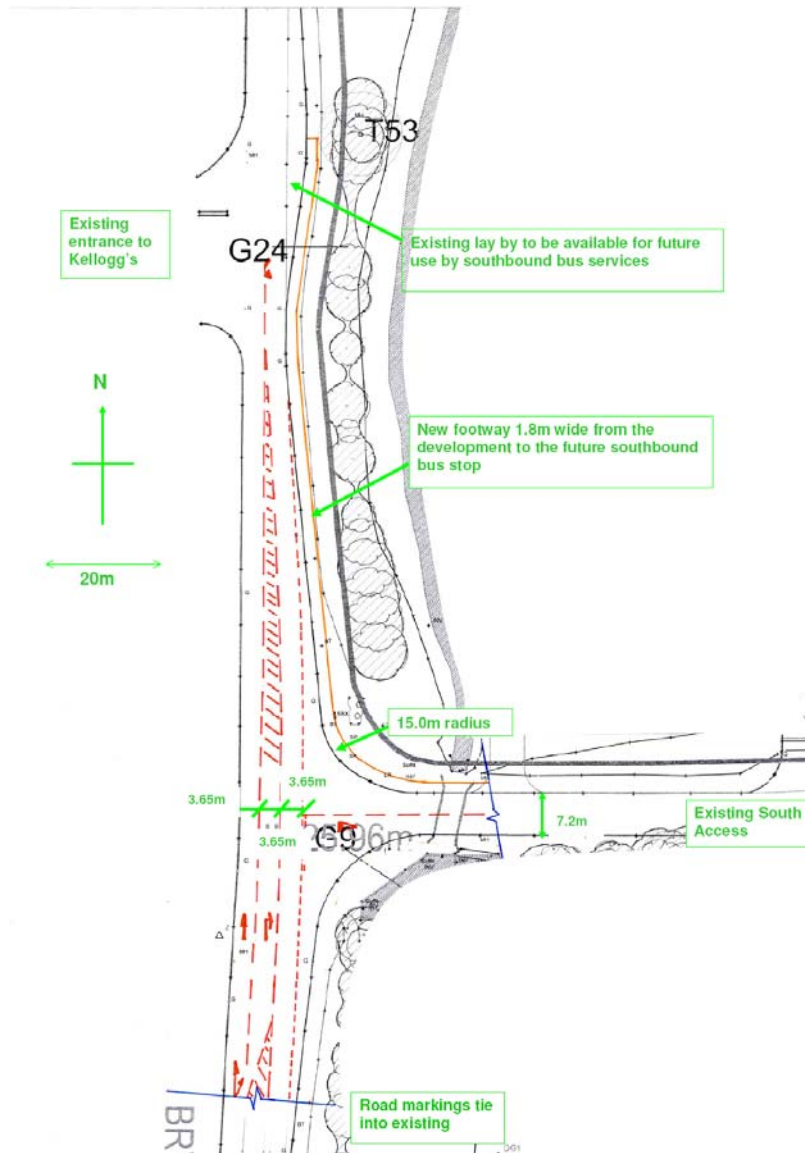


Figure 3 - Proposed footway provision and roadmarking amendments, Bryn Lane / Access Road

3. Conclusions

- 3.1. The current proposal generates very limited traffic at peak times.
- 3.2. The proposal was part of a much larger proposal considered by WCBC to be acceptable on highway grounds subject to certain minor highway improvements
- 3.3. The highway authority has requested three of the minor improvements previously proposed be provided for this smaller development. These are all offered by the developer as part of the application.
- 3.4. Hence, there is no transportation reason why the application for this development should not be approved.

Appendix 1 – Extracts from the Transport Assessment, September 2008

A1.1. The site is allocated in the Unitary Development Plan for industrial usage.

A1.2. Existing traffic flows on Bryn Lane are just over 2,200 vehicles per day (2003 data).

A1.3. Bryn Lane is a high standard two lane road circa 7.3m wide with grass verges. In the vicinity of the site, Bryn Lane is straight and on a north – south alignment but curves to the west at the northern part of the site. It is subject to a 40mph limit.

A1.4. The existing access to TDG is a priority junction with deceleration and acceleration lanes. The access road is 7.2m wide with wide verges.

A1.5. ...500,000sq ft (46,451m²) GFA development for TDG.

A1.6. The central unit end user is TDG. This unit will be for warehousing and will effectively extend the existing large complex operated by TDG at the adjoining site and served by the existing south access road. TDG currently operate a shift system for their 160 employees from 6.00 to 14.00 and 14.00 to 22.00. In addition, some staff work overnight. Approximately 50 HGV's serve the site daily with arrivals and departures evenly spread during the day equating to 5 per hour. The new facility will be much smaller than the existing.

A1.7. It is considered that the development will have a greater impact on the PM peak period for the following reasons;

- The TRICS database of similar developments throughout the UK shows that B2 and B8 uses generate more traffic in the PM period of 17.00 to 18.00 when compared with the AM.
- TDG operates a shift system. There are two shifts per day between 6.00 - 14.00 and 14.00 – 22.00. Only a few staff work 22.00 and 6.00. The traffic survey undertaken in August 2008 revealed minimal traffic from the existing site in the PM period as expected as this does not correspond to change over times.

A1.8. The traffic survey shows no vehicles leaving the site towards Hugmore Lane and only 2 HGV's from Hugmore Lane. Similar flows are envisaged from this facility which is smaller than the existing i.e. 2 HGV's.

Table A1 – Trip Generation and Distribution

(NOTE; only the TDG site is to be developed as part of this application)

	Total IN	IN from Hugmore Lane	Total OUT	Out to Hugmore Lane
Plot 3A	115	93	10	8
TDG	2	2	2	2
Plot 1	23	18	23	18
Total	140	113	36	28

Proposed Industrial Units Bryn Lane, Wrexham Industrial Estate

On behalf of Kingmoor Park Properties Ltd.

**Transport Assessment
September 2008**



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EXECUTIVE SUMMARY

- E1. Crowd Dynamics Ltd was appointed by Kingmoor Park Properties Ltd in April 2008 to provide transportation advice in relation to the development of a site on Bryn Lane, Wrexham Industrial Estate for industrial units for B2 and B8 usage. The site is split between Greenfield and Brownfield land. It is located on the north-eastern fringe of Wrexham Industrial Estate.
- E2. This Transport Assessment (TA), including a draft Travel Plan (TP), identifies the transport implications of this proposed development.
- E3. The TA has been developed following consultation with the local Highway Authority, Wrexham County Borough Council and TAITH (North Wales transport consortium), on matters including vehicular access, public transport and the draft Travel Plan provision.
- E4. The site is allocated in the Unitary Development Plan for industrial usage.
- E5. The proposed development is for three industrial units.
- The most southerly unit is referred to as Plot 1. This site is located off the existing access to the TDG complex on the east side of Bryn Lane, to the south of the TDG access road.
 - The central unit is a B8 warehousing unit which is to be constructed for TDG. This site is located off the existing access to the current TDG complex, to the north of the TDG access road.
 - The most northerly unit is referred to as Plot 3A. It is a mixed B2 / B8, factory and warehouse development. This site will have a new access onto Bryn Lane.
- E6. Public transport accessibility involves good access to the development from the northern part of Wrexham Town using the Wrexham Shuttle service. The Town Centre is poorly served by conventional bus services. However, infrastructure is being provided as requested by Wrexham County Borough Council to allow the current bus routing to be amended to better serve this development and the adjacent Kellogg's site.
- E7. Prior to the completion of the Wrexham Industrial Estate Access Road (WIEAR), which now has planning permission and is scheduled to open in 2011, there will continue to be traffic capacity issues at the Hugmore Lane / A534 junction. The proposed development will cause only a limited increase in traffic during this period. The nature of the uses is such that the impacts are minimal. The operation of shift working means that the vast majority of the staff arriving by car will do so outside of the peak hour traffic. Delivery vehicles also generally avoid the peak hour congestion to serve these developments.
- E8. Following the completion of WIEAR there will be no capacity issues on the wider highway network in this area of Wrexham County Borough as a result of this development. Calculations show that the immediate junctions onto Bryn Lane serving the development will operate satisfactorily.
- E9. A comprehensive Travel Plan will be adopted for each unit. These will promote all forms of sustainable travel with an emphasis on the promotion of cycling due to the close proximity of the residential areas of the town of Wrexham and the network of cycle routes which permit cyclists to be segregated from general traffic for much of their journey. Car sharing will also be promoted.
- E10. There is no transportation reason why the application for this development should not be approved.

1. INTRODUCTION

- 1.1 Crowd Dynamics Ltd was appointed by Kingmoor Park Properties Ltd. in April 2008 to provide transportation advice in relation to the development of industrial units on Bryn Lane, Wrexham Industrial Estate.
- 1.2 The Unitary Development Plan has allocated the site for industrial development.
- 1.3 This Transport Assessment (TA), including a draft Green Travel Plan (GTP), identifies the transport implications of this proposed development. It has been prepared in line with the latest guidelines 'Guidance on Transport Assessment', issued by the Department for Transport in 2007.
- 1.4 The TA has been developed following consultation with the local Highway Authority, Wrexham County Borough Council, on matters including vehicular access and public transport provision. The proposals take national and local transport policy into account.
- 1.5 The TA has been prepared in support of an outline planning application. It is anticipated that the site will be operational in 2010.
- 1.6 The 'Guidance on Transport Assessment', Department for Transport, March 2007 explains the transportation measures that need to be considered when development occurs. Particular emphasis is placed on alternative modes of travel to the motor vehicle.
- 1.7 Section 2 describes the site, the local highway network and public transport provision in the neighbourhood.
- 1.8 Section 3 describes the proposed development.
- 1.9 Section 4 describes the transportation impacts and mitigation measures.
- 1.10 Section 5 is an outline of the proposed Green Travel Plan.
- 1.11 Section 6 outlines the conclusions of the study.

2 EXISTING SITUATION

Road Network

- 2.1 This site is located on the north-eastern fringe of the large Wrexham Industrial Estate (WIE), some 5 km east of Wrexham Town Centre. Wrexham is the largest urban area in North Wales.
- 2.2 The site location is shown in Figure 1.
- 2.3 WIE has a number of road accesses.
 - Hugmore Lane in the north which connects to the A534 Wrexham to Nantwich road which is a principal road, at a signalised 'T' junction. Traffic flows towards Nantwich are modest but flows towards Wrexham are substantial. 1.8km west of Hugmore lane the A534 meets the A5156 Acton – Llanypwll Link Road. At this point the A534 leads to Wrexham town Centre whilst the A5156 leads in a northerly direction to meet the A483 and effectively forms the eastern bypass of Wrexham. The A483 is a high quality grade separated dual carriageway giving access in a north-easterly direction to Chester, the M53, and M56 to destinations such as Liverpool, Manchester and the North of England. In a south-westerly direction the A483 gives access to North and Mid Wales and the Midlands.
 - In the south of WIE, there are two road accesses. One leads to the A525 / Cross Lanes set of traffic signals which gives access to the A525 to Whitchurch and the east. The other is Cefn Road leading to the southern part of Wrexham.
 - Ridleywood Road gives access to the east via the B5130 which, in turn, joins the A525 near the village of Holt.
 - Brynestyn Lane gives access to the west but is restricted to cycles. It gives direct access to the eastern part of the Wrexham urban area where there is an extensive cycleway network.
- 2.4 Hugmore Lane carries the highest traffic flows to WIE, with a daily flow of over 12,000 vehicles (2003 data).
- 2.5 There is currently peak hour congestion at the Hugmore Lane / A534 junction in the north and to a lesser extent at the A525 / Cross Lanes junction to the south. There are firm proposals to construct a new link road to the north to bypass the Hugmore Lane / A534 traffic signals and similarly in the south to avoid the constraints at A525 / Cross Lanes.
- 2.6 The development site is located off Bryn lane on the eastern side of WIE. Bryn Lane forms the eastern side of the signed ring road around the northern part of WIE. At its north western end Bryn Lane meets Hugmore Lane at a roundabout and at its southern end Oak Road at a 'T' junction. Ridleywood Road meets Bryn Lane at a 'T' junction near its northern end. Existing traffic flows on Bryn Lane are just over 2,200 vehicles per day (2003 data).
- 2.7 Bryn Lane is a high standard two lane road circa 7.3m wide with grass verges. In the vicinity of the site, Bryn Lane is straight and on a north – south alignment but curves to the west at the northern part of the site. It is subject to a 40mph limit. The character of the road is mixed. Towards the north and west it is predominantly rural with few accesses and towards the south there are large industrial sites including Kellogg's. There is a public recycling facility on the east side and an access road serving a TDG warehousing complex on the east side.
- 2.8 The site abuts the TDG warehousing complex to the north, on the east side of Bryn lane. Part of the site was previously used for car parking and the remainder is agricultural land.

The existing access to TDG is a priority junction with deceleration and acceleration lanes. The access road is 7.2m wide with wide verges. A PM peak hour traffic count was undertaken at this access on Wednesday 20 August 2008 and also to the north of the Kellogg's access. The results are shown in Figure 5.

- 2.9 Ridleywood Road is a minor derestricted road abutting the north of the site. It is of limited width making it unsuitable for use by large numbers of HGV's. It carries light traffic flows.
- 2.10 Wrexham Industrial Access Estate Road (WIEAR) is a proposed high standard dual carriageway road that will provide improved access from both the north and the south of the Industrial Estate. The road is in two parts. The northern section is shown in Figure 2. The CPO and associated Inquiry is programmed to start in January 2009 and construction commence in 2010. The road is due to open at the end of 2011.

Existing Modal Share

- 2.11 Travel to work data from the 2001 census for the Holt ward which includes the WIE, identifies the modal share for trips of those travelling to work are as follows:
- 1.8% work from home
 - 2.4% travel by bus/taxi
 - 78.4% travel by car as the driver
 - 12.8% travel by car as a passenger
 - 1.7% travel by motorcycle
 - 1.5% travel by bicycle
 - 1.2% travel on foot

Pedestrian, Cycle and Public Transport

- 2.12 There are no footways on Bryn Lane in the vicinity of the site except for a short length of footway adjacent to the new recycling facility. There are very few residential properties within 1.5 km of the site so that walking is unlikely to be a realistic option for journeys to work.
- 2.13 In Wrexham Town there is an extensive network of cycle routes which connect to WIE via Brynestyn Lane. This allows cyclists access to the whole of the built-up area and to the surrounding villages. The whole of the built-up area of Wrexham lies within 6km of the site. Figure 3 shows the road network within WIE and the cycle route towards the town centre. There is also a cycle route from WIE to the villages of Holt and Farndon to the northeast of the development. These villages are between 3 and 5 km from the development with a cycle route in Holt along minor roads which then crosses the A534, and then uses the B5130 and Ridleywood Road, both of which traffic volumes are relatively light.
- 2.14 Conventional bus services within WIE currently run from Wrexham Town Centre to the centre of WIE at a half hourly frequency throughout the day and evening except on Sundays. Some buses are extended through to Holt
- 2.15 A versatile dial a ride type service 'Wrexham Shuttle' operates between any site within WIE to anywhere in the residential area of Wrexham Town (North) and including Llay and Gwersyllt. The areas are shown in Figure 13.

