



TRANSPORT ASSESSMENT

Wrexham Industrial Estate – The Oaks
Wrexham, Clwyd

Client: Cefn Park Development Ltd



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1 INTRODUCTION

1.1 Purpose of Report

- 1.1.1 This Transport Assessment (TA) considers the highways and transportation implications associated with the outline planning application for 7 development plots with associated parking, within Wrexham Industrial Estate (WIE). **Table 1.1** below details the development split in terms of B1/B8 land use within the development site.

Table 1.1 – Original Development Split and Proposed Development Split

Original Development Split	Proposed Development Split
<i>Plot 1 B1 - 4000sqm GFA</i>	Plot 1 B1 - 4000sqm GFA
<i>Plot 2 B1 – 5000sqm GFA</i>	Plot 2 B1 – 5000sqm GFA
<i>Plot 3 B8 – 3150sqm GFA</i>	Plot 3 B8 – 2700sqm GFA
<i>Plot 4 B8 – 4700sqm GFA</i>	Plot 4 B8 – 4800sqm GFA
<i>Plot 5 B8 - 3200sqm GFA</i>	Plot 5 B8 - 2400sqm GFA
<i>Plot 6 B8 – 3150sqm GFA</i>	Plot 6 B8 – 2700sqm GFA
<i>Plot 7 B1 – 5000sqm GFA</i>	Plot 7 B1 – 5000sqm GFA

- 1.1.2 The above development split has been derived following pre application consultation with Wrexham County Borough Council (WCBC). The originally proposed, and now redundant, development split can be seen highlighted in red italics. As seen, the proposal for the development has reduced in overall size by 1600sqm following pre application consultation with WCBC. This change, and how it has affected the highway assessment is detailed further within **Section 4** and **Section 6** of this report.
- 1.1.3 WIE currently accommodates in the region of 300 companies, which combined employ approximately 8000 people. The estate is the largest employment site in Wales, the second largest in the UK and as a result is one of the largest in Europe.
- 1.1.4 WCBC is the Local Highway Authority and the Local Planning Authority (LPA) for the area. Prime Transport Planning ('Prime') has produced this TA on behalf of the applicant, Cefn Park Developments Ltd.
- 1.1.5 The document has been prepared in accordance with the UK Government's Planning Practice Guidance: Transport Evidence Bases in Plan Making (October 2014) and Travel Plans, Transport Statements and Statements in Decision-Taking (March 2014) as well as the Department for Transport's (DfT) Guidance on Transport Statement (GTA) (March 2007). It considers the accessibility of the site and safety for all modes of travel with an emphasis on walking, cycling and public transport, while assessing the potential impact on the highway network.

- 1.1.6 The conclusions and recommendations contained herein have been drawn based on information available and obtained in advance of the planning submission to which this report relates.
- 1.1.7 Reasonable checks have been carried out on any third-party information used in the preparation of this report but, nonetheless, Prime accepts no liability for the accuracy or otherwise of this data.
- 1.1.8 Third-party rights are excluded for the use of information contained within this report.

1.2 Scope of Report

- 1.2.1 As stated above this document has been prepared in accordance with DfT GTA which, it is noted, was withdrawn from circulation on the 22nd October 2014. The www.gov.uk website states that the document has been archived and superseded by 'Transport Evidence Bases in Plan Making.'
- 1.2.2 The new document is not a like-for-like replacement for GTA, providing no guidance on the production of Transport Assessments to accompany developments. The latest guidance instead helps local planning authorities assess strategic transport needs to reflect and, where appropriate, mitigate these in their Local Plan.
- 1.2.3 More relevant information is provided within the PPG under 'Travel Plans, Transport Statements and Statements in Decision-Taking' however this also does not provide the level of detailed guidance that was contained within DfT's GTA. This report therefore follows the generally accepted structure and methodology that GTA suggested.
- 1.2.4 An e-mail based scoping exercise has been undertaken with WCBC, and an initial scoping note highlighting the proposed methodology was submitted to the highway's officers at WCBC on 6th February 2019. A verbal response was then received on the 8th February 2019 via a phone call. The scoping note is contained in **Appendix A**. Further comments were received from the highway's officers at WCBC in September 2019 through pre application consultation. This report is similarly included within **Appendix A**, with comments made addressed where appropriate within the report.
- 1.2.5 The remainder of this report is structured as follows:
- **Section 2** describes the relevant local and national transport policy and guidance;
 - **Section 3** describes the existing situation in terms of the site, local highway network and traffic conditions whilst also reviewing the five-year accident records for the local highway network;
 - **Section 4** details the development proposal including the access strategy and parking arrangements;
 - **Section 5** details access to the site by sustainable modes of travel which includes walking, cycling and public transport;

- **Section 6** describes the impact of the proposed development on the surrounding transportation network;
- **Section 7** Addresses the main comments made through pre application consultation; and
- **Section 8** – Summarises and concludes the findings of the report.

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2 TRANSPORT POLICY AND GUIDANCE

2.1 Introduction

- 2.1.1 It is important that any new developments conform to and compliment national and local planning policy. This section details the policies that are relevant to this development.

2.2 Planning Policy Wales

- 2.2.1 The document Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government and is supported by a series of Technical Advice Notes (TANs). The most recent version of PPW is Edition 10, published in November 2018.

- 2.2.2 Transport is considered in Chapter 3, Chapter 4 and Chapter 5 of PPW. The document sets out a primary objective *‘to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales’*

- 2.2.3 Chapter 3 outlines the importance of strategic placemaking, with early decisions having the greatest impact on contributing towards a sustainable development. The chapter continues to state:

‘Good design is about avoiding the creation of car-based developments. It contributes to minimising the need to travel and reliance on the car, whilst maximising opportunities for people to make sustainable and healthy travel choices’

- 2.2.4 The chapter addresses placing making within rural areas, with it being acknowledged that for rural areas *‘opportunities for reducing car use and increasing walking, cycling and use of public transport are more limited than in urban areas’*.

- 2.2.5 Chapter 4 highlights the importance of cohesive communities, with such considerations through placemaking contributing towards a *‘prosperous’* and *‘resilient’* Wales. The chapter discusses transport in detail, with the need for the people to access jobs and services through *‘shorter, more efficient and sustainable journeys, by walking, cycling and public transport’*.

- 2.2.6 Chapter 4 also addresses the following:

- Integrated planning and transport strategies;
- Sustainable transport and reduction in private car reliance;
- Active/social streets designed to be publicly orientated;
- Active travel and the encouragement of walking/cycling;
- Public transport and its availability;
- The encouragement of ultra-low emission vehicles;

- Traffic management and improved forecasting; and
- The availability of car parking.

2.2.7 Chapter 5 discusses the economic components of placemaking and the creation of ‘*productive and enterprising places*’. The chapter continues to state that such enterprising places are ‘*designed and sited to promote healthy lifestyles*’ with this being done by making them ‘*easy to walk and cycle to and around*’, and easy to access by public transport.

2.2.8 Transport infrastructure is discussed in detail, with the importance of such infrastructure towards sustainable development stated below:

‘The provision of sustainable transport infrastructure is essential in order to build prosperity, tackle climate change, reduce airborne pollution and to improve the social, economic, environmental and cultural well-being of Wales. The planning system should facilitate the delivery, decarbonisation and improvement of transport infrastructure in a way which reduces the need to travel, particularly by private vehicles, and facilitates and increases the use of active and sustainable transport’

2.2.9 Accordingly, this TA has been structured to include an assessment of accessibility by sustainable modes including walking, cycling and public transport, road safety and the impacts of the development on the local highway network.

2.3 Technical Advice Note 18: Transport

2.3.1 TAN 18 outlines the need for, and the required content of TA’s, for some classifications and scales of development in Wales. The document outlines the following aims to be considered when producing a TA:

- Understand the transport impacts of the development;
- Clearly communicate the impacts to assist the decision-making process;
- Demonstrate the development is sited in a location that will produce a desired and predicted output (for example in terms of target modal split);
- Mitigate negative transport impacts through the design process and secure through planning conditions or obligations; and
- Maximise the accessibility of the development by non-car mode

2.3.2 TAN 18 provides detailed guidance on visibility standards, and essentially provides for visibility to be based upon the standards in Design Manual for Roads and Bridges (DMRB) for roads where actual road speeds are unknown or where the speed limit is >60kph (37mph), and the standards in Manual for Streets (MfS) where speeds are known and are <60kph (37mph). Visibility at the proposed site access is considered within Section 4 of this TS.