Accidents

2.16 Figure 4 and Appendix 2 detail the personal injury accidents that have occurred on Bryn Lane in the period January 2003 to June 2008 inclusive. a period of 5.5 years. The data shows personal injury accidents reported to the police for the section of Bryn lane from just east of its junction with Hugmore Lane in the north to its junction with Oak Road in the south, a distance of 1.9 km. The existing access road to the TDG complex lies approximately midway along this section. Relevant analysis is as follows:

- 8 accidents
- Accident rate 0.77 accidents / km / year
- All accidents are slight severity
- The only cluster site is at Bryn Lane / Oak road junction where 3 accidents occurred. 2 involving vehicles turning into Bryn Lane and 1 involving a vehicle leaving Bryn Lane
- No accidents occurred at the existing TDG access road junction.

2.17 Bryn Lane is not considered a high casualty collision site by the highway authority.

3. PROPOSED DEVELOPMENT

- 3.1 The general arrangement of the proposed development is shown in Figure 7 and comprises three separate elements:
- A 400,000sq ft (37,161m²) GFA development. This is referred to as Plot 3A in the subsequent text.
 - A 500,000sq ft (46,451m²) GFA development for TDG. The design is such that it will be constructed in two equal sized phases
 - A 75,000sq ft (6,967m²) GFA development. This is referred to as Plot 1 in the subsequent text
- 3.2 All three elements are accessed directly from Bryn Lane.
- 3.3 The new TDG site and Plot 1 will use the existing access from Bryn Lane which currently serves the existing TDG complex and formerly a car park where the new TDG facility is to be located. At the accesses, Bryn Lane is a two-way road with acceleration and deceleration lanes leading to the access road. It is proposed that the road markings are amended to form a more conventional priority junction with a ghost island right turn facility from Bryn Lane south as shown in Figure 8. This will remove the acceleration and deceleration lanes, which are not required by current standards. The layout will replicate the junction arrangements at the new recycling facility provided by Wrexham County Borough Council four years ago, which is located immediately south of this site.
- 3.4 Footways will be provided on both sides of the access road from Bryn Lane to Plot 1 on the south side and up to the new TDG access on the north side. The north side footway will extend alongside Bryn Lane in a northerly direction up to the existing unused layby opposite the Kellogg's entrance. This layby will be available for future use as a bus layby. On the south side the footway will extend around the junction radius to a point where the footway on the east side of Bryn Lane constructed as part of the recycling facility terminates. A future bus stop can be provided at this point on the existing carriageway for northbound buses on Bryn Lane. The footway provision will provide a safe route from both sites to this northbound bus stop.
- 3.5 The access to the TDG site will be located on the north side of the access road some 80m from Bryn Lane with the access to Plot 1 on the south side of the access road opposite.
- 3.6 The Plot 3A site will use a new access which is called the new "North Access" onto Bryn Lane between the TDG access and Ridleywood Lane. This junction is shown in Figure 9. It is designed in accordance with TD 42/95, with 3.65m wide through and right turning lanes.
- 3.7 There will be a bus stop provided on the north side of the access road. A footway abutting the access road will lead from the bus stop into the development. The car park access and egress will be located on the south side of the access road. The car park access and egress will permit a conventional bus to exit the bus stop and return to Bryn Lane.
- 3.8 The future bus service routing has yet to be studied in detail and agreed. Should it be decided to run a service along Bryn lane then bus stop(s) on Bryn Lane itself would probably be preferred to the off road facility offered. A provisional sum of £5,000 is offered in the Travel Plan to enable a footway link to such a facility from the development.
- 3.9 There will not be any specific facilities provided for pedestrians on the public highway as the nearest settlement is at Hugmore Lane some 2.0km from the site. This would be the normal limit of walking but there are few footways along the route and the lack of verges and high level of HGV traffic make this mode of travel unattractive.
- 3.10 Parking on all three sites will conform to the County Council's parking standards for both

cars and cycles with specific provision for those with mobility impairment.

4. TRANSPORT IMPACTS AND MITIGATION MEASURES

- 4.1 This Section of the report considers the likely transport impacts that the development will have on the local environment, the wider area and the operation of the local road network.
- 4.2 In this section, the scale of these movements and measures off site to encourage the use of the most sustainable modes is described. The scale of off site highway impacts is then forecast together with the requisite off site highway improvements to mitigate for these impacts.

Pedestrian and cycle movement

- 4.3 Cycling is an attractive mode of travel to this development with cycle routes from the Industrial Estate to the existing eastern side of the built up area of Wrexham Town. A considerable proportion of the residential areas lie within 5km. Government guidance indicates that for trips of less than 5km cycling should be an important mode for journeys. The route uses Brynestyn Lane along part of which motor vehicle traffic is prohibited and then via the Industrial Estate internal road network where traffic is restricted to 30 or 40 mph. In Wrexham Town there is an extensive network of cycle routes linking to Brynestyn Lane allowing access to the whole of the built-up area and also to the surrounding villages. The whole of the built-up area of Wrexham lies within 6km of the site.
- 4.4 There are also short lengths of cycletrack in Holt allowing travel from this village and the adjacent village of Farndon, Cheshire to the site with a simple crossing of the A534 and then using the B5130 and Ridleywood Road, both of which are relatively lightly trafficked.
- 4.5 As noted earlier it is not expected that any workers will walk from home to this site.

Public Transport

- 4.6 The conventional bus services serving the WIE currently stops around 1.4km from this development. Following discussions with WCBC Transportation Section it is proposed to allow in the design for conventional services to stop and turn around in the vicinity of the site enabling a potential revision of bus services involving the use of Bryn Lane, which WCBC envisage will take place.
- 4.7 At the north access a bus stop is provided on the access road with a turn around facility to egress to Bryn Lane. This facility could be used as a terminal stop or for through buses travelling northbound or southbound.
- 4.8 At the south access, a stop for southbound services could use the existing lay-by opposite Kellogg's and a northbound service could stop on the highway between the recycling facility and the site access road.
- 4.9 Footways are proposed to allow access from all sites to the adjacent bus stops.
- 4.10 The Wrexham Shuttle bus service will serve this development.
- 4.11 At the north access, the shuttle bus will be able to use the facility provided for conventional buses. At the south access, the shuttle bus will be able to turn around within the car parks.

Vehicular Accessibility for Staff

- 4.12 The use of sustainable modes will be encouraged, in particular cycling. Car sharing is also to be promoted as there is considerable scope for this to achieve a considerable reduction in car movements. However, a considerable proportion of travel to and from the development will still be via private vehicles. An assessment of the traffic impacts of the development on the local road network has therefore been undertaken.

Vehicular accessibility –Commercial

- 4.13 Commercial vehicles are expected to arrive predominantly from the north via Hugmore Lane as this gives access to the A483 which leads to:
- Northwest England via the A55 / M53 / M56.
 - North Wales via the A55.
 - Mid and South Wales.
 - The Midlands via the A5 / M54.
- 4.14 Only more localised journeys will use the A525 towards Whitchurch and the A534 towards Nantwich.

Trip generation

- 4.15 The planning application is to construct three separate units.
- Plot 3A will be served off a new north access road. A major occupier will operate the site as a factory unit with a substantial warehouse element. A shift system is envisaged with working four days on, four days off, working 12 hour shifts of 6.00 to 18.00 and 18.00 to 6.00. Up to 330 staff will be employed overall. A 250 space car park is provided which in broad terms allows for 110 staff vehicles to arrive prior to a shift change, 110 staff cars to be parked for staff finishing their shift and the remaining spaces available for office staff and visitors. The number of HGV's to the site is not known but is assumed to be 100 per day. The number of HGV movements in the PM peak hour is likely to be limited as deliveries normally avoid the peak hour and associated congestion. The number of vehicles in and out in the PM peak hour is assumed to be 5 based on observed vehicle movements at the nearby TDG site, where 5% of vehicle movements take place in the PM peak hour.
 - The central unit end user is TDG. This unit will be for warehousing and will effectively extend the existing large complex operated by TDG at the adjoining site and served by the existing south access road. TDG currently operate a shift system for their 160 employees from 6.00 to 14.00 and 14.00 to 22.00. In addition, some staff work overnight. Approximately 50 HGV's serve the site daily with arrivals and departures evenly spread during the day equating to 5 per hour. The new facility will be much smaller than the existing.
 - Plot 1 does not have a specific end user identified at this time.
- 4.16 In respect of trip generation two scenarios are considered.

- 4.17 Assuming that this planning application is approved and that construction commences expeditiously, then all units could possibly be operational by the end of 2009, (although it is currently planned that half of the TDG facility which is referred to as "TDG Expansion" in Figure 7 will not be constructed for at least 3 years). This worse case scenario is referred to as Scenario 1 and will only occur with the specific end user identified for the central unit i.e. TDG and a major occupier for Plot 3A. The developer is unlikely to construct two very large units without end users identified for two reasons. Firstly, in the current economic climate the demand for such sized units is limited and secondly the user may require a large single unit or two differently sized units which speculative building would not provide.
- 4.18 The traffic situation at the end of 2009 will be as existing, i.e. there will be continuing traffic congestion at Hugmore Lane / A534 in the peak hours and this will continue until the Wrexham Industrial Estate Access Road (WIEAR) is completed at the end of 2011 i.e. a two year period.
- 4.19 Scenario 2 assumes that the identified end user decides against development. In this case there will be a substantial delay in the commencement of construction with contractual negotiations, redesign of the buildings etc. In this scenario it is unlikely that the premises would be operational prior to the opening of the WIEAR at the end of 2011.
- 4.20 The reason for considering two scenarios is that the traffic implications are different.
- In Scenario 1 the critical traffic issue is the additional traffic that will be generated on the congested Hugmore Lane / A534 junction prior to completion of WIEAR. [Note this will not be an issue in Scenario 2 as the bypass will be open and there will be no congestion or capacity issues on the surrounding road network]
 - In Scenario 2 the critical traffic issue is the capacity of the site access roads / Bryn Lane junctions.

Scenario 1 – Prior to the Construction of WIEAR

- 4.21 This scenario assumes that
- A major occupier is identified for the north site.
 - TDG occupies the whole of the middle site.
 - Unspecified users occupy Plot 1.
- 4.22 The assessment is based on the traffic flows up to the end of 2011, when the WIEAR is programmed to open.
- 4.23 There is currently AM and PM peak hour traffic congestion at the Hugmore Lane / A534 junction. It is considered that the development will have a greater impact on the PM peak period for the following reasons;
- The TRICS database of similar developments throughout the UK shows that B2 and B8 uses generate more traffic in the PM period of 17.00 to 18.00 when compared with the AM.
 - Some of the shift patterns of the identified operator coincide with the PM period but none coincides with the AM.

- 4.24 The Plot 3A occupier operates a 12 hour shift system with change over times of 6.00 and 18.00. This does not coincide with AM peak period. In the PM peak period there will be employees arriving just prior to 18.00 for the shift change. 110 vehicles are assumed although this may be an overestimate as night shift numbers may be lower than day shift.
- 4.25 In addition to the shift workers there may be a limited number of office staff departing at this time and a nominal allowance of 5 vehicles is assumed. As indicated above around 5 HGV's are assumed to arrive and depart each hour.
- 4.26 TDG operates a shift system. There are two shifts per day between 6.00 - 14.00 and 14.00 – 22.00. Only a few staff work 22.00 and 6.00. The traffic survey undertaken in August 2008, Figure 5, revealed minimal traffic from the existing site in the PM period as expected as this does not correspond to change over times.
- 4.27 The traffic survey shows no vehicles leaving the site towards Hugmore Lane and only 2 HGV's from Hugmore Lane. Similar flows are envisaged from this facility which is smaller than the existing i.e. 2 HGV's.
- 4.28 Plot 1 is a development with undefined end users that will be marketed for B8 usage. TRICS database of similar developments throughout the UK gives 85%ile trip rates as follows.

Table 1 – 85%ile trip rates

	PM (1700-1800)	
	In	Out
B8	0.333	0.333

- 4.29 Plot 1 has a GFA of 6967m² which will generate the trips shown in Table 2

Table 2 – Trip Generation from Plot 1 with B8 use and using 85%ile Trip Rates

	PM (1700-1800)	
	In	Out
B8	23	23

- 4.30 To ascertain the likely routes taken to and from the development journey to work data was obtained from the 2001 census. The data was split into the five areas shown in Figure 10, which correspond to the columns in Table 3. Table 4 shows this data as displayed a percentage.

Table 3 – Journey to Work Numbers for Wrexham Industrial Estate (Holt Ward) from 2001 Census

	Wrexham	S East	SW W N NE	Holt	East	Grand Total
Total	2661	362	6093	523	290	9929
Works at or mainly from home	0	0	0	182	0	182
Underground metro light tram	0	0	3	0	0	3
Train	0	0	12	0	0	12
Bus_ Minibus or Coach	90	6	113	3	6	218
Taxi	9	0	9	0	0	18
Car - Driver	1926	297	5066	243	252	7784
Car Passenger	491	40	688	22	29	1270
Motorcycle etc	47	0	118	3	3	171
Bicycle	68	13	54	16	0	151
On Foot	30	6	30	51	0	117
Other	0	0	0	3	0	3

Table 4 – Journey to Work Percentages for Wrexham Industrial Estate (Holt Ward) from 2001 Census

Area	Percentage Distribution	Percentage distribution, discounting 'works at home'
Wrexham	26.8%	27.3%
S East	3.6%	3.7%
SW W N NE	61.4%	62.5%
Holt	5.3%	3.5%
East	2.9%	3.0%

4.31 The likely routes taken by traffic to and from this development are shown in Table 5 and their impact on Hugmore Lane / A534 is identified.

Table 5 – Trip Distribution Percentages (excluding 'works at home')

Area	Percentage	Likely route to and from WIE	% using Hugmore Lane
Wrexham	27.3%	Two thirds via Hugmore Lane and one third via Cefn Road	18.2%
S East	3.7%	A525 Cross Lanes	0
SW W N NE	62.5%	Hugmore Lane via A483	62.5%
Holt (including WIE)	3.5%	Internal trips	0
East	3.0%	Ridley Wood Lane	0
TOTAL via Hugmore Lane			80.7%

4.32 Hence it is estimated that 80.7% of traffic from the developments will use Hugmore Lane.

- 4.33 This distribution is considered a worst case scenario in respect of Hugmore Lane as traffic from the south west is assumed to use the A483 and approach WIE from the north whereas some traffic will choose to use the shorter route via the A539 from Ruabon and then the A528 and B5130 to Cross Lanes. This route will be attractive if congestion occurs on Hugmore Lane.