2.3.3 In relation to accessibility, TAN 18 emphasises the utility of using ‘*accessibility profiles*’, which consider whether a site has the potential to minimise travel by the private car. In accordance with this, GIS software has been utilised to generate accessibility isochrones for walking and cycling trips, while the site’s accessibility by public transport has been considered in the context of timetabled services in the area.

2.3.4 TAN 18 goes on to outline the requirement for a “Transport Implementation Strategy” (TIS) to be produced as an output of the TA. The document summarises the requirements of the TIS as follows:

“[The TIS] should set objectives and targets relating to managing travel demand for the development and set out the infrastructure, demand management measures and financial contributions necessary to achieve them. The TIS should set a framework for monitoring the objectives and targets, including the future modal split of transport to development sites.”

2.3.5 In relation to how a TIS interfaces with the production of a TA and TS, the guidance states that:

“TISs resulting from the TA process are intended to incorporate all the components of a travel plan and ensure these are integrated with design elements of the new development.”

2.3.6 In the light of the above, a TIS is included within the contents of the Framework TP which has been produced to accompany this TS, and draws upon the findings and conclusions of this TS, in addition to the potential sustainable travel measures described within the TP.

2.4 North Wales Joint Local Transport Plan 2015

2.4.1 The North Wales Joint Local Transport Plan (LTP) was jointly prepared by the North Wales Local Authorities in response to the Welsh Government requirement for LTPs to be submitted by the end of January 2015. The LTP’s stated ‘vision’ is to ‘*remove barriers by delivering safe, sustainable, affordable and effective transport networks*’.

2.4.2 The LTP aims to address the key issues for North Wales:

- The ability of the strategic road and rail corridors to provide the necessary good connectivity, for people and freight, within North Wales, to the ports and to the rest of the UK to support the economy and jobs, including tourism;
- The lack of resilience of the road and rail networks to planned and unplanned events including extreme weather;
- The need for good access to and between the three Enterprise Zones in North Wales;
- The lack of viable and affordable alternatives to the car to access key employment sites and other services; and

- The need for good road links to / from the trunk road network into the rural areas to help retain the viability of local businesses and support the Welsh language and culture.

2.4.3 This Plan therefore provides the strategic baseline for considering developments that have a transportation element within the wider area. In terms of the proposed residential units within this application, consideration will be made of the wider integration within the highways network and access by sustainable modes.

2.5 Wrexham Unitary Development Plan (1996-2011)

2.5.1 The Unitary Development Plan (UDP) 1996 - 2011 was adopted by WCBC on the 14th February 2005. The Plan covers the administrative area of the WCBC. It supersedes previous adopted development plans, namely the Wrexham Maelor Local Plan: Forward to 2001, the Glyndwr District Local Plan, and the Clwyd Structure Plan: First Alteration.

2.5.2 The document reflects the council's corporate vision for the County Borough's future based on:

- Aspiring city status, with Wrexham centre as its civic hub;
- Rural revitalised distinct towns and villages and attractive viable hinterland;
- Modern robust economy across all sectors;
- Improve quality of life for residents with an emphasis on supporting access to a variety of education and employment opportunities; and
- Institutions of growing stature: for example, the Council itself.

2.5.3 Part 1 of the strategic policies within this document outlines policy PS1, PS2, PS3, PS4. These policies outline the broad locations of where developments should be sought:

- **Policy PS1** New development for housing, employment, and community services will be directed to within defined settlement limits/employment areas;
- **Policy PS2** Development must not materially detrimentally affect countryside, landscape/townscape character, open space, or the quality of the natural environment;
- **Policy PS3** Development should use previously developed brownfield land comprising vacant, derelict or underused land in preference to the use of greenfield land, wherever possible, particularly so where greenfield land is of ecological, landscape or amenity value, or comprises agricultural land of grades 1, 2 or 3a quality; and

- **Policy PS4** Development should maintain the existing settlement pattern and character and be integrated with the existing transport network to help reduce the overall need to travel and encourage the use of alternatives to the car.

2.5.4 In addition to these, Policy PS5 outlines the need for housing provision between 1996 – 2011, with Policy PS8 outlining the development targets for transportation:

- **Policy PS5** Provision will be made for the development of 5775 dwellings between 1996 and 2011.
- **Policy PS8** The transport network will be developed by providing an integrated range of travel options to and from principal residential, commercial, employment and education centres by making the best use of the existing road and rail network, including, where necessary, the provision of facilities for both passenger and freight interchange and by the encouragement of public transport, cycling and walking.

2.5.5 It is noted that the Unitary Development Plan (1996-2011) is currently outdated, however, the Wrexham Local Development Plan 2 (2013-2028) is still undergoing consultation and is yet to be released. As such, the Unitary Development Plan (1996-2011), as the only document available, shall be used for reference when completing this Statement.

2.6 Wrexham Local Development Plan 2 (2013-2028)

2.6.1 Wrexham County Borough Council is preparing the Local Development Plan (LDP) which will replace the current adopted Unitary Development Plan. The LDP will be a long-term land use and development strategy focused on achieving sustainable development and will:

- Guide development for housing, employment, retail and other uses;
- Set out policies that will be used to decide planning applications; and
- Safeguard areas of land requiring protection or enhancement

2.6.2 The LDP is due to be fully adopted as the statutory Development Plan for the LA in Spring 2019.

2.7 Local Planning Guidance Note 16- Parking Standard

2.7.1 This guidance note explains the parking standards the Council applies to new development. It amplifies Unitary Development Plan (UDP 1996-2011) policies and will be a material consideration in the determination of planning applications. This guidance note was revised by the Council in July 2011, subject to external consultation in September 2011 and was formally adopted for use by the Executive Board in November 2011.

- 2.7.2 It is noted through a review of this document the parking standards required for the B1 and B8 land uses proposed for the development. Given that this application is for outline planning permission and the final mix of development is not known and subject to future submissions, calculations relating to parking provision are liable to change.
- 2.7.3 Reserved Matters applications will be expected to provide sufficient parking to comply with the relevant standards at the time of submission. These standards can be seen below within **Table 2.1** and 1 car parking space per 30m² required for B1 land use, and 1 car parking space per 100m² required for B8 land use. The expected final mix of parking provision is further discussed within **Section 4** of this report and is also included with any site plans submitted for this application.

Table 2.1 Parking Standards

Type of Development	Parking Standard	Cycle Parking Standard
B1 Business and light industry	1 car space per 30m ² gross floor space	1 cycle space per 300m ² gross floor space
B2 General Industry	1 car space per 50m ² gross floor space	1 cycle space per 500m ² gross floor space
B8 Storage and Distribution	1 car space per 100m ² gross floor space	1 cycle space per 1000m ² gross floor space
An area suitable for HGVs to load/unload and turn within the site will normally be required for B2 and B8 uses, particularly for sites accessed from a classified road. Any extensions to industrial or warehouse premises should not result in the loss of HGV loading/unloading/turning spaces unless an adequate alternative can be provided within the site.		

2.8 Wrexham Connected: Our Sustainable Urban Mobility Plan 2016

- 2.8.1 The Wrexham Connected document sets a clear vision for the future of transport for the area. It brings together the council's overall direction of transport planning.
- 2.8.2 The document outlines the importance of the councils Sustainable Urban Mobility Plan (SUMP). This is discussed in specific reference to WIE, and the councils concern for the public ability to connect in and around the town centre, as well as corridors outside of the town.
- 2.8.3 Stated within the document are the Wrexham Connected objectives, which are set to maximise how the council can contribute to the national well-being goals contained within the Future Generations Act, being that they support a cohesive Wales and more resilient Wales;
- **Safer Places** – working with partners to create safer environments for people to live, work and play;
 - **Sustainable Places** – will embrace a 'sustainable', transport-first approach to new development;
 - **Healthy Places** – reduce the impacts of air and noise pollution;

- **Affordable Places** – stimulate inwards investment and regeneration that leads to job creation; and
- **Well Connected Places** – enhance connectivity to, from and within Wrexham to improve the attractiveness and quality of the area.