Table 6 – Trip Distribution

	Total IN	IN from Hugmore Lane	Total OUT	Out to Hugmore Lane
Plot 3A	115	93	10	8
TDG	2	2	2	2
Plot 1	23	18	23	18
Total	140	113	36	28

- 4.34 Capita Symonds Transport assessment for WIEAR (figure 2/4) shows that the existing traffic flow on Hugmore Lane in the PM peak hour is 1097 vehicles twoway. The dominant flow in the evening is leaving WIE, say 70%. This gives the following impact:

- increase in traffic leaving WIE – 768 before and 804 after = 4.7%
- increase in traffic flows into WIE – 329 before and 442 after = 34%

- 4.35 In practise the flows are likely to be lower and the effects less due to:

- The operators of Plot 1 may well adjust start times and shift patterns to avoid the peak hour
- 85%ile generation for Plot 1 has been assumed so that actual flows are likely to be lower
- Drivers of private cars may find alternative routes e.g. a greater percentage than assumed living in Wrexham may choose to use Cefn Road.
- The majority of the arrivals will do so just prior to 18.00 when traffic condition on Hugmore Lane show minimal congestion.
- A large proportion of the employees at Plot 3A are likely to be in 'low skill' jobs. Such employees typically have low car ownership levels.

Scenario 2 – Following the completion of WIEAR

- 4.36 In this scenario the WIEAR is complete and each of the new units is occupied by an unknown end user. The planning application is for B2 and B8 uses. B2 will generate more traffic than B8 use. A worst case with the greatest traffic generation is if the development is 50% B2 and 50% B8 based on the majority of developments within the WIE where large units contain a large proportion of B8 use.
- 4.37 The trip generation rates from the TRICS database are shown in Table 7.

Table 7 – 85%ile trip rates

	PM (1700-1800)	
	In	Out
B2	0.375	0.655
B8	0.333	0.333

- 4.38 As shown in Table 5 the main entry and exit route for traffic is to the north, currently via Hugmore Lane, and in the future via the new WIEAR. In the AM peak period most traffic will arrive at the two site access roads from the north via Bryn Road and then make a left turn into either of the access roads. This left turn manoeuvre will cause minimal traffic capacity issues. Conversely in the PM peak period the predominant flow is from the access roads and turning right into Bryn Lane to travel northbound. Right turn manoeuvres at priority junctions potentially do create traffic capacity issues. Accordingly the PM peak period has been analysed for each access.
- 4.39 The traffic generation at each access is shown in Tables 8 and 9 below.

Table 8 – Traffic Generation – PM 17.00 to 18.00 at the North Access Road assuming 50% B2 and 50% B8 Development

	In	Out
B2	70	122
B8	62	62
Total	132	184

Table 9 – Traffic Generation – PM 17.00 to 18.00 at the South Access Road Assuming 50% B2 and 50% B8 Development at Both Development Sites

	In	Out
B2	102	178
B8	89	89
Existing traffic	12	6
Total	203	274

- 4.40 The layout of each access is shown in Figures 8 and 9.
- 4.41 The generated flows from the development have been distributed in accordance with Table 5 and based upon the areas shown in Figure 10. These flows have been added to the forecast base traffic flows in 2025 prepared by Capita Symonds for WIEAR. An extract of their 2025 base traffic forecasts is shown in Figure 6. These forecasts are derived from a traffic model which aggregates particular occupiers within the WIE into traffic zones and hence there can be “step” changes in flows on particular roads in the estate around these traffic zone loading points. This is the case with Bryn Lane with traffic forecasts to the north of the site being much higher than to the south. For the purposes of this assessment the northern figures have been used in the calculation. These will represent a very much worst case scenario. Bryn Lane flows two-way are assumed to be split with two thirds northbound and one third southbound to correspond to the splits recorded in traffic count undertaken on 20 August 2008.
- 4.42 A PICADY analysis of each access road junction has been undertaken and is attached in Appendices 3 and 4.
- 4.43 The results are shown in Tables 10 and 11.

Table 10 – Capacity and Queue Length at the new North Access with 2025 flows and 50% B2 and 50% B8

Ratio of Flow to Capacity (RFC)		0.742
Maximum Queue Length	Access	2.6
	Bryn Lane (right turn from South)	0.0

Table 11 – Capacity and queue Length at the Existing South Access with 2025 flows with 50% B2 and 50% B8

Ratio of Flow to Capacity (RFC)		0.797
Maximum Queue Length	Access	3.5
	Bryn Lane (right turn from South)	0.1

- 4.44 An RFC value of less than 0.95 indicates satisfactory operation; hence with figures of less than 0.8, the table shows the new access arrangements operate satisfactorily.

Impacts on Safety

- 4.45 The existing safety record in the area was presented in Section 2. This shows that no accidents were recorded at the existing south entrance to TDG in the 5.5 years studied. The accident rate along Bryn Lane from its junction with Oak Road in the south to just east of the Hugmore Lane junction in the north was only 0.84 injury accidents / km / year and that there was only one accident cluster at the Oak Road / Bryn Lane junction with 3 accidents in the 5.5 year study period and that these involved two types of collision. The accidents at the Hugmore lane / Bryn Lane roundabout were not studied as this junction will be remodelled as part of WIEAR.
- 4.46 This accident rate is low, probably reflecting that Bryn Lane is constructed to a high standard with a 7.3m carriageway, wide verges and gentle curvature. During the accident study period the speed limit on Bryn Lane was reduced from the national limit to 40mph which will also have a positive effect on the future accident rate.

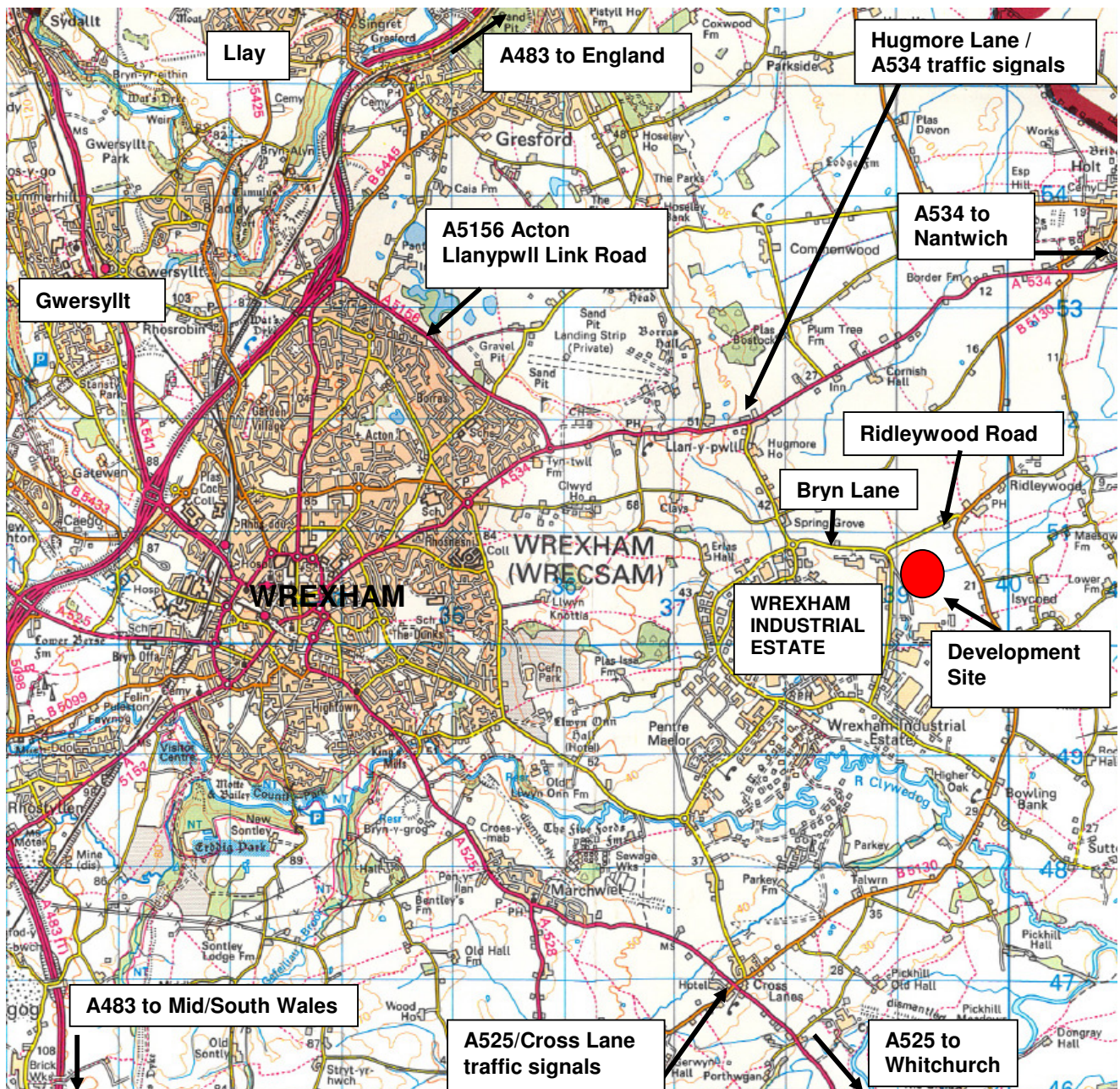
- 4.47 The existing south junction will be amended to provide a right turning lane to complement and extend the road marking arrangement adopted by WCBC at the recently constructed junction to the Recycling facility and the new north access will be constructed to current highway standards. There is no reason to be concerned regarding future highway safety for traffic generated by this development.

5. TRAVEL PLAN

- 5.1. This section outlines the proposed Green Travel Plan for the development. It is essential that sustainable transport modes are constantly promoted and funded during the period of the development of the site and that the transport strategy is refined to best meet the needs of the occupiers in the future. Circumstances will change over the years and solutions identified now need to be tailored over time to optimise the use of sustainable modes.
- 5.2. This is the role of the Green Travel Plan. The final plan, including its financial commitments will become a legally binding part of the planning approval. The plan is outlined in this Section but will be subject of some refinement as part of the development of the S106 planning contributions process.
- 5.3. An outline of the Green Travel Plan is provided in Appendix 1. Firstly, details of the contributions contained within the Green Travel Plan are described, followed by those physical measures provided on site as part of the development itself.

6. CONCLUSIONS

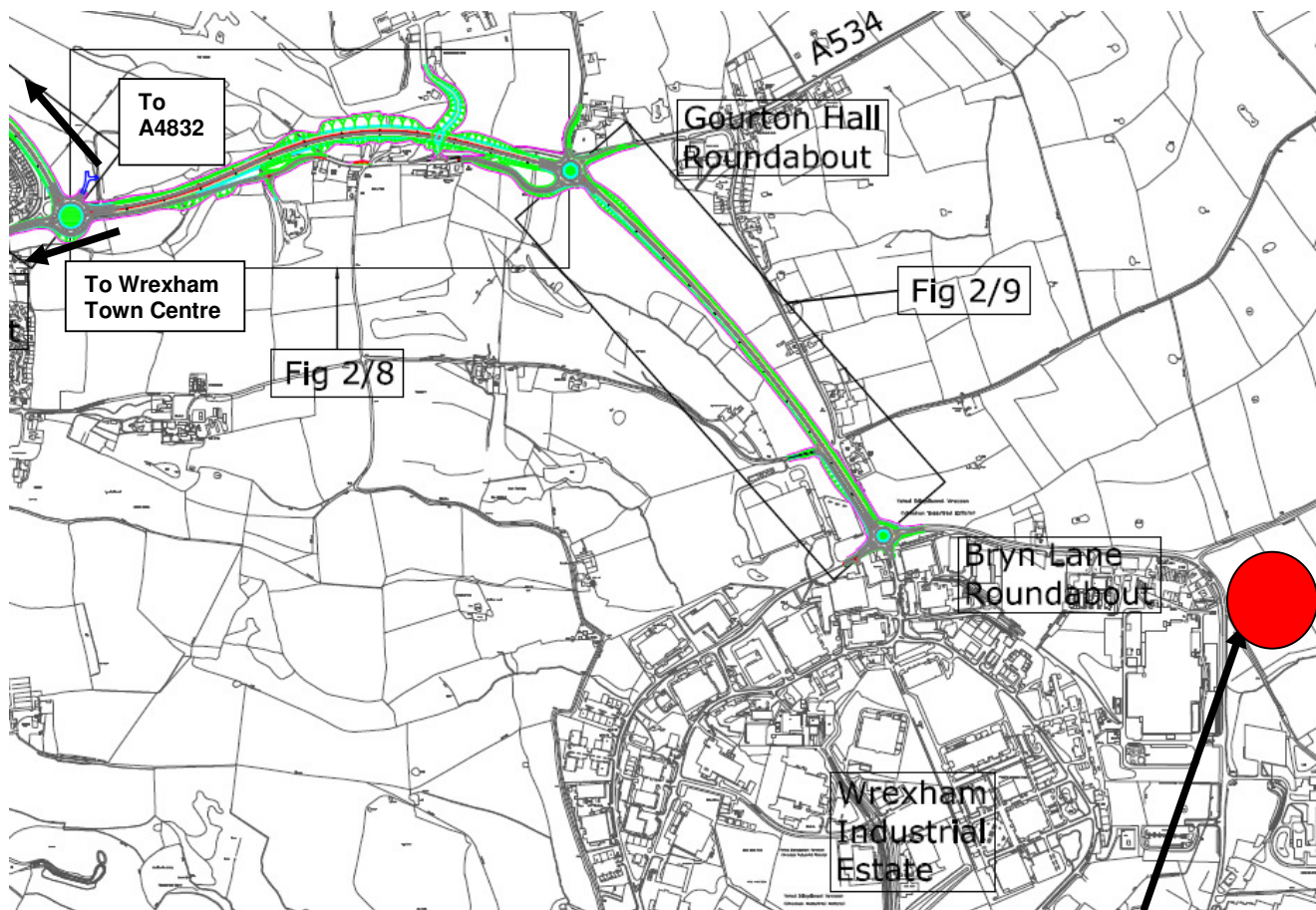
- 6.1 Staff at the site will be strongly encouraged to car share or cycle to work. However given the nature of the development a considerable proportion of workers will travel by car. The nature of the uses is such that additional traffic volumes are generally outside the peak hours that currently occur.
- 6.2 Road access to WIE will radically improve after 2011 with the opening of the WIEAR. This new link road will greatly improve access to both the north and south after which time issues of congestion on the local road network are overcome.
- 6.3 Two scenarios have therefore been considered. The first scenario considers the period of two years between the completion of the development in 2009 until the opening of WIEAR in 2011. The second considers the period after the opening of WIEAR.
- 6.4 Prior to 2011 (Scenario 1) the key transportation issue is the increase in traffic on Hugmore Lane. The PM peak period is considered to be the most critical. Outbound flows on Hugmore Lane increase in this period by a modest 4.6%. Inbound flows increase significantly but in this direction of flow there is no capacity issue and additionally the flows occur near to 18.00 when traffic flows are much lower. Hence it is considered that the additional traffic generated by the development can be accommodated in the network for the relatively short period up to 2011.
- 6.5 Post 2011 (Scenario 2) the key transportation issue is the capacity of the immediate access junctions from the development onto Bryn Lane. In this scenario a worse case is considered with the development being assumed to be 50% B2, 50% B8 in the event that the identified end user does not pursue their development and other users with potentially higher traffic generations are pursued for the site. PICADY analysis shows that the junctions operate satisfactorily in these conditions.
- 6.6 Travel Plans will be prepared for each unit which will strongly promote cycling and car sharing.
- 6.7 There is no accident problem identified on the highway network in the vicinity of the site.
- 6.8 Hence, there is no transportation reason why the application for this development should not be approved.