2.9 Summary

- 2.9.1 This section has outlined national and local transport policies and guidance which are applicable to the development site. The production of this TA is consistent with the requirement for TAs set out in PPW, TAN 18 and the UDP for Wrexham. How the site conforms to and complements the other policies and guidance described above is discussed in the following sections of this report, where relevant.

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3 EXISTING SITUATION

3.1 Site Description

- 3.1.1 The application site currently has no existing usage and exists as grasslands and trees, with some unused building structures present. The site is bounded to the north by Oak Road, with an approximate 500m frontage to the carriageway. To the south, the site is bounded by open grassland, with industrial units/ HMP Berwyn to the west and south west. Some smaller industrial units exist to the east.
- 3.1.2 WIE is circa 3.5km east from Wrexham town centre, circa 4km north from Bangor-on-Dee and approximately 6km south west from Farndon.
- 3.1.3 The location of the site in the context of WIE and the local highway network, as well as the accident study area, is illustrated in **Figure 1** in **Appendix B**.

3.2 Local Highway Network

Oak Road/Redwither Road

- 3.2.1 Oak Road is single carriageway, running in a general east to west alignment, circa 7m/8m in width. The road is subject to a 40mph speed limit across the site's frontage, with this increasing to national speed limit approximately 400m to the east from the site boundary. Footway exists along both the northern and southern verge of the road, with this footway varying in width between 2m to 3m. The footway ceases to exist in the approximate same location as the speed limit change to the east. A site visit was undertaken on the 27th February 2019, to which it was noted street lighting is present.
- 3.2.2 Oak Road transitions to Redwither Road in the approximate location of the development sites western boundary. Redwither Road, similarly to Oak Road, has footway provided within both the southern and northern verge, at a circa 2m width. The road is subject to a 40mph speed limit and provides a route through to the remainder of WIE.

Bryn Lane

- 3.2.3 Bryn Lane meets with Oak Road at a priority junction. Bryn Lane provides a route north through WIE, subject to a 40mph speed limit, with a carriageway of circa 7m/8m width. An out of carriageway cycle route exists along this stretch of carriageway within the eastern verge, before swapping to the opposite side of the carriageway, continuing north to the 4-armed roundabout of Industrial Estate Road/Abenbury Way/Ash Road N and beyond. A site visit was undertaken on the 27th February 2019 to which it was noted street lighting is present.

3.3 Existing Traffic Conditions

- 3.3.1 As mentioned above, a site visit was undertaken on 27th February 2019. Traffic was observed to move freely throughout the Estate with no issues noted at the majority of the key junctions. Both the Cefn Road route and the A525 towards Wrexham (via Marchwiel) were also observed and both routes appeared quiet, with slightly more traffic on the more localised Cefn Road at the time of the site visit. From the site visit there would appear to be spare capacity on the highway network to accommodate additional development. No safety concerns with the operation of the existing highway network were noted during the site visit.
- 3.3.2 GTA suggests that an increase of 30 two-way trips is a useful point of reference regarding traffic impact at junctions, implying that any increase in trips less than this figure is unlikely to cause a detrimental impact. In absence of any more recent guidance as to when a capacity assessment is required, this has been applied as an appropriate threshold as the basis for assessment. Therefore, a trip distribution exercise based on 2011 Census Method of Travel to Work (MTW) data was undertaken across ten junctions on the local highway network. These works and assessments are discussed in length within **Section 6** of this **TA**.
- 3.3.3 Following discussions with WCBC, the following junctions were deemed to require surveys;
- Bridge Road/Coed Aben Road/Redwither Road (Priority);
 - Bridge Road N/Redwith Road (Priority);
 - Bryn Lane/ Oak Road (Priority);
 - Bryn Lane/Ash Road N/Abenbury Way/ Industrial Estate Road (Roundabout)
- 3.3.4 Classified turning counts were undertaken at the junctions listed above. The traffic surveys were undertaken by external traffic data collection specialist 360TSL Traffic Data Collection, on behalf of Prime.
- 3.3.5 The manual classified turning counts were undertaken on Tuesday 10th July 2018 for the Bridge Road/Coed Aben Road/Redwither Road priority junction, as well as for the Bridge Road N/Redwither Road priority junction. The Bryn Lane/Oak Road priority junction manual classified turning counts and Bryn Lane/Ash Road N/Abenbury Way/Industrial Estate Road roundabout turning counts were undertaken on Tuesday 5th March 2019. The surveys were undertaken on a Tuesday, and given that minimal changes/developments have occurred to the local highway network/on the estate between both survey dates, they can be considered comparable.

- 3.3.6 The surveys were taken between the hours of 07:00 and 10:00 and 16:00 and 19:00 to ensure that the commuter peaks were surveyed allowing the morning (AM) and evening (PM) peak hours to be determined. A survey of queue lengths on the various approaches to the above junctions was also undertaken as part of these surveys.
- 3.3.7 The utilisation of the results of these surveys to ascertain the capacity of the site access and the above junctions, is described within the **Section 6** of this **TA**. Traffic Flow Diagrams have been produced from these survey result, these can also be found within **Appendix C** of this **TA**. The raw survey data informing the peak hour assessments can be provided, for information, upon request.

3.4 Road Safety

- 3.4.1 Personal injury accident data has been obtained from WCBC to cover the five-year period from 1st January 2012 and 31st December 2016, this being the latest data available at the time of our request. A 3rd party website (www.crashmap.co.uk) has consulted in order to provide an up to date assessment of the local highway network, years 2017 and 2018.
- 3.4.2 The information provided can be viewed within **Appendix D** of this report. The study area extends from the Bryn Lane junction with Oak Road, west to the Coed Aben Road/Abenbury Way junction with Clywedog Road N. The accident study area is shown in **Figure 1** in **Appendix B**.
- 3.4.3 In total there were 4 accidents, of which 1 were classed as serious and 3 were classed as slight. The annual breakdown of numbers and type of classification is shown in **Table 3.2** below.

Table 3.2: Summary of Reported Personal Injury Accidents

Year	Severity			Total
	Slight	Serious	Fatal	
2012	-	-	-	-
2013	1	-	-	1
2014	-	1	-	1
2015	1	-	-	1
2016	1			1
2017	-	-	-	-
2018	1	-	-	1
Total	4	1	-	5
Severity %	80%	20%	-	100%

- 3.4.4 The serious accident occurred at the junction of Coed Aben Road/Abenbury Way with Clywedog Road N. The details state that the weather was fine occurring in daylight, and only 1 motorcycle was involved. The motorcycle is said to have been travelling along Abenbury Way when the rider manoeuvred to turn right, and for unknown reasons, fell from the bike.

- 3.4.5 The remaining accidents were all classed as slight, occurring across the study area, with a number of contributory factors. Some of these factors have been stated at a failure to look properly, failure to judge another vehicles path/speed and careless/reckless driving.
- 3.4.6 From a review of the data provided, it is therefore concluded that there are no deficiencies in the existing highway network, or existing safety issues within the vicinity of the site, that would be exacerbated by the development proposals.

4 DEVELOPMENT PROPOSAL

4.1 Development Description

4.1.1 This document has been produced to accompany a planning application by Cefn Park Development Ltd for a development comprising up to 7 separate plots with associated parking. The development site is currently vacant comprising largely of overgrown vegetation, with some unused building structures present. Below details the development split in terms of B1/B8 land use within the development, as derived following pre application consultation with WCBC:

- Plot 1 B1 - 4000sqm GFA;
- Plot 2 B1 – 5000sqm GFA;
- Plot 3 B8 – 2700sqm GFA;
- Plot 4 B8 – 4800sqm GFA;
- Plot 5 B8 - 2400sqm GFA;
- Plot 6 B8 – 2700sqm GFA; and
- Plot 7 B1 – 5000sqm GFA.