Not to Scale

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Figure 1
Site Location Plan



Extract from Capita Symonds
– WIEAR Figure 2/6
“Present and Peak Hour Flows
with Scheme”

Figure 2
Wrexham Industrial Estate Access Road
(North)

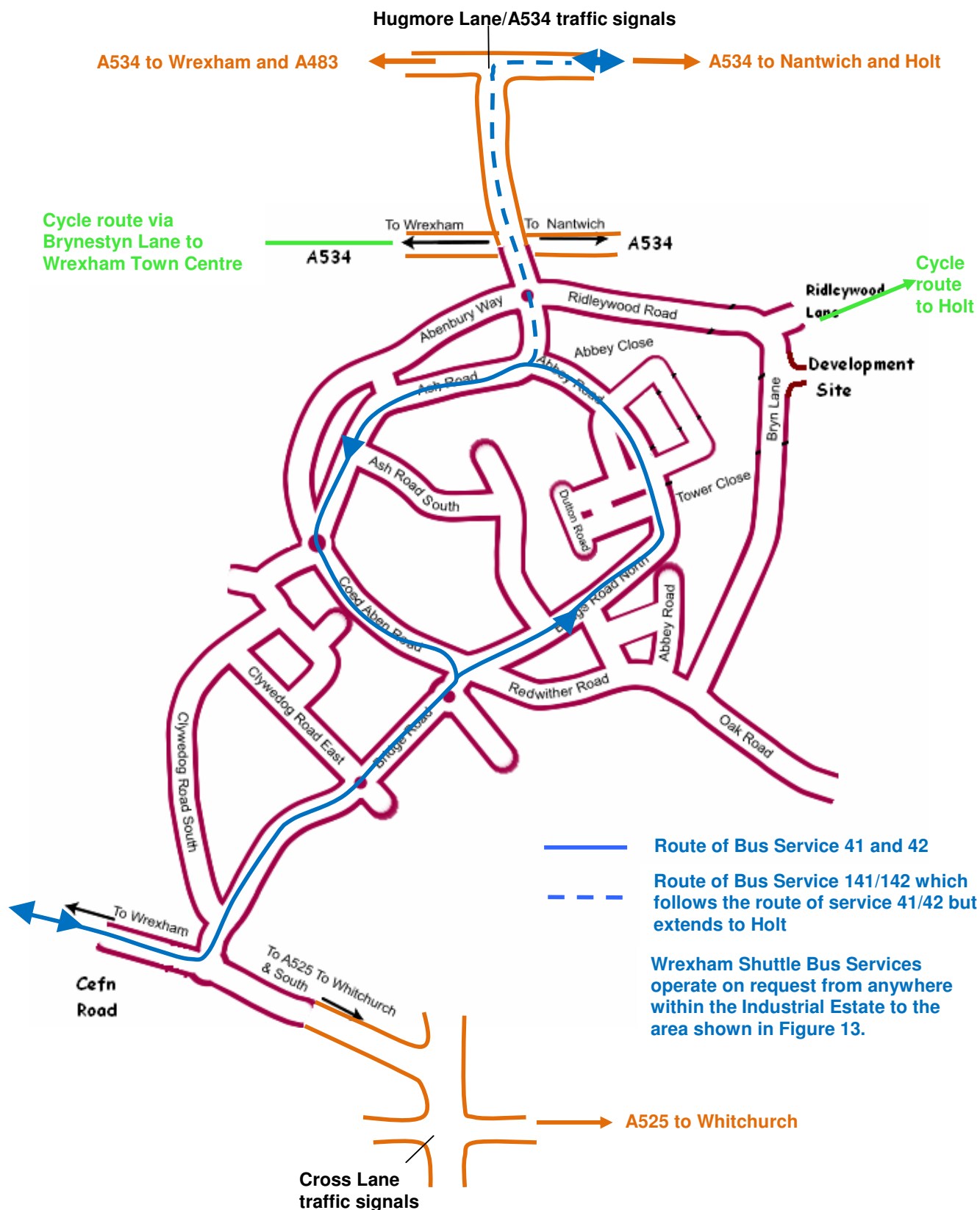
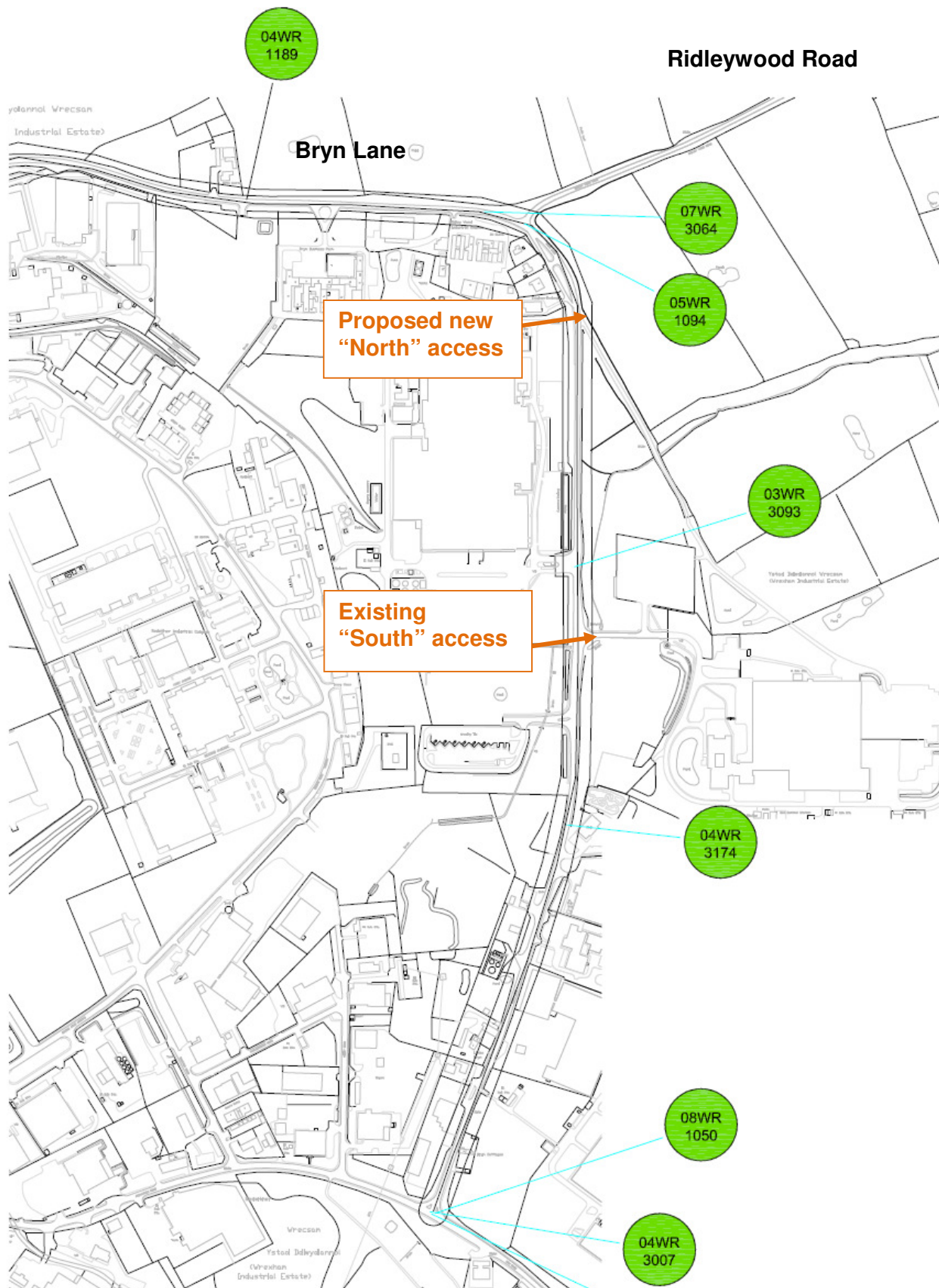


Figure 3
Existing Local Road Network
Showing Designated Cycling and Bus
Routes



Not to Scale

Figure 4
Personal Injury Traffic Accidents
Jan 2003 to June 2008 – 5.5 years

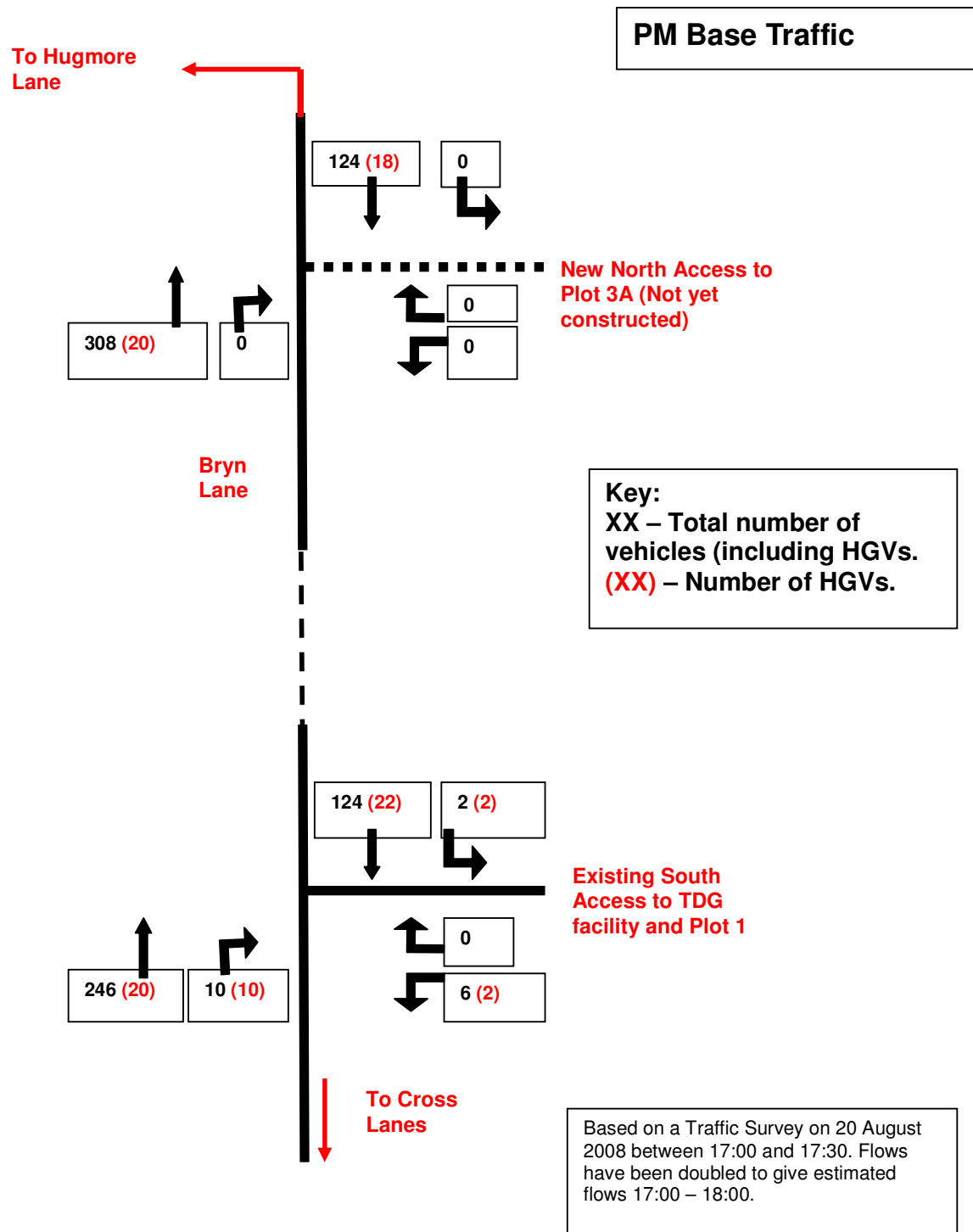
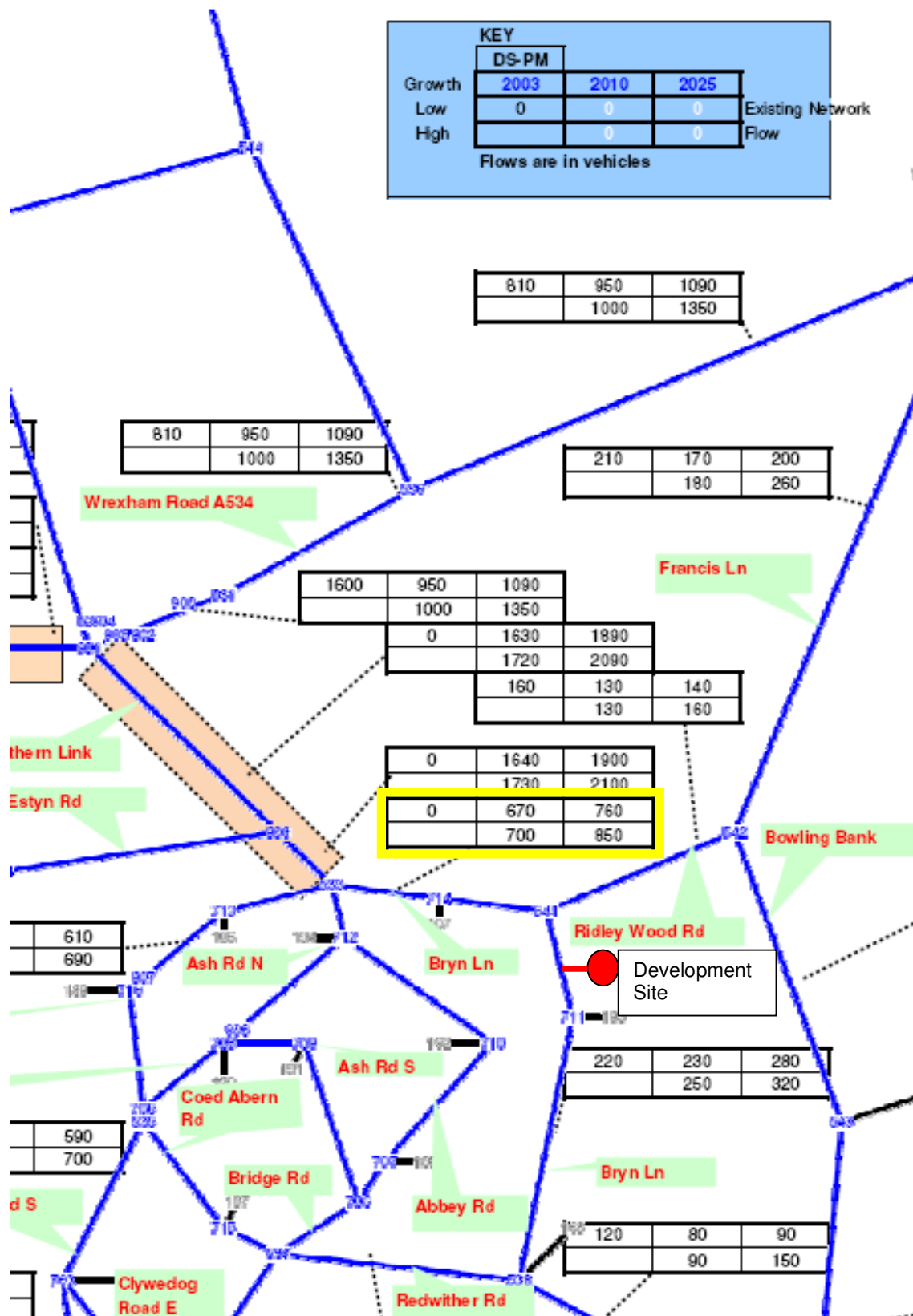