4.1.2 WIE currently accommodates in the region of 300 companies, which combined employ approximately 8000 people. The estate is the largest employment site in Wales, the second largest in the UK and as a result is one of the largest in Europe.

4.1.3 An ecology zone is proposed to be provided within the southern/western section of the site with a heritage zone similarly proposed within the eastern area of the site. The 7 development plots are to be situated to the north of the ecology zone and to the west of the heritage zone. The site is proposed to take access from Oak Road, with the 7 plots then also proposing to utilise this road for access to their individual sites.

4.1.4 A Development Framework Plan has been produced and forms part of the supporting documentation for the planning application. It is not included within this document as it has the potential to be revised up to the point of submission and therefore to avoid conflicting and superseded layouts being submitted within the various planning documents, it is omitted from this report. Planning documents should be available via the WCBC online planning portal.

4.2 Access Arrangement

Proposed Access Arrangement

4.2.1 The site is proposed to take access directly from Oak Road, in the form of a priority-controlled junction. This access will serve both vehicles, pedestrians and cyclists.

- 4.2.2 The access will be positioned circa 50m to the west of Abbey Road and circa 100m to the east of Dunster Road and will serve all plots of the development. As agreed with the highway's officers at WCBC the proposed access will comprise of a 7.3m wide carriageway, 15m wide kerb radii and 2m footways either side of the site access, connecting to existing footway along Oak Road. These geometric parameters being robust enough to accommodate the largest vehicles which could utilise this access i.e. 16.5m long articulated HGV's. The future capacity for this site is discussed in detail within **Section 6** of this report. Also agreed with the highway's officers at WCBC are the provision of visibility splay of 4.5m x 120m, these also being compliant with DMRB standards for the prevailing 40mph speed limit on the adjacent highway network. The proposed access arrangements are depicted in **Drawing 19014-001E** contained with **Appendix E**. In line with highways officer requests, a pedestrian crossing is also to be provided at the access to the site, to aid in pedestrian movements, with appropriate dropped kerb crossings also provided along Oak Road.
- 4.2.3 To demonstrate that such an access will be safe and suitable to serve the development for larger vehicles, a swept path analysis using the industry approved AutoTrack software package has been undertaken for a 16.5m articulated HGV, the largest vehicle expected to regularly access the site. The swept path analysis has been illustrated in **Drawing 19014-003** in **Appendix E** which demonstrates that the vehicle can safely access and egress the site in forward gear.

Alternative Forms of Access

- 4.2.4 It was noted through the original scoping on this TA that the preferred access solution to this proposed development by the highways officers at WCBC was the conversion of the Oak Road/Bryn Lane junction to a roundabout, this view also being expressed in WCBC's response to the pre-application consultation process. It should however be noted that the delivery of this form of access is compromised by a wide strip of 3rd party land that lies between the site and Oak Road.
- 4.2.5 With regard to the use of a priority-controlled junction, the pre-application response from WCBC suggested that given the volume of traffic likely to be generated by the site then consideration should be given to the provision of a ghost island right turn facility. It should be noted that whilst the junction of Oak Road/Bryn Lane (located along the site frontage) has a ghost island right turn facility, this reflects the role that Bryn Lane plays in the hierarchy of road within WIE. The provision of such a facility at the Oak Road/Bryn Lane junction is therefore the exception, with most junctions within WIE being standard priority controlled junctions.
- 4.2.6 A review of DMRB CD123 suggests that ghost island right turn facility is normally provided if '*the minor road flow exceeds 300 vehicles 2-way annual average daily traffic (AADT), or the major road flow exceeds 13,000 vehicles 2-way AADT*'. **Table 4.1** below outlines the AADT flows for the site access and Oak Road which could potentially be expected in line with the 2034 assessment year. The site access

AADT flows have been derived through utilising TRICs 7.5.1 to generate development trips. These development trips were then factored utilising Department for Transport AADT data. The Oak Road AADT flows were derived through turning count surveys, which were then factored to the assessment year 2034 using the DfT software TEMPro (Trip End Model Presentation Program) version 7.2. The Oak Road 2034 flows were then factored again utilising Department for Transport AADT data, before applying a seasonality factor.

Table 4.1 – Expected 2034 AADT Flows

Link Description	2034 with Development Flows
Proposed Site Access	1504
Oak Road to the East of Proposed Site Access	4369
Oak Road to the West of Proposed Site Access	4585

4.2.7 A review of the above shows that the proposed access to the site exceeds the typical 300 AADT in which ghost island right turn facilities are justified, the AADT flows on Oak Road itself are significantly less than the suggested requirement of 13,000 AADT.

4.2.8 Given the above and the fact that standard priority junctions are the predominant form of junction within WIE, the provision of the access shown in **Drawing P19014-001E** is the most appropriate form of access to this proposed development. It is therefore suggested that the provision of the additional construction required to deliver a ghost island right turn facility an unwarranted and costly addition to the development.

4.2.9 A capacity assessment for the proposed site access has been undertaken, as seen within **Section 6** and **Table 6.18**. This assessment has shown a standard priority junction as being likely to operate with spare capacity, with these findings further supporting Primes conclusion that additional infrastructure would likely be an unnecessary and unwarranted expense.

4.3 Parking

4.3.1 Given that this application is for outline planning permission and the final mix of development is not known and subject to future submissions, calculations relating to parking provision are liable to change. Reserved Matters applications will be expected to provide sufficient parking to comply with the relevant standards at the time of submission.

4.3.2 '*Local Planning Guidance Note 16- Parking Standard*' has been reviewed in line with the proposed development mix, so as to determine the level of parking to be provided following a reserved matters application. The currently proposed parking levels for the site meet with WCBC standards for both B1

and B8 land usages. **Table 2.1** details the appropriate standards, with 1 car parking space per 30m² required for B1 land use, and 1 car parking space per 100m² required for B8 land use.

4.3.3 The parking mix for the development, largely in line with current standards, can be seen below:

- Plot 1 – 133 spaces;
- Plot 2 – 166 spaces;
- Plot 3 – 32 spaces;
- Plot 4 – 47 spaces;
- Plot 5 – 32 spaces;
- Plot 6 – 32 spaces; and
- Plot 7 – 166 spaces.

4.4 Additional Pedestrian Accesses/Emergency Access

4.4.1 Additional pedestrian connections are to be provided in line with the proposed development. Footpaths are to be delivered within the development sites heritage mitigation zone, connecting to an existing access point to Oak Road. The location of this existing access is depicted on **Drawing P19014-001E**. The pedestrian/emergency access will be a minimum of 3.7m in width, in order to allow for the largest emergency vehicles to access the site, with this width conforming to the normal operational requirements of the emergency services.

4.4.2 These footpaths will provide an additional connection to Oak Road. A potential connection could be provided to the west of the site, to an existing public right of way, Footpath 19. Footpath 19 provides a pedestrian route through to Redwither Road to the west, before transitioning to Footpath 25 to the south, with additional southern connections then being possible. Sean Hanratty (Public Rights of Way Officer) has been contacted in regard to Footpath 19, with a phone call and a number of emails exchanged.

4.5 Road Safety Audit

4.5.1 As part of pre application consultation, a Road Safety Audit (RSA) was requested by the highway's officers at WCBC. A Stage 1 RSA was then completed, with Prime commissioning the independent consultant six:TEN Highways & Traffic Ltd to undertake this report. The RSA was undertaken by two Society of Road Safety Auditors qualified professionals who undertook a site visit as part of the RSA on 16th October 2019. The RSA was carried out based on the DMRB document GG119 – *Road Safety Audit*.

4.5.2 The RSA was based on **Drawing P19014-001D** of the proposed access design, an extract of which is provided in Appendix Three of the RSA. The abovementioned 5-year personal injury collision data

obtained from WCBC, and subsequent crashmap data, was also sent to the auditors. A copy of the RSA is provided in **Appendix F**.

- 4.5.3 No problems were identified relating to local alignment, road safety issues or road signs, carriageway markings or lighting. The RSA did identify two ‘problems’, relating to pedestrian/driver ‘*intervisibility*’. These are detailed below along with a Designers’ Response provided to each:

‘RSA Comment 6.1

Location: Proposed uncontrolled pedestrian crossing west of Dunster Road

Problem

Summary: Waiting bus may obscure pedestrian/driver intervisibility

The proposed uncontrolled pedestrian crossing on Oak Road to the west of Dunster Road is located adjacent to an existing bus stop. A bus waiting at the bus stop will obstruct intervisibility between a pedestrian crossing from the north and eastbound drivers. This may increase the risk of pedestrian/vehicular collisions, if a pedestrian chooses to cross in front of a waiting bus. (Photo 10.1)

Recommendation

The proposed uncontrolled pedestrian crossing or existing bus stop should be relocated to a suitable position to ensure a bus waiting at the bus stop does not obscure intervisibility between pedestrians and approaching drivers.’

Designers’ Response to Comment 6.1

- 4.5.4 It should be noted that the bus stop in question is no longer in use. However, in order to future proof the safety of the uncontrolled crossing point, it is proposed to be relocated circa 70m to the west of this bus stop, highlighted within **Drawing P19014-001E** in **Appendix E**.

‘RSA Comment 6.2

Location: Proposed uncontrolled pedestrian crossing east of Abbey Road South

Problem

Summary: Existing trees/vegetation may obscure pedestrian/driver intervisibility

The intervisibility between pedestrians crossing from the south at the proposed uncontrolled pedestrian crossing to the east of Abbey Road South and westbound drivers may be obscured by existing trees/vegetation on the southern side of Oak Road. This reduction of intervisibility may increase the risk of pedestrian/vehicular collisions as crossing pedestrians fail to sufficiently appreciate approaching traffic and vice versa. (Photo 10.2)

Recommendation

The appropriate pedestrian/driver intervisibility should be checked to ensure the existing trees/vegetation are not located within the visibility splay. The proposed pedestrian dropped crossing should be relocated or the trees/vegetation removed if it is found to be located within the pedestrian/driver intervisibility splay.'

Designers' Response to 6.2

- 4.5.5 This is noted. The proposed uncontrolled pedestrian crossing has been moved approximately 30m to the east to allow for improved pedestrian and vehicle intervisibility. This change can be seen with **Drawing P19014-001E** in **Appendix E**. Pedestrian visibility to westbound drivers can be achieved within highway boundary land, and as such it would be the responsibility of the highway authority to ensure visibility is maintained.

4.6 Summary

- 4.6.1 The development is proposed to be served by 1 access point. It has been demonstrated that the site is able to accommodate all likely vehicle types which will regularly access the development. The currently proposed parking numbers largely meet with WCBC parking standards, subject to reserved matter application.

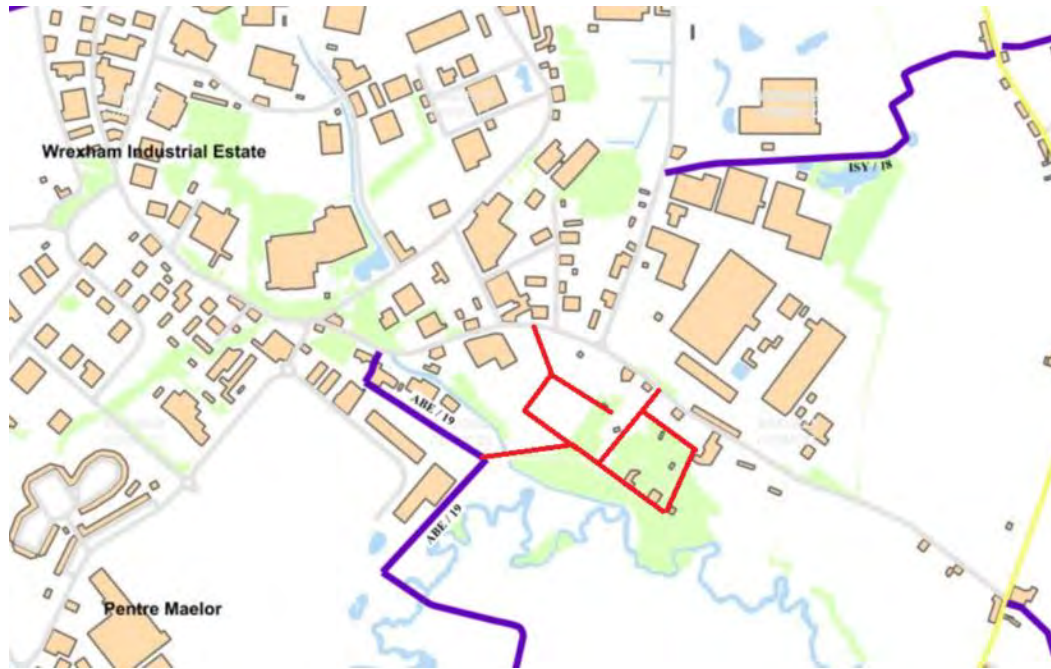
5 ACCESS BY SUSTAINABLE MODES

5.1 Introduction

- 5.1.1 National and local transport planning policy centres on the importance of sustainable development, meaning that new developments should be located in areas where there is access to sustainable modes of travel, or where sustainable modes of travel can be introduced. These sustainable modes include walking, cycling, public transport, car sharing and use of low emission vehicles (electric/hybrid).
- 5.1.2 Walking, cycling and public transport are commonly regarded to be the most sustainable modes of transportation. This section of the report will describe how accessible the site is by these modes.

5.2 Access by Foot

- 5.2.1 As described in **Section 4** above, the site is proposed to take access from Oak Road in the form of a priority junction, with 2m footways provided either side of the carriageway. This priority access is circa 50m to the west of Abbey Road and circa 100m to the east of Dunster Road. Footway currently exists along the site frontage, with streetlighting also present.
- 5.2.2 The sites footways are proposed to adjoin to the existing footway provision along Oak Road. Footways will also be provided internally within the site along both sides of the carriageway, with pedestrian crossing points also provided internally to further aid pedestrian movements within the site.
- 5.2.3 Footpaths are to be delivered within the development sites heritage mitigation zone. These footpaths will provide an additional connection to Oak Road, with a potential connection being made to the west of the site, to an existing public right of way, Footpath 19. Footpath 19 provides a pedestrian route through to Redwither Road to the west, before transitioning to Footpath 25 to the south, with additional southern connections then also being possible.
- 5.2.4 **Figure 5.1** highlights the public rights of ways which currently exist within the vicinity of the development site, as extracted from the WCBC online '*Public rights of Way Definitive Map*'. The purple lines highlight these existing footpaths, with the red lines highlighting indicatively the new footpaths to be provided in line with the development. It can be seen that pedestrian connectivity within WIE as a whole will be improved following the provision of the site's new footway network.

Figure 5.1: Existing Public Rights of Way and indicative new footway

SOURCE: https://www.wrexham.gov.uk/english/leisure_tourism/prow/definitive_map.htm

- 5.2.5 Research has indicated that acceptable walking distances depend on several factors, including the quality of the street environment, the type of amenity offered, the surrounding area, and other local facilities. The Chartered Institution of Highways and Transportation (CIHT) document entitled *Providing for Journeys on Foot* (2000) suggests walking distances which are relevant to this application. These distances are shown in **Table 5.1**.

Table 5.1: Suggested Acceptable Walking Distances

Criteria	Commuting (m)	Local Services (m)
Desirable	500	400
Acceptable	1000	800
Preferred Maximum	2000	1200

Source: CIHT Document 'Providing for Journeys on Foot' (2000)

- 5.2.6 Whilst **Table 5.1** provides useful guidance on walking distances, Manual for Streets provides a context for interpreting them. Manual for Streets states that:

'The propensity to walk is influenced not only by distance, but also by the quality of the walking experience. A 20-minute walk alongside a busy highway can seem endless, yet in a rich and stimulating street... it can pass without noticing.'