Figure 5
PM Base Traffic Flows 2008
17:00 – 18:00



Extract from Capita Symonds
– WIEAR Figure 2/5
“Present and Peak Hour Flows
with Scheme

Figure 6
PM Future Base Traffic Flows 2025

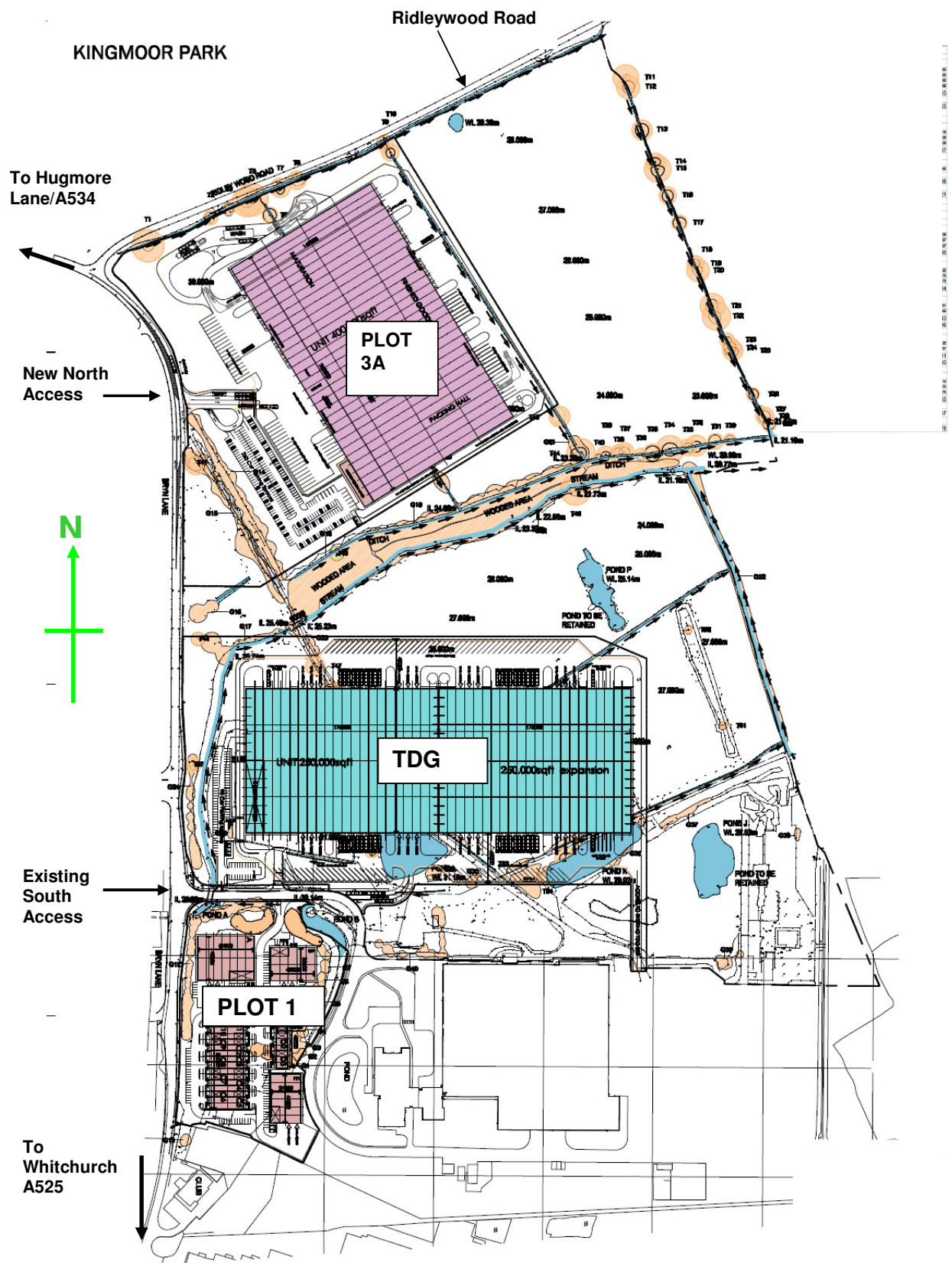


Figure 7
Plan of Development
(General Arrangement)

Existing entrance to Kellogg's

Existing lay by to be available for future use by southbound bus services

New footway 1.8m wide from the development to the future southbound bus stop

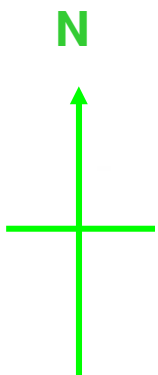
15.0m radius

Existing South Access

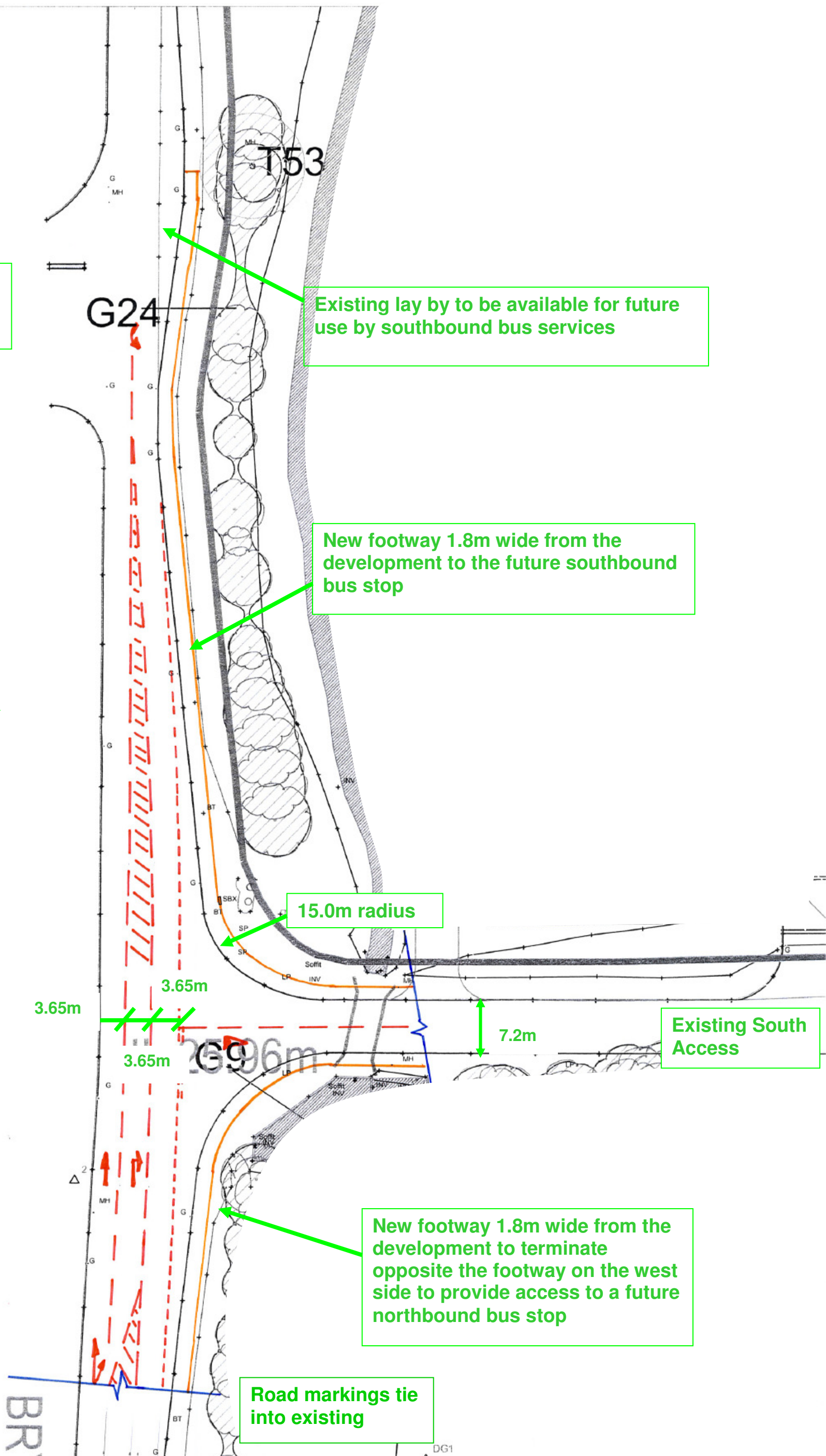
New footway 1.8m wide from the development to terminate opposite the footway on the west side to provide access to a future northbound bus stop

Road markings tie into existing

Figure 8
South Access / Bryn Lane
Junction



20m



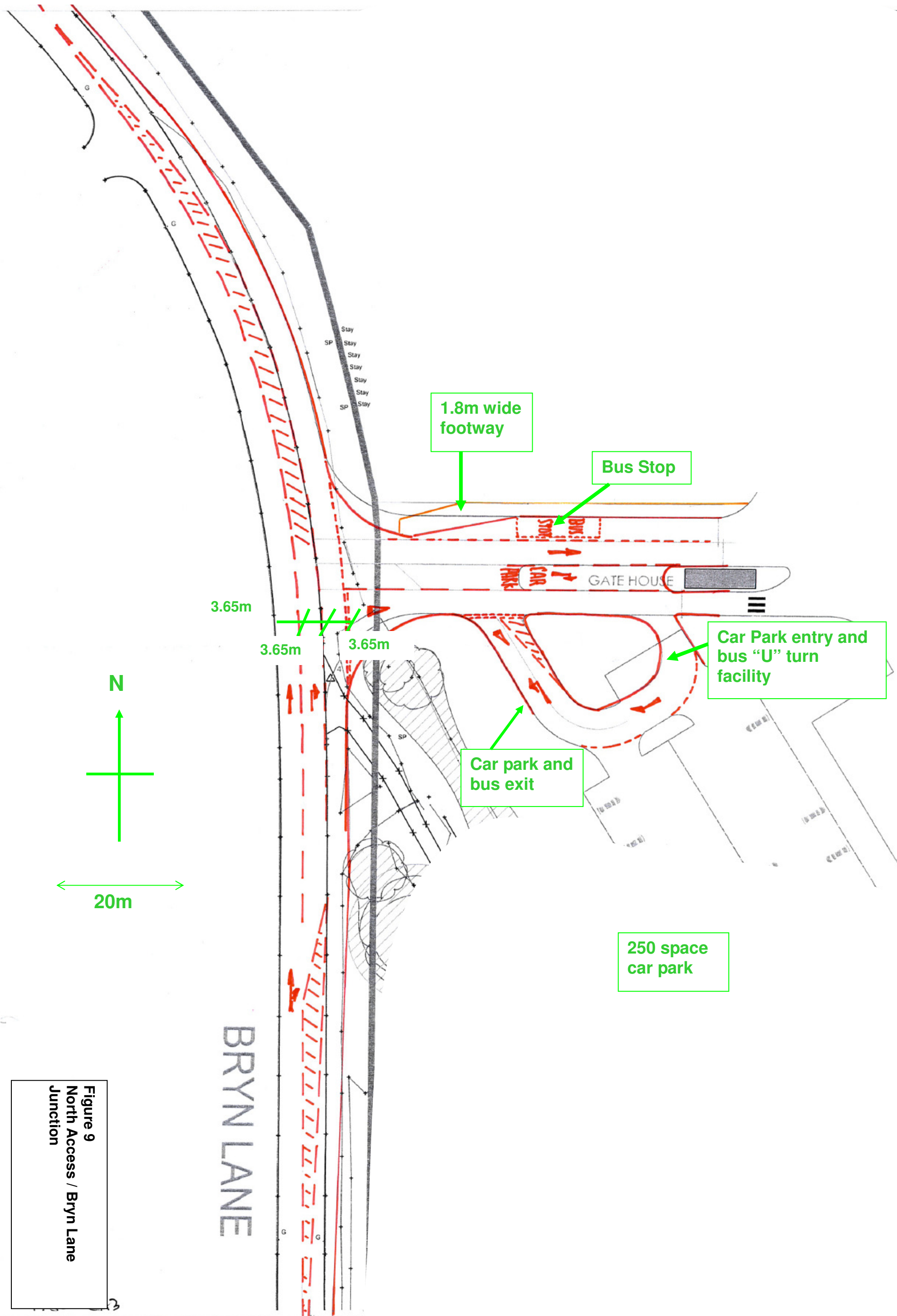
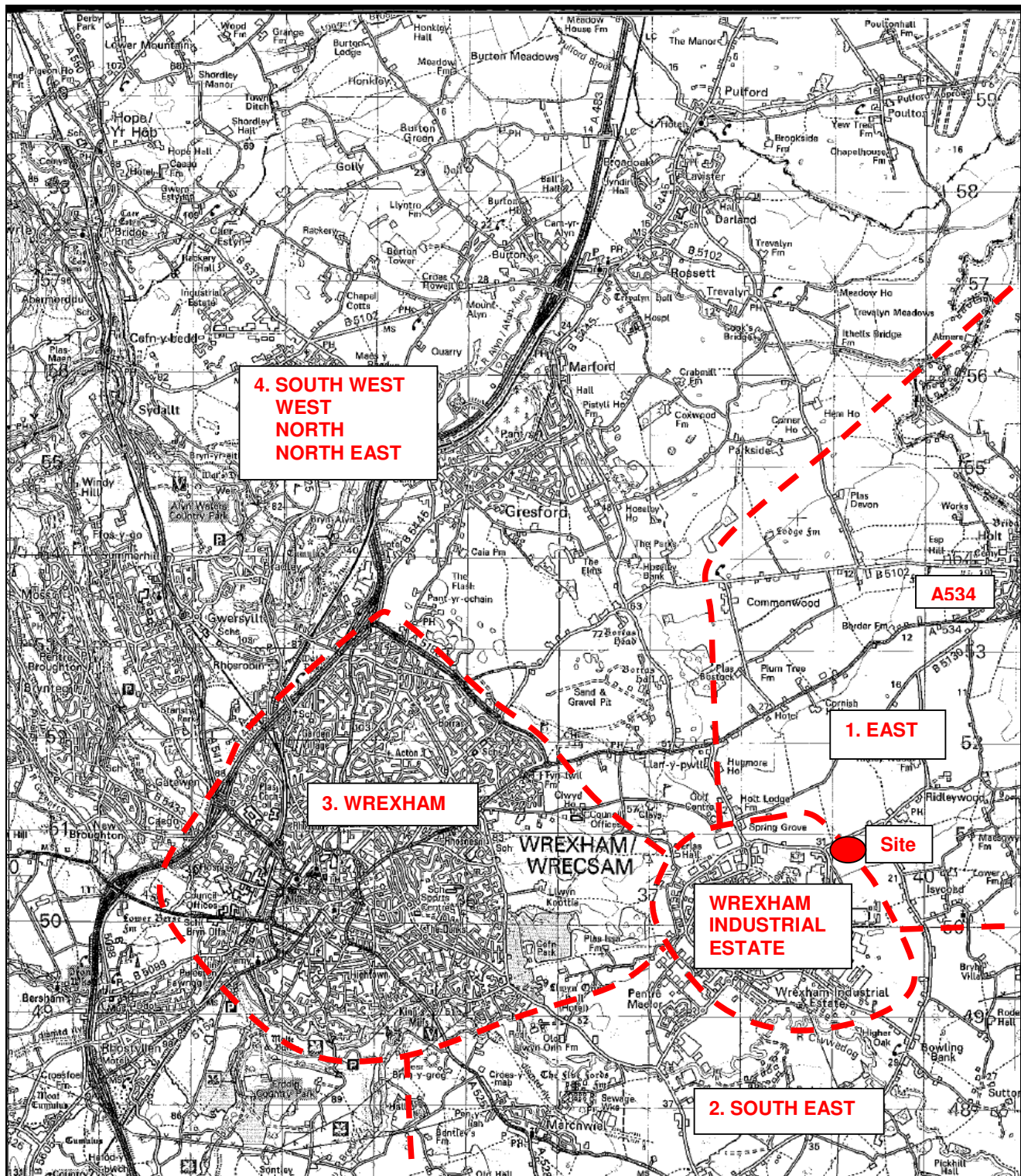