- 5.2.7 The accessibility for pedestrians to and from the site, in relation to WIE has been considered in the above context. **Figure 2 Appendix B** demonstrates the area which is realistically achievable to walk to and from the site, in accordance with the CIHT guidance.
- 5.2.8 Seen within **Figure 2 Appendix B**, the site is accessible by the vast majority of WIE, with only a handful of units falling outside of the 2000m walking range, this being the preferred CIHT maximum distance.
- 5.2.9 The Clubhouse Wrexham falls well within the 1200m walking range, with the existing amenities to the west of the site (local row of shops, Gourmet Café and Barclays Bank), also falling within this walking range and can be easily accessed by utilising the footways on the surrounding road network. The Maes Brenin/Pilgrim Way residential access to the south west of the site falls within an approximate 2000m walking range, this being within the preferred maximum commuting distance, seen within **Table 5.1**. The amenities associated with this residential area, i.e. Post Office and Scallywags Day Nursery, are within a similar walk distance.
- 5.2.10 The local bus stops to WIE are further highlighted within **Figure 2 Appendix B**, as can be seen these bus stops fall within a 1200m walking distance, with the closest being the 'Bridge Road N' stop, at a circa 950m walk from the site. The services provided by these bus stops are further detailed in **Section 5.3** below.
- 5.2.11 All footways, as described within **Section 3**, are of reasonable width and quality. With street lighting provided to aid in pedestrian movements and contribute towards a conducive walking environment.
- 5.2.12 Given the evidence presented above, walking can be considered a realistic method of travel from the site to access the surrounding industrial, manufacturing and residential areas of WIE, and vice versa.

5.3 Access by Cycle

- 5.3.1 It is widely recognised that cycling can offer an attractive alternative to short car trips, particularly those under 5km, and also as part of longer journeys by public transport.
- 5.3.2 The DfT's Local Transport Note 2/08 Cycle Infrastructure Design states that:

'The road is the most basic (and important) cycling facility available, and the preferred way of providing for cyclists is to create conditions on the carriageway where cyclists are content to use it, particularly in urban areas.'

- 5.3.3 In terms of cycling, there are both on-road and off-road/ traffic free cycle routes within WIE, these being highlighted in **Image 5.1** below. There is an on-road/ advisory cycle route running along the western side of WIE (depicted in pale yellow on **Image 5.1**) which runs via Erlas Lane, onto Redwither Lane leading south to Cefn Road. There is also an on-road / advisory route from Erlas Lane, via Clywedog Road South and Clywedog Road East towards Cefn Road and Cross Lanes. This route then

meets with the traffic free route on Bridge Road South (shown in bright yellow, with dotted black edges in **Image 5.2**). On the eastern edge of WIE, there is a traffic free route on Bryn Lane which leads to the roundabout junction of Bryn Lane and Abenbury Way to the west. This route then leads towards Borras/ Acton to the north, towards Wrexham.

- 5.3.4 There were signposts to the on-road and traffic free routes observed during the site visit, particularly around Clywedog Road South and East, nearby the residential dwellings of Maes Brenin/Pilgrim Way. In addition to the localised routes, there are a number of National Cycle Network Routes (NCNs) relatively close to WIE. Regional Route 70 is an on-road route, this being located circa 5km to the east of WIE. This links with NCN45 to the east of the site and continues northwards towards Chester and southwards towards Whitchurch and beyond.

Image 5.2: Cycling map / route from Sustrans Website



SOURCE: www.sustrans.org.uk

- 5.3.5 A cycling isochrone showing the site's catchment has also been produced using TRACC and is shown as **Figure 3** in **Appendix B**. The figure illustrates 2000m and 5000m catchment ranges, which equate to 10-minute and 25-minute journey times respectively which are based on the somewhat conservative cycle speed of 12kph. Commuting cyclists are in fact more typically considered to travel at speeds between 15-20kph, so a greater catchment may be more realistic.

- 5.3.6 It is clear that the aforementioned Maes Brenin/Pilgrim Way residential site, local shops/cafe and industrial units of WIE listed in **Section 5.2** all fall within this first 2000m cycling range indicated within **Figure 3 of Appendix B**. Further to this, the eastern boundary of Wrexham also fall within the 5000m cycling range. This allows for the residential areas of Hightown and Rhosnesni to become accessible to the site and offer residents of these areas potential job opportunities.
- 5.3.7 In addition to this the smaller residential village of Marchwiell falls within the 5000m cycling range, as well as Cross Lanes, and the smaller hamlets of Hugmore and Bowling Bank.
- 5.3.8 These residential areas then allow for additional amenities found within Wrexham and the surrounding area to be accessed from the site, including but not limited to a Co-op food store and an ATM cash point.
- 5.3.9 Due to the accessible location of the site, and the cycling infrastructure providing in close proximity to the site, it is considered that commuting to the site via cycling is a viable option for future employees and no additional off-site cycling measures are considered to be necessary.

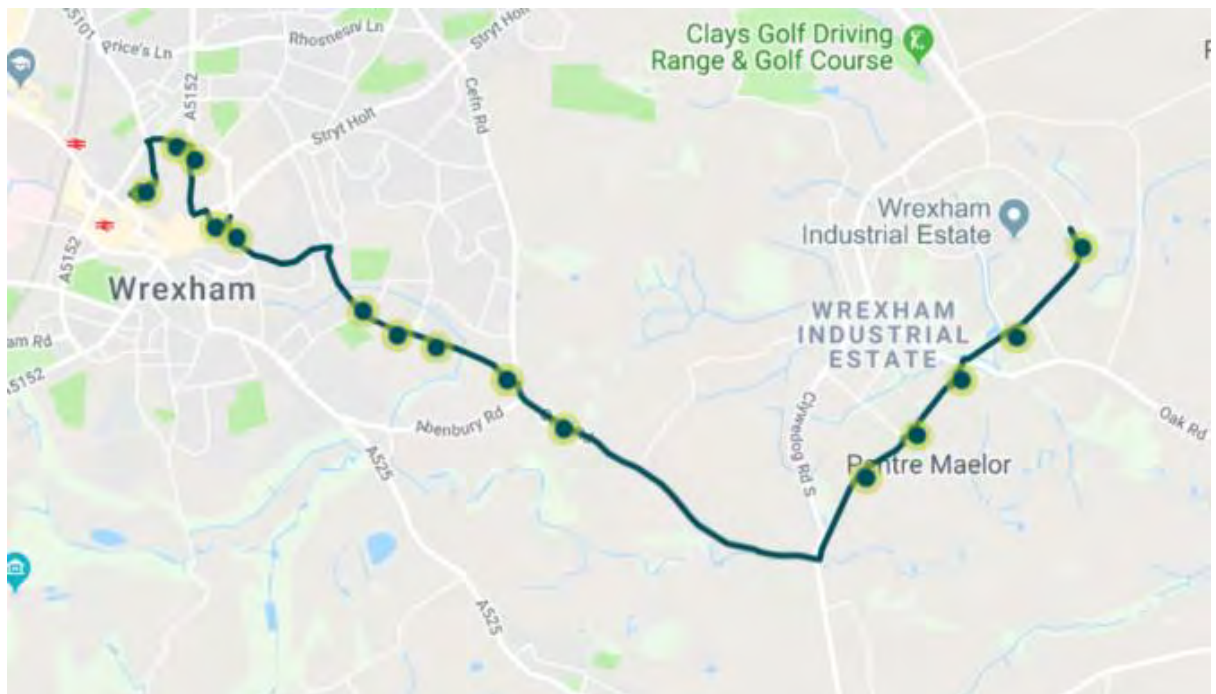
5.4 Access by Public Transport

- 5.4.1 The CIHT document '*Planning for Public Transport in Developments*' (1999) recommends a walking distance of up to 400m to bus waiting facilities from new developments, which is equivalent to a five-minute walk based on approximately 1.4m/s walking speed.
- 5.4.2 The nearest bus stops to the site can be seen to be the 'Bridge Road North' and 'Barclays Bank'. The 'Bridge Road North' stop is the closest, at circa 790m. It is acknowledged that this stop is outside of recommended CIHT distance, however the route between the stop and the site consists of good quality footways with decent width and can be considered conducive to walking. The bus stop itself consists of a flag and pole. Dropped kerbs along the footways to the stop help to facilitate pedestrian connections between the site and bus stop. The stop has northbound services only.
- 5.4.3 The 'Barclays bank' stops are similarly outside the recommended CIHT walking distance, though the conditions remain the same, in that the footways connecting to these bus stops are of good quality with decent width. The bus stop consists of shelter, seating and timetable information, with northbound and southbound services.
- 5.4.4 The services from these stops provide connections to/from WIE from Wrexham and the Brynteg areas. These services are summarised in **Table 5.2** below.
- 5.4.5 Timetabling information has been obtained from 'Traveline' with the timetables reference at the time of writing this report available on request. (<https://www.traveline.info/>).

Table 5.2: Summary of Bus Services Near to the Site

Bus Service	Route	Weekday Period	Weekend	
			Sat	Sun
41A	Redwither Tower - Wrexham	06:08 – 18:15 Approx. 1 service/hr	06:08 – 18:15 Approx. 1 service/hr	-
	Wrexham - Redwither Tower	05:48 – 17:59 Approx. 1 service/hr	05:48 – 17:44 Approx. 1 service/hr	-
41B	Wrexhaam - HMP Berwyn	-	-	0907 – 1707 Approx. 1 service/hr
	HMP Berwyn - Wrexham	-	-	0915 – 1715 Approx. 1 service/hr

5.4.6 **Table 5.2** above demonstrates the 41A service which operates from the nearest bus stop, providing a route around WIE and up towards Wrexham. The 41A is relatively frequent with a service approximately every hour and would be a viable option for commuters and visitors to the proposed development proposals with the site being reached within a circa 20-minute journey time from Wrexham town centre to the 'Bridge Road North' stop. **Appendix B Figure 4** visualises the journey time and areas served by these services for a typical Monday morning between 06:00 and 09:00. **Figure 5.3** below highlights the most frequent service 41A bus route, as extracted from Arriva Wales and the bus route map provided.

Figure 5.3: Arriva Bus Service 41A Route

SOURCE: <https://www.arrivabus.co.uk/wales/services/41-41a---wrexham-to-wrexham-industrial-estate/?direction=outbound>

- 5.4.7 **Table 5.2** also highlights the 41B service which came into effect in April 2019, funded by HMP Berwyn. This service operates on Sundays only, providing an hourly frequency. The service offers a potentially viable commuting option to employees of WIE, should they be required to work over the weekend.
- 5.4.8 In light of existing service times and frequencies, it is considered that existing bus services provide a realistic travel option for staff at the proposed development to travel to work during typical weekday working hours and also on a Saturday if it's a requirement for weekend working.
- 5.4.9 In respect of rail travel, Wrexham Railway Station can be reached as part of a multi-modal journey including the use of the above-mentioned bus services and a short walk from Wrexham Bus Station. This station provides access to a wider range of locations, with Cardiff Central, Holyhead, Bidston, Birmingham International, Shrewsbury, Chester and Manchester all having services from this station. The station provides twenty bicycle storage spaces with 68 car parking spaces also provided.
- 5.4.10 In summary, both bus and rail services, combined with walk / cycle as part of a multi modal commute are likely to provide a realistic travel option for commuters and visitors at the proposed development at both peak times and throughout the day.

5.5 Summary

- 5.5.1 This section of the report has demonstrated that the site is in a reasonably sustainable location where access to public transport is available and where local amenities fall within reasonable walking and cycling distances. The vast majority of WIE falls within a reasonable walking distance, indicating that the site itself is accessible within the local area and is commutable from the Maes Brenin/Pilgrim Way residential site. The local bus services provide connections both locally around WIE and towards Wrexham town centre at traditional working times and throughout the day, making bus travel a viable option to and from the proposed development. As such, the development proposals accord with the context and thinking as outlined in Wrexham Connected: Our Sustainable Urban Mobility Plan (2016) and the Wrexham Unitary Development Plan (1996-2011).
- 5.5.2 The PPW, at chapter 3, sets out the aim of '*maximising opportunities for people to make sustainable and healthy travel choices*'. The document states that these aims can be achieved in numerous ways, such as reducing the need to travel and developing/maintaining places that support healthy active lifestyles. In light of the location of the site and the existing walking, cycling and public transport infrastructure it is considered that there are is good opportunity for access to the site by sustainable modes.

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6 IMPACT ASSESSMENT

6.1 Vehicular Trip Generation

6.1.1 In order to determine the traffic generation associated with the proposed developments, the TRICS 7.5.1 database has been used. This industry-standard database contains traffic generation surveys of numerous sites of various land use types across the UK and Eire.

6.1.2 It should be noted that this trip generation exercise and following junction capacity assessments were conducted prior to pre application consultation, and as such have been produced in accordance to the original development split and plot sizes. **Table 6.1** below details the two-way trip generation at the site access of the original development split and the now proposed development split.

Table 6.1: 12 Hour TRICS Derived Trip Rates and Trip Generation for 4000sqm GFA – Plot 1

Time	Original Development - Total Two-Way Flows	Proposed Development - Total Two-Way Flows	Difference
AM	187	178	-9
PM	151	140	-11

6.1.3 The original development split has a combined higher trip generation than the now proposed development split. In order to ensure a robust assessment, the original development trip generation has been maintained and utilised within the below assessment.

6.1.4 In accordance to the scoping note available within **Appendix A** of this report and in agreement with WCBC, average trip rates have been derived by interrogating this database, deriving samples of sites with somewhat similar characteristics to the proposed development site. The report outputs for these trip rates, detailing the summary of the key selections applied in order to derive the samples for the sites can be viewed within **Appendix G**.

6.1.5 The derived trip rates were then applied to the differing sites, dependent upon the best suited land use, resulting in the trip generation, calculated hourly between the hours of 07:00 and 19:00. The estimated 12-hour trip generations of the sites are shown in **Table 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 and 6.8**.

Table 6.2: 12 Hour TRICS Derived Trip Rates and Trip Generation for 4000sqm GFA – Plot 1

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.385	0.061	0.446	15	2	18
08:00-09:00	0.385	0.094	0.479	15	4	19
09:00-10:00	0.248	0.114	0.362	10	5	14
10:00-11:00	0.152	0.114	0.266	6	5	11
11:00-12:00	0.109	0.124	0.233	4	5	9
12:00-13:00	0.17	0.175	0.345	7	7	14
13:00-14:00	0.172	0.195	0.367	7	8	15
14:00-15:00	0.109	0.127	0.236	4	5	9
15:00-16:00	0.111	0.167	0.278	4	7	11
16:00-17:00	0.076	0.319	0.395	3	13	16
17:00-18:00	0.056	0.426	0.482	2	17	19
18:00-19:00	0.022	0.13	0.152	1	5	6
Daily (12hr)	1.995	2.046	4.041	78	83	161
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	3	3	6
16:00-17:00	0.063	0.039	0.102	3	2	4

Table 6.3: 12 Hour TRICS Derived Trip Rates and Trip Generation for 5000sqm GFA – Plot 2

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.385	0.061	0.446	19	3	22
08:00-09:00	0.385	0.094	0.479	19	5	24
09:00-10:00	0.248	0.114	0.362	12	6	18
10:00-11:00	0.152	0.114	0.266	8	6	13
11:00-12:00	0.109	0.124	0.233	5	6	12
12:00-13:00	0.17	0.175	0.345	9	9	17
13:00-14:00	0.172	0.195	0.367	9	10	18
14:00-15:00	0.109	0.127	0.236	5	6	12
15:00-16:00	0.111	0.167	0.278	6	8	14
16:00-17:00	0.076	0.319	0.395	4	16	20
17:00-18:00	0.056	0.426	0.482	3	21	24
18:00-19:00	0.022	0.13	0.152	1	7	8
Daily (12hr)	1.995	2.046	4.041	100	103	202
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	4	4	8
16:00-17:00	0.063	0.039	0.102	3	2	5

Table 6.4: 12 Hour TRICS Derived Trip Rates and Trip Generation for 3150sqm GFA – Plot 3