Figure 9
North Access / Bryn Lane
Junction



Trip distribution is based upon 2001 census, using Holt ward for analysis purposes

Figure 10
Trip Distribution Areas

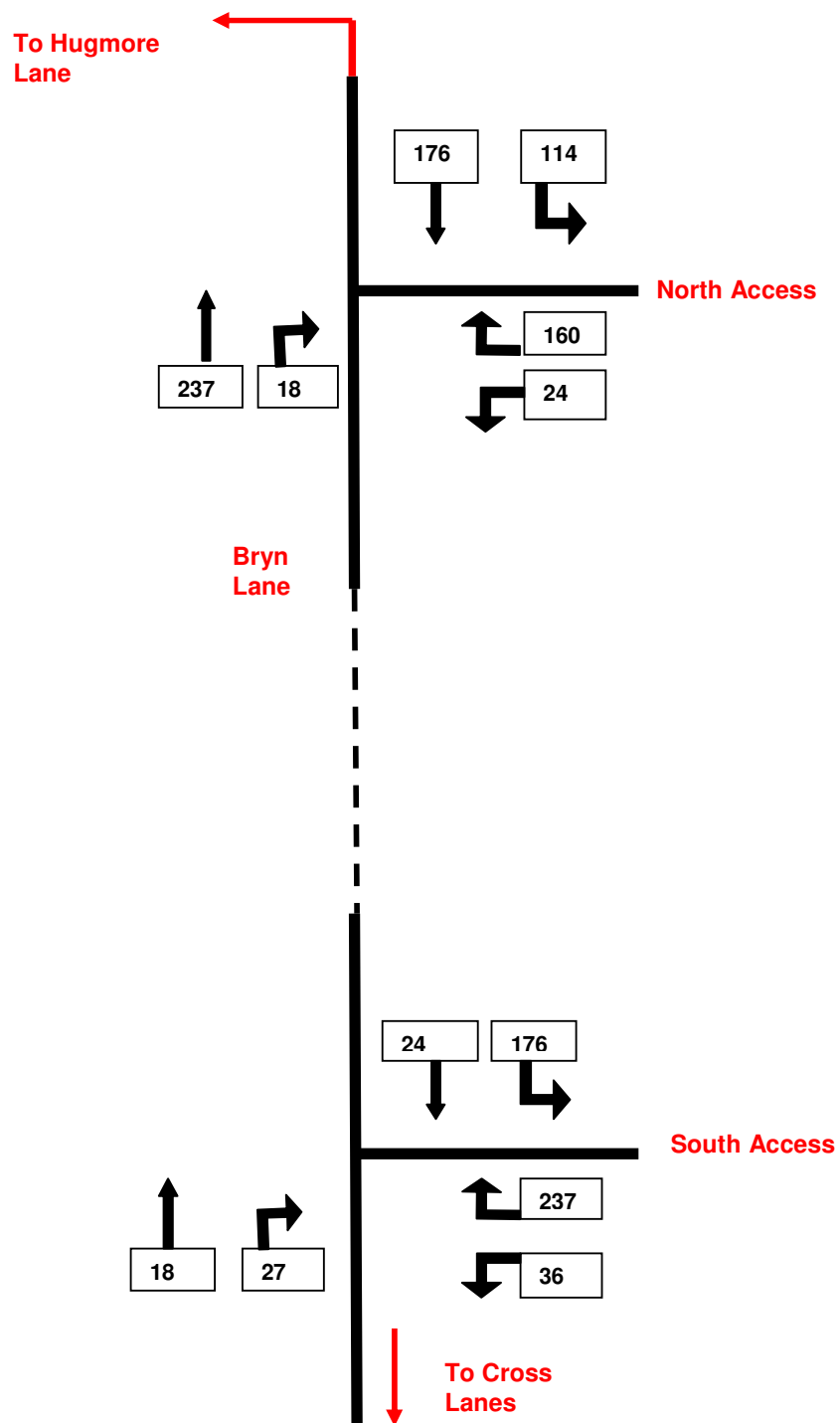


Figure 11
PM Development Traffic Flows
(Scenario 2)

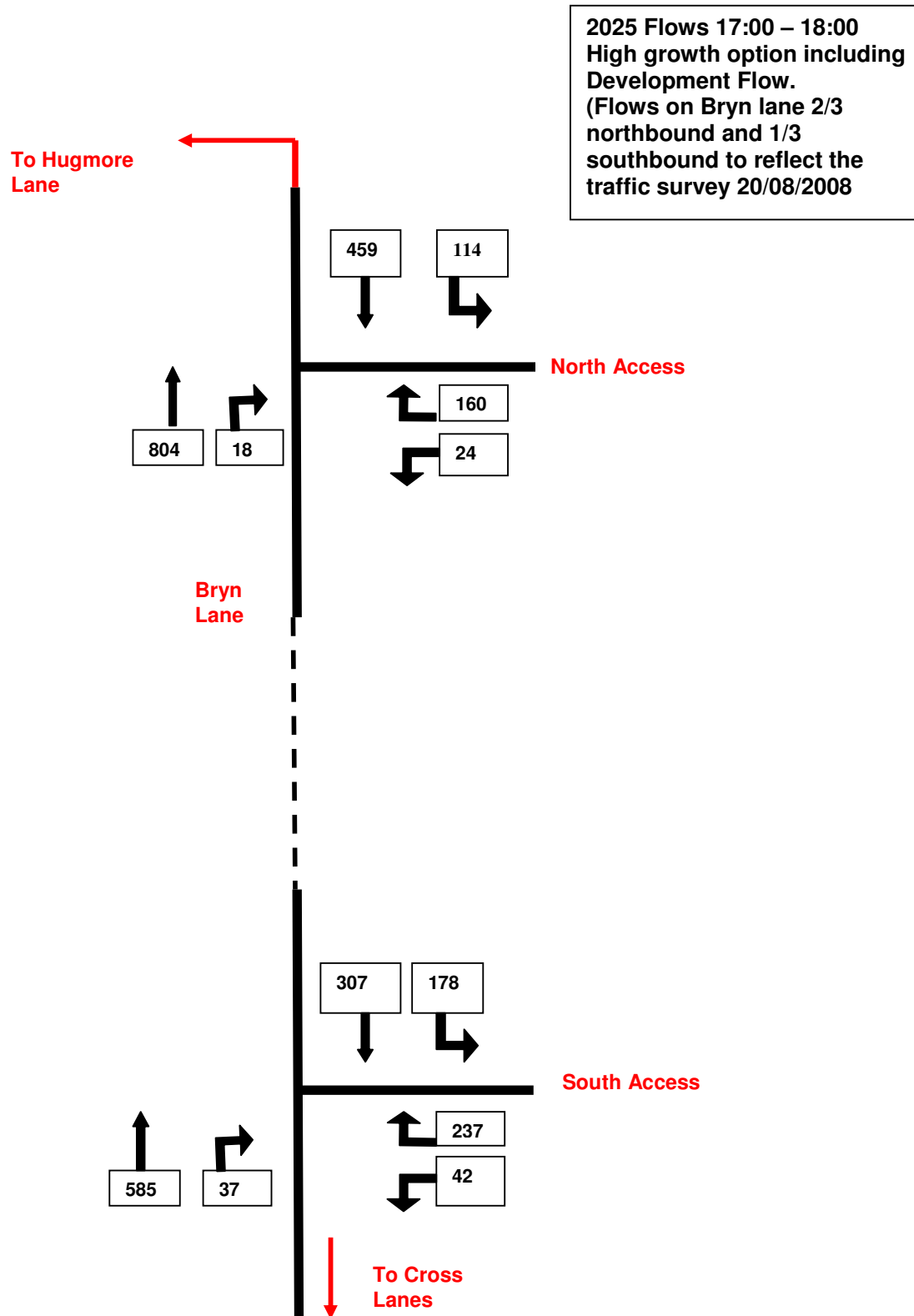
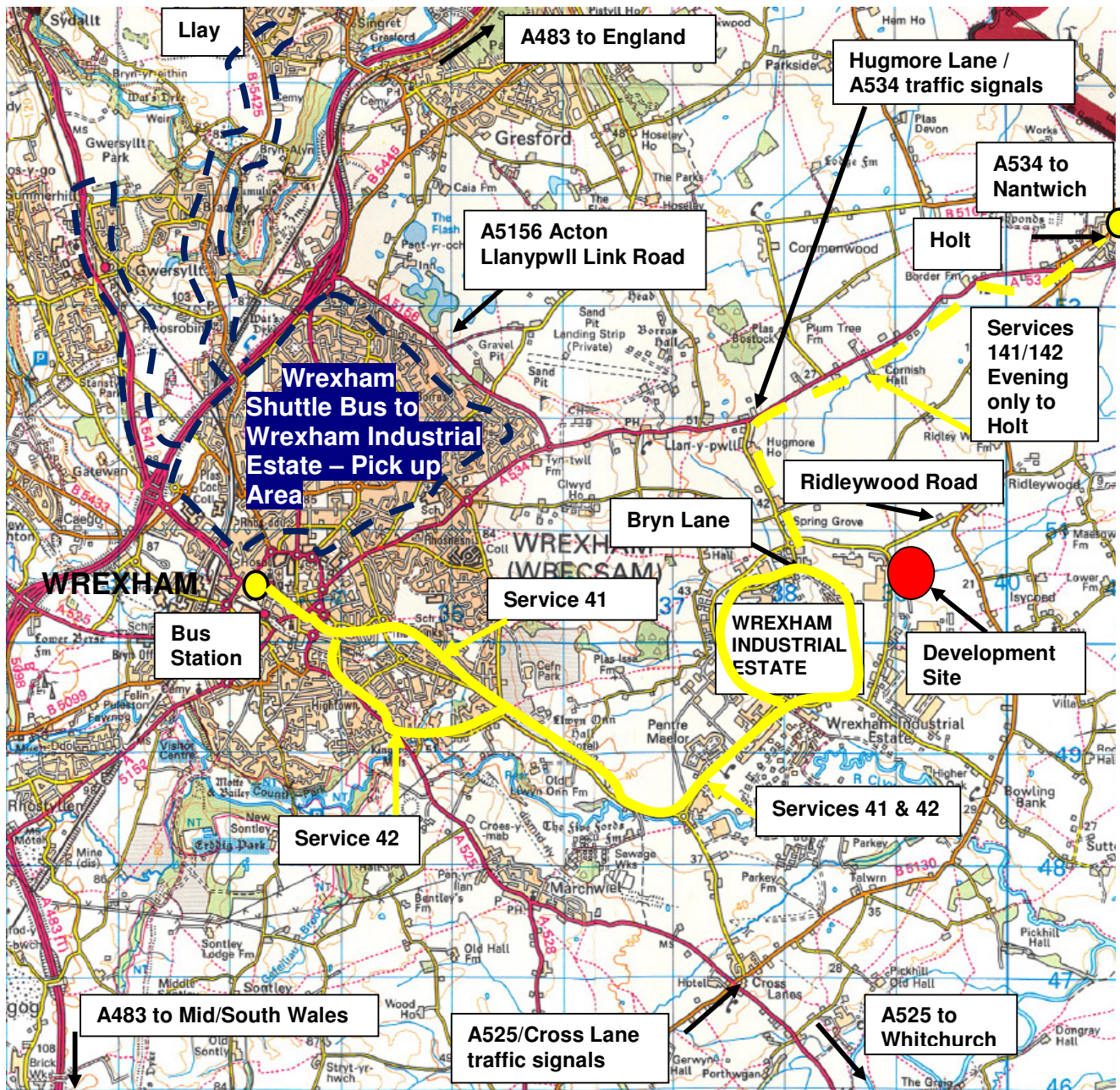


Figure 12
PM Total Traffic Flows 2025
(Scenario 2)



Not to Scale

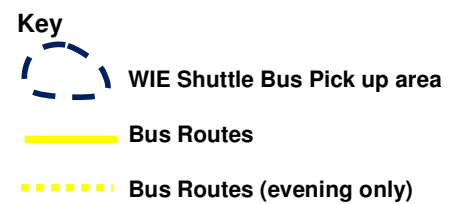


Figure 13
Bus Services

APPENDIX 1 – DRAFT TRAVEL PLAN

The following draft Travel Plan (TP) is proposed for Plot 3A.

An identical Travel Plan is proposed for Plot 1.

A similar Travel plan is proposed the TDG facility but in this case the Travel Plan will be coordinated with any existing Travel Plan operational at the site.

Draft Travel Plan for Plot 3A

Introduction

This TP seeks to reduce single occupancy car travel to the site and to promote more environmentally friendly alternatives, in accordance with national government policy, in particular PPG 13 and the requirements of Wrexham county Borough Council in the granting of planning permission.

Resources

- 1 A Travel Plan Coordinator (TPC) will be appointed. This will be a member of staff working on site in any event.
- 2 The TPC will:
 - Oversee the development and implementation of the TP including obtaining the commitment of senior management and the necessary financial resources to implement the TP
 - Arrange the collection of data as appropriate for monitoring the TP.
 - Act as the point of contact for staff requiring information
 - Arrange for all new employees to receive TP information prior to commencing employment.
 - Set up a Travel Plan Group (TPG) which will meet at a minimum of 6 monthly intervals and comprise:
 - The Site manager
 - Union representative(s)
 - Member(s) of staff with an interest in cycling or other environmental means of travel
 - Liaise with other Travel Plan Officers within the Estate and the council's travel plan officer at least annually
 - Provide a "TRAVEL" notice board at a prominent location where staff will pass on a daily basis. The notice board is to be approximately 1500mm wide and 1000mm high. The following information is to be displayed;
 - Name of the TPC together with a statement that he/she is available to answer and discuss any travel related issues.
 - Copy of the TP.
 - Copy of the Minutes of the most recent TPG meeting.
 - Plan of Wrexham showing walking and cycling routes and approximate journey times.
 - Plan showing the location of the nearest bus stops and timetable information.
 - Plan showing the location of Wrexham General and Wrexham Central Rail Stations.
 - List of useful telephone numbers, addresses and e-mail addresses, e.g. rail and bus enquires, cycle suppliers and repairers, cycling groups,
 - Car sharing information for the current scheme which is operated throughout the Industrial estate.
 - Special promotions as appropriate.

- 3 Showers will be available for all staff with lockable storage to keep cycling clothing, drying area for wet clothes and a hairdryer.
- 4 A travel plan induction leaflet will be prepared and regularly updated showing the information listed above and emphasising the health and financial benefits of walking and cycling
- 5 New staff will be offered cycle helmet and weatherproof reflective cycling outer clothing on condition that they cycle to work for a minimum of one month.
- 6 Following each TPG a newsletter will be circulated to all staff promoting sustainable travel and including a promotion, etc as applicable.
- 7 The TPC to be allocated a budget of £500 per annum for the promotion of sustainable travel together with an allowance to purchase cycle clothing to new employees.
- 8 TPC will strongly encourage car sharing. TPC will ensure the WIE Car Share Database is readily available to all staff. In the event of WIE car share scheme being withdrawn, on-site car share scheme will be introduced.
- 9 Car sharers to be guaranteed a lift home in an emergency.
- 10 Senior staff to require staff and encourage visitors to use rail services where applicable.
- 11 A staff survey is to be organised six months after the initial opening of the premises and yearly thereafter. The results are to be considered by the TPG.
- 12 Should Wrexham County Borough Council or the local bus operator decide to run a bus service along Bryn Lane that does not enter the north access road, then a provisional sum to a maximum of £5,000 shall be paid to WCBC for the provision of a footway to bus stops near the northern access.
- 13 The TPG will:
 - Consider a report prepared by the TPC as the first item at each meeting
 - Consider the results of staff travel surveys if applicable
 - Set dates for actions
 - Review progress on the TP
 - Develop future initiatives
 - Expand objectives and targets
 - Consider partnership arrangements e.g. Wrexham CBC, CTC, local bus operator
 - Produce an annual report to be submitted to Wrexham CBC and the Board Meeting of the Company detailing the progress of the TP
 - Within 5 working days of the meeting the TPC will produce minutes of the meeting and circulate to all TPG members, the site notice board and senior management.

APPENDIX 2 – PERSONAL INJURY TRAFFIC ACCIDENT DETAILS

Bryn Lane : Jan 2003 - Jun 2008

Area/LA	Reference	Severity	Day	Date	Time	Grid	Coords	Link/Veh2	Street			
WR 725	04WR1189	Slight	Thursday	08/07/2004	09:20	338509	350859					
Location: BRYN LANE. WREXHAM INDUSTRIAL ESTATE. 1st Rd: U 2nd Rd:												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedK	- Human	- Phy Fac	Special	Hazard		
40MPH	Single c'way	NotJCT	Light/no lights	Rain	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age
1	Car	No	Going ahead	W E	On main	Not at	Yes	None	None	Male	19	-
2	Car	No	Stop	W E	On main	Not at	No	None	None	Male	66	-
Cas	NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil		
1	2	Drv/Rider	Male	66	Slight	No	Not ped	Not ped	Not ped			
Description: VEH2 BRAKED IN ANTICIPATION TO PEDESTRIAN AT EDGE OF ROAD. VEH1 FAILED TO STOP IN TIME AND COLLIDED WITH REAR OF VEH2.												
User Information: 00 Contributory Factors: 37 39 63 00												
WR 725	04WR3007	Slight	Thursday	22/01/2004	09:00	338763	349454					
Location: JUNCTION OF BRYN ROAD AND OAK ROAD WREXHAM INDUSTRIAL ESTATE. 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedK	- Human	- Phy Fac	Special	Hazard		
60MPH	Single c'way	T/Stag Give	Light/with lights	Rain	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age
1	Car	No	Right turn	N W	On main	Junt appr	No	None	None	Male	51	-
2	Car	No	Going ahead	W E	On main	Junt appr	No	None	None	Male	75	-
Cas	NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil		
1	2	Drv/Rider	Male	75	Slight	No	Not ped	Not ped	Not ped			
Description: VEH1 APPROACHED JUNCTION ON RIGHT HAND SIDE AND TURNED INTO PATH OF ON COMING VEH2												
User Information: 00 Contributory Factors: 41 39 00 00												
725	07WR1039	Slight	Monday	05/02/2007	07:55	338765	349451					
Location: REDWITHER ROAD AT J/W BRYN LANE, WREXHAM IND EST. 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedK	- Human	- Phy Fac	Special	Hazard		
40MPH	Single c'way	T/Stag Give	Light/with lights	Fine	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age
1	Car	No	Start	SE NW	On main	Mid junction	No	None	None	Male	42	-
2	Car	No	Going ahead	NW SE	On main	Mid junction	No	None	None	Female	53	-
Cas	NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil		
1	2	Drv/Rider	Female	53	Slight	No	Not ped	Not ped	Not ped			
Description: VEH 1 ON REDWITHER ROAD TRAV TOWARDS JNC WITH BRYN LANE. VEH 2 IN OPPOSITE DIRECTION GOING STRAIGHT AHEAD. AS VEH 2 PASSES JNC. VEH 1 TURNS RIGHT INTO THE PATH OF VEH 2.												
User Information: 405 602 402 302												
725	08WR1050	Slight	Tuesday	05/02/2008	14:25	338770	349452					
Location: OAK ROAD AT J/W BRYN LANE, WREXHAM 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedK	- Human	- Phy Fac	Special	Hazard		
40MPH	Single c'way	T/Stag Give	Light/with lights	Fine	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj in	Left cway	Hit obj off	Sex	Age
1	Other M.veh	No	Right turn	N W	On main	Enter main	No	None	None	Male	18	-
2	Car	No	Going ahead	W E	On main	Junt appr	No	None	None	Male	40	-
Cas	NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil		
1	1	Drv/Rider	Male	18	Slight	No	Not ped	Not ped	Not ped			
2	2	Drv/Rider	Male	40	Slight	No	Not ped	Not ped	Not ped			
Description: VEH1 PULLS OUT OF 'T' JUNCTION INTO PATH OF ONCOMING VEH2 AND COLLIDES WITH SAME.												
User Information: 302 406												

Area L/A	Reference	Severity	Day	Date	Time	Grid	Coords	Link/Node	Street			
725	07WR3064	Slight	Thursday	06/09/2007	18:26	338838/350842						
Location: BRYN LANE, NORTH OF KELLOGS, WREXHAM 1st Rd: U 2nd Rd:												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX	- Human	- Phy	Fac Special	Hazard		
40MPH	Single c'way	NotJCT	Light/with lights	Fine	Dry	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj	in Left cway	Hit obj off Sex	Age	
1	Goods > 7.5t	Art	Lt hand ben	W E	On main	Not at	No	None	None	Male	38	
2	Car	No	Rt hand ben	E W	On main	Not at	Yes	None	None	Male	53	
Cas NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Male	53	Slight	No	Not ped	Not ped	Not ped			
Description: VEH1 CAME OUT OF KELLOGS IND EST ONTO WRONG SIDE OF ROAD. TRAVELLED APPROX 600M AND COLLIDED WITH ON COMING VEH2 ON LEFT HAND BEND. DRIVER OF VEH1 IS FOREIGN NATIONAL.												
User Information: Contributory Factors: 999 403												
725	05WR1094	Slight	Thursday	07/04/2005	08:20	338894/350825						
Location: U/C BRYN LANE AT JUNCTION WITH U/C OAK ROAD, WREXHAM. 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX	- Human	- Phy	Fac Special	Hazard		
40MPH	Single c'way	T/Stag Give	Light/with lights	Rain	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj	in Left cway	Hit obj off Sex	Age	
1	Car	No	Right turn	N W	On main	Mid junction	No	None	None	Female	23	
2	Other M.veh	No	Going ahead	W E	On main	Junt appr	No	None	None	Male	48	
Cas NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Male	48	Slight	No	Not ped	Not ped	Not ped			
Description: V1 WAS TRAVELLING ALONG BRYN LANE TOWARDS JUNCT OF OAK ROAD. V1 HAS THEN PULLED OUT OF THE JUNCTION INTO OAK ROAD WHERE V2 COLLIDED WITH IT.												
User Information: Contributory Factors: 401 302												
WR 725	04WR3174	Slight	Wednesday	22/12/2004	10:00	338952/349991						
Location: BRYN LANE, WREXHAM IND EST. OUTSIDE AMENITY SITE. 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX	- Human	- Phy	Fac Special	Hazard		
40MPH	Single c'way	T/Stag Give	Light/with lights	Rain	Wet	None	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj	in Left cway	Hit obj off Sex	Age	
1	Car	No	Right turn	W S	On main	Enter main	No	None	None	Male	42	
2	Car	No	Going ahead	S N	On main	Junt cleared	No	None	None	Male	51	
Cas NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	1	Drv/Rider	Male	42	Slight	No	Not ped	Not ped	Not ped			
2	1	Passenger	Male	12	Slight	Front	Not ped	Not ped	Not ped			
Description: DRIVER OF VEH1 PULLS OVER TO NEARSIDE TO ANSWER PHONE. VEH1 THEN PULLS OUT TO RESUME JOURNEY INTO PATH OF ONCOMING VEH2. OFFSIDE OF VEH1 THEN COLLIDES WITH NEARSIDE OF VEH2.												
User Information: 00 Contributory Factors: 41 00 00 00												
WR 725	03WR3093	Slight	Thursday	31/07/2003	17:00	338963/350349						
Location: OUTSIDE KELLOGS ON WREXHAM IND EST RING ROAD 1st Rd: U 2nd Rd: U												
Speed	C'Way	Jct Det/Ctrl	Lighting	Weather	Rd Surf	PedX	- Human	- Phy	Fac Special	Hazard		
30MPH	Single c'way	Priv	Give	Light/no lights	Fine	Dry	None	None	None	None		
Veh	Vehicle type	Towing	Manoeuvre	Dir	Veh loc	Junct. loc	Skidding	Hit obj	in Left cway	Hit obj off Sex	Age	
1	Goods > 7.5t	Art	Right turn	N W	On main	Junt cleared	No	None	None	Male	42	
2	Car	No	Going ahead	S N	On main	Junt cleared	Yes	None	Offside	None	Male	56
Cas NoVeh ref	Cas Class	Sex	Age	Severity	Car Pass	Ped Direction	Ped Movement	Ped location	School Pupil			
1	2	Drv/Rider	Male	56	Slight	No	Not ped	Not ped	Not ped			
Description: VEH1 TURNING RIGHT CUT ACROSS PATH OF ON COMING VEH2 WHICH WAS TRAVELLING IN OPPOSITE DIRECTION.												
User Information: 00 Contributory Factors: 01 41 39 00												

APPENDIX 3 - SITE ACCESS (SOUTH) 2025 PM PEAK HOUR (Scenario 2)

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

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Run with file:-
"y:\Projects\PCD 20145 Wrexham Industrial Estate\Wrexham Industrial Estate Bryn Road South
Access.vpi"
at 09:19:44 on Thursday, 4 September 2008

RUN TITLE

Wrexham Industrial Estate Bryn Road South Access

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY *****

INPUT DATA

MAJOR ROAD (ARM C) ----- MAJOR ROAD (ARM A)
I
I
I
I
I
I
MINOR ROAD (ARM B)

ARM A IS Bryn Road North
ARM B IS Site Southern Entrance
ARM C IS Bryn Road South

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

.GEOMETRIC DATA -----

I	DATA ITEM	I	MINOR ROAD B	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I (W)	7.30 M.	I
I	CENTRAL RESERVE WIDTH	I (WCR)	0.00 M.	I
I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I (WC-B)	3.70 M.	I
I	- VISIBILITY	I (VC-B)	100.0 M.	I
I	- BLOCKS TRAFFIC	I	NO	I
I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I (VB-C)	120.0 M.	I
I	- VISIBILITY TO RIGHT	I (VB-A)	215.0 M.	I
I	- LANE 1 WIDTH	I (WB-C)	-	I
I	- LANE 2 WIDTH	I (WB-A)	-	I
I	- WIDTH AT 0 M FROM JUNC.	I	10.00 M.	I

.TRAFFIC DEMAND DATA

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I	I	I	NUMBER OF	MINUTES FROM START WHEN	I	RATE OF FLOW (VEH/MIN)	I			
I	ARM	I	FLOW STARTS	I TOP OF PEAK	I FLOW STOPS	I BEFORE	I AT TOP	I AFTER	I	
I		I	TO RISE	I IS REACHED	I FALLING	I PEAK	I OF PEAK	I PEAK	I	
I	ARM A	I	15.00	I	45.00	I	6.06	I	6.06	I
I	ARM B	I	15.00	I	45.00	I	3.49	I	5.23	I
I	ARM C	I	15.00	I	45.00	I	7.78	I	11.66	I

		TURNING PROPORTIONS					
		TURNING COUNTS (VEH/HR)					
		(PERCENTAGE OF H.V.S)					
TIME		FROM/TO	ARM A	ARM B	ARM C		
16.45 - 18.15							
	ARM A	0.000	0.367	0.633			
		0.0	178.0	307.0			
		(0.0)	(20.0)	(20.0)			
	ARM B	0.849	0.000	0.151			
		237.0	0.0	42.0			
		(20.0)	(0.0)	(20.0)			
	ARM C	0.941	0.059	0.000			
		585.0	37.0	0.0			
		(20.0)	(20.0)	(0.0)			

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
B-C	0.53	8.14	0.065		0.0	0.1	1.0	
B-A	2.96	6.89	0.430		0.0	0.7	10.2	
C-A	7.31							
C-B	0.46	8.58	0.054		0.0	0.1	0.8	
A-B	2.22							
A-C	3.84							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
			MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY		
MARGINAL	LANE WIDTH	WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT		
CHANGE:	(.1M)	(.1M)	(.1M)	(.1M)	(M)	(M)		
B-C	0.099	0.007				0.008		
B-A	0.072	0.017		0.027	0.005	0.007		
C-B	0.096	0.009			0.009			

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
B-C	0.63	7.11	0.088		0.1	0.1	1.4	
B-A	3.54	6.28	0.563		0.7	1.2	17.0	
C-A	8.73							
C-B	0.55	8.26	0.067		0.1	0.1	1.0	
A-B	2.66							
A-C	4.58							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.092	0.008			0.008			
B-A	0.066	0.021	0.027	0.005	0.006			
C-B	0.093	0.011		0.009				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
B-C	0.77	4.36	0.176		0.1	0.2	3.0	
B-A	4.33	5.44	0.796		1.2	3.2	39.5	
C-A	10.69							
C-B	0.68	7.83	0.086		0.1	0.1	1.4	
A-B	3.25							
A-C	5.61							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.083	0.009			0.007			
B-A	0.057	0.025	0.027	0.004	0.005			
C-B	0.088	0.013		0.009				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
B-C	0.77	4.01	0.192		0.2	0.2	3.4	
B-A	4.33	5.44	0.797		3.2	3.5	50.1	
C-A	10.69							
C-B	0.68	7.83	0.086		0.1	0.1	1.4	
A-B	3.25							
A-C	5.61							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.082	0.009			0.007			
B-A	0.057	0.025	0.027	0.004	0.005			
C-B	0.088	0.013		0.009				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
B-C	0.63	6.89	0.091		0.2	0.1	1.6	
B-A	3.54	6.28	0.563		3.5	1.4	23.3	
C-A	8.73							
C-B	0.55	8.26	0.067		0.1	0.1	1.1	
A-B	2.66							
A-C	4.58							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:						
	MARGINAL	LANE WIDTH	MAJOR RD. WIDTH	CENT RES WIDTH	VIS TO LEFT (AHEAD FOR MAJOR)	VISIBILITY TO RIGHT
	CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)
	B-C	0.092	0.007			0.008
	B-A	0.066	0.021	0.027	0.005	0.006
	C-B	0.093	0.011		0.009	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
B-C	0.53	8.07	0.065		0.1	0.1	1.1	
B-A	2.96	6.89	0.430		1.4	0.8	12.4	
C-A	7.31							
C-B	0.46	8.58	0.054		0.1	0.1	0.9	
A-B	2.22							
A-C	3.84							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:						
	MARGINAL	LANE WIDTH	MAJOR RD. WIDTH	CENT RES WIDTH	VIS TO LEFT (AHEAD FOR MAJOR)	VISIBILITY TO RIGHT
	CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)
	B-C	0.099	0.007			0.008
	B-A	0.072	0.017	0.027	0.005	0.007
	C-B	0.096	0.009		0.009	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.2
17.45	0.2
18.00	0.1
18.15	0.1

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.7	*
17.15	1.2	*
17.30	3.2	***
17.45	3.5	***
18.00	1.4	*
18.15	0.8	*

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.1

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING * DELAY	* INCLUSIVE QUEUEING * DELAY
	(VEH)	(VEH/H)	(MIN)
B-C	57.6	38.4	11.4
B-A	325.0	216.7	152.6

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===== end of file
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APPENDIX 4 - SITE ACCESS (NORTH) 2025 PM PEAK HOUR (Scenario 2)

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CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 4.1 ANALYSIS PROGRAM
RELEASE 3.0 (MAR 2001)

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Run with file:-
"y:\Projects\PCD 20145 Wrexham Industrial Estate\Wrexham Industrial Estate Bryn Road North
Access.vpi"
at 10:56:38 on Thursday, 4 September 2008

RUN TITLE

Wrexham Industrial Estate Bryn Road North Access

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY *****

INPUT DATA

MAJOR ROAD (ARM C) ----- MAJOR ROAD (ARM A)
I
I
I
I
I
I
MINOR ROAD (ARM B)

ARM A IS Bryn Road North
ARM B IS Site Northern Entrance
ARM C IS Bryn Road South

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

.GEOMETRIC DATA -----

I	DATA ITEM	I	MINOR ROAD B	I
I	TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	I (W)	7.30 M.	I
I	CENTRAL RESERVE WIDTH	I (WCR)	0.00 M.	I
I		I		I
I	MAJOR ROAD RIGHT TURN - WIDTH	I (WC-B)	3.70 M.	I
I	- VISIBILITY	I (VC-B)	100.0 M.	I
I	- BLOCKS TRAFFIC	I	NO	I
I		I		I
I	MINOR ROAD - VISIBILITY TO LEFT	I (VB-C)	215.0 M.	I
I	- VISIBILITY TO RIGHT	I (VB-A)	125.0 M.	I
I	- LANE 1 WIDTH	I (WB-C)	-	I
I	- LANE 2 WIDTH	I (WB-A)	-	I
I	- WIDTH AT 0 M FROM JUNC.	I	10.00 M.	I

.TRAFFIC DEMAND DATA

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

I		I	NUMBER OF	I	MINUTES FROM START WHEN	I	RATE OF FLOW (VEH/MIN)	I		I				
I	ARM	I	FLOW STARTS	I	TOP OF PEAK	I	FLOW STOPS	I	BEFORE	I	AT TOP	I	AFTER	I
I		I	TO RISE	I	IS REACHED	I	FALLING	I	PEAK	I	OF PEAK	I	PEAK	I
I	ARM A	I	15.00	I	45.00	I	75.00	I	7.16	I	10.74	I	7.16	I
I	ARM B	I	15.00	I	45.00	I	75.00	I	2.30	I	3.45	I	2.30	I
I	ARM C	I	15.00	I	45.00	I	75.00	I	10.27	I	15.41	I	10.27	I

		TURNING PROPORTIONS					
		TURNING COUNTS (VEH/HR)					
		(PERCENTAGE OF H.V.S)					
TIME		FROM/TO	ARM A	ARM B	ARM C		
16.45 - 18.15							
	ARM A	0.000	0.199	0.801			
		0.0	114.0	459.0			
		(0.0)	(20.0)	(20.0)			
	ARM B	0.870	0.000	0.130			
		160.0	0.0	24.0			
		(20.0)	(0.0)	(20.0)			
	ARM C	0.978	0.022	0.000			
		804.0	18.0	0.0			
		(20.0)	(20.0)	(0.0)			

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
16.45-17.00								
B-C	0.30	7.50	0.040		0.0	0.0	0.6	
B-A	2.00	5.75	0.348		0.0	0.5	7.2	
C-A	10.05							
C-B	0.22	8.28	0.027		0.0	0.0	0.4	
A-B	1.42							
A-C	5.74							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
			MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY		
MARGINAL	LANE WIDTH	WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT		
CHANGE:	(.1M)	(.1M)	(.1M)	(.1M)	(M)	(M)		
B-C	0.089	0.008				0.008		
B-A	0.061	0.022		0.026	0.004	0.006		
C-B	0.093	0.011			0.009			

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.00-17.15								
B-C	0.36	6.68	0.054		0.0	0.1	0.8	
B-A	2.39	4.99	0.478		0.5	0.9	12.2	
C-A	12.00							
C-B	0.27	7.91	0.034		0.0	0.0	0.5	
A-B	1.70							
A-C	6.85							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.083	0.010			0.008			
B-A	0.053	0.026	0.026	0.003	0.005			
C-B	0.089	0.013		0.009				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.15-17.30								
B-C	0.44	4.30	0.102		0.1	0.1	1.6	
B-A	2.92	3.94	0.742		0.9	2.4	29.8	
C-A	14.70							
C-B	0.33	7.39	0.045		0.0	0.0	0.7	
A-B	2.08							
A-C	8.39							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.072	0.011			0.007			
B-A	0.042	0.032	0.026	0.003	0.004			
C-B	0.083	0.016		0.008				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.30-17.45								
B-C	0.44	4.01	0.109		0.1	0.1	1.8	
B-A	2.92	3.94	0.742		2.4	2.6	37.4	
C-A	14.70							
C-B	0.33	7.39	0.045		0.0	0.0	0.7	
A-B	2.08							
A-C	8.39							
EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:								
		MAJOR RD.	CENT RES	VIS TO LEFT	VISIBILITY			
MARGINAL	LANE WIDTH	WIDTH	WIDTH	(AHEAD FOR MAJOR)	TO RIGHT			
CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)			
B-C	0.071	0.011			0.007			
B-A	0.042	0.032	0.026	0.003	0.004			
C-B	0.083	0.016		0.008				

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
17.45-18.00								
B-C	0.36	6.54	0.055		0.1	0.1	0.9	
B-A	2.39	4.99	0.478		2.6	1.0	16.4	
C-A	12.00							
C-B	0.27	7.91	0.034		0.0	0.0	0.5	
A-B	1.70							
A-C	6.85							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:						
	MARGINAL	LANE WIDTH	MAJOR RD. WIDTH	CENT RES WIDTH	VIS TO LEFT (AHEAD FOR MAJOR)	VISIBILITY TO RIGHT
	CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)
	B-C	0.082	0.010			0.007
	B-A	0.053	0.026	0.026	0.003	0.005
	C-B	0.089	0.013		0.009	

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)
18.00-18.15								
B-C	0.30	7.46	0.040		0.1	0.0	0.7	
B-A	2.00	5.75	0.348		1.0	0.5	8.7	
C-A	10.05							
C-B	0.22	8.28	0.027		0.0	0.0	0.4	
A-B	1.42							
A-C	5.74							

EFFECT ON CAPACITY (PCU/MIN) OF MARGINAL CHANGES IN:						
	MARGINAL	LANE WIDTH	MAJOR RD. WIDTH	CENT RES WIDTH	VIS TO LEFT (AHEAD FOR MAJOR)	VISIBILITY TO RIGHT
	CHANGE:	(.1M)	(.1M)	(.1M)	(M)	(M)
	B-C	0.089	0.008			0.008
	B-A	0.061	0.022	0.026	0.004	0.006
	C-B	0.093	0.011		0.009	

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1
18.15	0.0

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE	
17.00	0.5	*
17.15	0.9	*
17.30	2.4	**
17.45	2.6	***
18.00	1.0	*
18.15	0.5	*

QUEUE FOR STREAM C-B

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0
18.15	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND	* QUEUEING * DELAY	* INCLUSIVE QUEUEING * DELAY
	(VEH)	(VEH/H)	(MIN)
B-C	32.9	21.9	6.4
B-A	219.4	146.3	111.8

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APPENDIX 5 – BUS SERVICES

41 WREXHAM - WREXHAM INDUSTRIAL ESTATE - WREXHAM GHA COACHES

Smithfield - The Queensway - Pentre Maelor

Monday to Saturday except Bank Holidays

Llun I Sadwrn heblaw Gwyliau Cyhoeddus

Wrexham Bus Station(St2)	5:30	6:30	7:30	7:50	8:20		:20	16:20	....	17:20
Brook Street	5:32	6:32	7:32	7:52	8:22		:22	16:22	....	17:22
High Street	5:34	6:34	7:34	7:54	8:24	then	:24	16:24	....	17:24
Bernard Road	5:37	6:37	7:37	7:57	8:27		:27	16:27	....	17:27
The Queensway	5:42	6:42	7:42	8:02	8:32	at	:32	16:32	....	17:32
Pentre Maelor	5:47	6:47	7:47	8:07	8:37		:37	16:37	....	17:37
Redwither Tower (arr.)	5:50	6:50	7:50	8:10	8:40	these	:40	until	16:40	 17:40
Redwither Tower (dep.)	6:06	7:06	7:50	....	8:40		:40	16:40	17:15	....
Ash Road	6:08	7:08	7:53	....	8:43	mins	:43	16:43	17:18	....
Coed Aben Road	6:10	7:10	7:56	....	8:46		:46	16:46	17:21	....
Pentre Maelor	6:12	7:12	7:59	....	8:49	past	:49	16:49	17:24	....
The Queensway	6:17	7:17	8:04	....	8:54		:54	16:54	17:29	....
Bernard Road	6:22	7:22	8:09	....	8:59	hour	:59	16:59	17:34	....
High Street	6:25	7:25	8:12	....	9:02		:02	17:02	17:37	....
Wrexham Bus Station	6:29	7:29	8:16	....	9:06		:06	17:06	17:41	....

42 WREXHAM - WREXHAM INDUSTRIAL ESTATE - WREXHAM GHA COACHES

Stockwell Grove - Monger Road - Kings Mills - Pentre Gwyn - Pentre Maelor

Monday to Saturday except Bank Holidays

Llun I Sadwrn heblaw Gwyliau Cyhoeddus

Wrexham Bus Station(St2)	....	8:50	9:50		:50	15:50	16:50	17:50
Brook Street	....	8:52	9:52		:52	15:52	16:52	17:52
High Street	....	8:54	9:54	then	:54	15:54	16:54	17:54
Stockwell Grove	....	8:59	9:59		:59	15:59	16:59	17:59
Hightown Kwiksav	....	9:02	10:02	at	:02	16:02	17:02	18:02
Hightown Monger Road	....	9:04	10:04		:04	16:04	17:04	18:04
Kings Mills	....	9:05	10:05	these	:05	16:05	17:05	18:05
Pentre Gwyn	....	9:07	10:07		:07	16:07	17:07	18:07
Pentre Maelor	....	9:12	10:12	mins	:12	16:12	17:12	18:12
Redwither Tower	8:10	9:15	10:15		:15	until	16:15	....
Ash Road	8:13	9:18	10:18		:18	16:18	....	....
Coed Aben Road	8:16	9:21	10:21	past	:21	16:21	....	....
Pentre Maelor	8:19	9:24	10:24		:24	16:24	....	....
Pentre Gwyn	8:23	9:28	10:28	each	:28	16:28	....	....
Kings Mills	8:24	9:29	10:29		:29	16:29	....	....
Hightown Monger Road	8:26	9:31	10:31	hour	:31	16:31	....	....
Hightown Kwiksav	8:29	9:34	10:34		:34	16:34	....	....
Stockwell Grove	8:33	9:38	10:38		:38	16:38	....	....
High Street	8:37	9:42	10:42		:42	16:42	....	....
Wrexham Bus Station	8:41	9:46	10:46		:46	16:46	....	....

141 WREXHAM - WREXHAM INDUSTRIAL ESTATE - (HOLT)

GHA COACHES

Smithfield - The Queensway - Pentre Maelor

142 WREXHAM - WREXHAM INDUSTRIAL ESTATE - (HOLT)

GHA COACHES

Hullah Lane - The Queensway - Pentre Maelor

Monday to Saturday except Bank Holidays

Llun I Sadwrn heblaw Gwyliau Cyhoeddus

	141	142	141	141	142	141	142
Wrexham Bus Station (St2)	.....	.....	18:45	19:40	20:25	21:25	22:25
Brook Street	.....	.....	18:47	19:42	20:27	21:27	22:27
High Street	.....	.....	18:48	19:43	20:28	21:28	22:28
Smithfield Road	.....	.....	18:52	19:47	.....	21:32	.....
Hullah Lane	.....	.....	.....	.....	20:35	.....	22:35
The Queensway	.....	.....	18:55	19:50	20:41	21:35	22:41
Pentre Maelor	.....	.....	19:00	19:55	20:46	21:40	22:46
Redwither Tower	.....	.....	19:05	20:00	20:51	21:45	22:51
<i>Holt</i>	.....	.....	<i>19:15</i>	.....	<i>21:05</i>	.....	<i>23:01</i>
Redwither Tower	17:43	18:18	19:25	20:05	21:15	22:15	.....
Pentre Maelor	17:48	18:23	19:30	20:10	21:20	22:20	.....
The Queensway	17:53	18:28	19:35	20:16	0.8924	22:25	.....
Hullah Lane	.....	18:34	.....	20:22	.....	22:31	.....
Smithfield Road	17:56	.....	19:38	.....	21:28	.....	.....
High Street	17:59	18:40	19:41	20:28	21:31	22:37	.....
Wrexham Bus Station	18:03	18:44	19:45	20:32	21:35	22:41	.....