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.296	0.125	0.421	9	4	13
08:00-09:00	0.349	0.193	0.542	11	6	17
09:00-10:00	0.217	0.2	0.417	7	6	13
10:00-11:00	0.178	0.176	0.354	6	6	11
11:00-12:00	0.188	0.183	0.371	6	6	12
12:00-13:00	0.193	0.166	0.359	6	5	11
13:00-14:00	0.195	0.195	0.39	6	6	12
14:00-15:00	0.19	0.193	0.383	6	6	12
15:00-16:00	0.181	0.241	0.422	6	8	13
16:00-17:00	0.169	0.292	0.461	5	9	15
17:00-18:00	0.089	0.277	0.366	3	9	12
18:00-19:00	0.045	0.108	0.153	1	3	5
Daily (12hr)	2.29	2.349	4.639	72	74	146
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	2	3	5
16:00-17:00	0.063	0.039	0.102	2	1	3

Table 6.5: 12 Hour TRICS Derived Trip Rates and Trip Generation for 4700sqm GFA – Plot 4

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.296	0.125	0.421	14	6	20
08:00-09:00	0.349	0.193	0.542	16	9	25
09:00-10:00	0.217	0.2	0.417	10	9	20
10:00-11:00	0.178	0.176	0.354	8	8	17
11:00-12:00	0.188	0.183	0.371	9	9	17
12:00-13:00	0.193	0.166	0.359	9	8	17
13:00-14:00	0.195	0.195	0.39	9	9	18
14:00-15:00	0.19	0.193	0.383	9	9	18
15:00-16:00	0.181	0.241	0.422	9	11	20
16:00-17:00	0.169	0.292	0.461	8	14	22
17:00-18:00	0.089	0.277	0.366	4	13	17
18:00-19:00	0.045	0.108	0.153	2	5	7
Daily (12hr)	2.29	2.349	4.639	107	110	218
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	4	4	7
16:00-17:00	0.063	0.039	0.102	3	2	5

Table 6.6: 12 Hour TRICS Derived Trip Rates and Trip Generation for 3200sqm GFA – Plot 5

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.296	0.125	0.421	9	4	13
08:00-09:00	0.349	0.193	0.542	11	6	17
09:00-10:00	0.217	0.2	0.417	7	6	13
10:00-11:00	0.178	0.176	0.354	6	6	11
11:00-12:00	0.188	0.183	0.371	6	6	12
12:00-13:00	0.193	0.166	0.359	6	5	11
13:00-14:00	0.195	0.195	0.39	6	6	12
14:00-15:00	0.19	0.193	0.383	6	6	12
15:00-16:00	0.181	0.241	0.422	6	8	14
16:00-17:00	0.169	0.292	0.461	5	9	15
17:00-18:00	0.089	0.277	0.366	3	9	12
18:00-19:00	0.045	0.108	0.153	1	3	5
Daily (12hr)	2.29	2.349	4.639	72	74	147
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	2	3	5
16:00-17:00	0.063	0.039	0.102	2	1	3

Table 6.7: 12 Hour TRICS Derived Trip Rates and Trip Generation for 3150sqm GFA – Plot 6

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.296	0.125	0.421	9	4	13
08:00-09:00	0.349	0.193	0.542	11	6	17
09:00-10:00	0.217	0.2	0.417	7	6	13
10:00-11:00	0.178	0.176	0.354	6	6	11
11:00-12:00	0.188	0.183	0.371	6	6	12
12:00-13:00	0.193	0.166	0.359	6	5	11
13:00-14:00	0.195	0.195	0.39	6	6	12
14:00-15:00	0.19	0.193	0.383	6	6	12
15:00-16:00	0.181	0.241	0.422	6	8	13
16:00-17:00	0.169	0.292	0.461	5	9	15
17:00-18:00	0.089	0.277	0.366	3	9	12
18:00-19:00	0.045	0.108	0.153	1	3	5
Daily (12hr)	2.29	2.349	4.639	72	74	146
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	2	3	5
16:00-17:00	0.063	0.039	0.102	2	1	3

Table 6.8: 12 Hour TRICS Derived Trip Rates and Trip Generation for 5000sqm GFA – Plot 7

Time	Average Vehicle Trip Rates			Average Vehicle Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
07:00-08:00	0.385	0.061	0.446	19	3	22
08:00-09:00	0.385	0.094	0.479	19	5	24
09:00-10:00	0.248	0.114	0.362	12	6	18
10:00-11:00	0.152	0.114	0.266	8	6	13
11:00-12:00	0.109	0.124	0.233	5	6	12
12:00-13:00	0.17	0.175	0.345	9	9	17
13:00-14:00	0.172	0.195	0.367	9	10	18
14:00-15:00	0.109	0.127	0.236	5	6	12
15:00-16:00	0.111	0.167	0.278	6	8	14
16:00-17:00	0.076	0.319	0.395	4	16	20
17:00-18:00	0.056	0.426	0.482	3	21	24
18:00-19:00	0.022	0.13	0.152	1	7	8
Daily (12hr)	2.29	2.349	4.639	100	103	202
Time	Average HGV Trip Rates			Average HGV Trip Generation		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
08:00-09:00	0.077	0.08	0.157	4	4	8
16:00-17:00	0.063	0.039	0.102	3	2	5

- 6.1.6 As the above tables show, the sites cumulatively together could generate in the region of **187** combined two-way trips in the AM network peak hour and **151** trips in the PM network peak hour. It should be noted that no allowance has been made for any future reduction in car travel based on any potential increased use of sustainable modes of travel, remembering that the above trip generation has been based upon the larger original development split, and therefore the trip generation figures are considered to be robust.

6.2 Traffic Growth

- 6.2.1 Ordinarily, the assessment year is taken to be the year of application plus five years (2024), and it is expected that the site would be built-out and occupied by then. However, in accordance with WCBC scoping note comments, an assessment considering the application year plus 15 years has been requested. In accordance with this request, and to provide a robust assessment, the forecast year of assessment will be 2034. In order to maintain consistency, and in line with the above trip generation derived, the original development split has been utilised within the forecasting methodology described below.
- 6.2.2 The 2018/2019 observed traffic flows, shown in **Traffic Flow Diagrams 1 and 2** in **Appendix C**, were factored to the assessment year using the DfT software TEMPro (Trip End Model Presentation Program) version 7.2. This package allows access to data used in the National Trip End Model (NTEM)

and can be used to 'provide summaries of traffic growth using data from the National Transport Model (NTM)' (<https://www.gov.uk/government/collections/tempro>).

- 6.2.3 The latest version of the software provides traffic growth figures at the mid layer super output area (MSOA) level. In order to derive local traffic growth factors, the 'Wrexham 020' mid layer super output area (MSOA), which includes WIE as an area of employment, was selected. Trip end growth factors for car drivers were derived and adjusted by NTM dataset AF15 for 'rural' area types and 'principal' road types.
- 6.2.4 Before applying the traffic growth factors derived from the above methods, the jobs generated from the 7 development plots have been considered based on their Gross Floor Area (GFA) and the guidance provided within the 'Employment Density Guide 3rd edition (November 2015)' published by the Homes and Communities Agency. The jobs generated in line with 4 other live development site applications within the estate, as submitted by FI Real Estate Management, (EP/CD/P/2018/1084, EP/CD/P/2018/1085, EP/CD/P/2018/1086, EP/CD/P/2018/1087) have also been considered.
- 6.2.5 As TEMPro includes government derived planning forecasts, it is necessary to manually adjust the planning assumptions within the database software to remove the number of jobs associated with developments within the estate, which would otherwise result in double counting. The adjustment involved the removal of 393 jobs associated with the 7 development plots included with this application, and 277 jobs associated with the other 4 development applications within the estate. These were removed from the TEMPro zone between the base year and the forecast year (2034). The base year has varied between 2018 and 2019, with the applicable TEMPro factor then applied dependent upon the year of survey.
- 6.2.6 In order to avoid a negative growth of jobs within WIE, the future job assumption for 2034 has been set to the base jobs for 2019. A comparative summary of this reduction in the job assumptions is shown in **Table 6.9** and **Table 6.10**.

Table 6.9: TEMPro Default and Alternative Planning Assumptions (2018-2034)

Base Year	Forecast Year	Default Assumptions			Alternative Assumptions		
		Base Jobs	Future Jobs	Difference	Base Jobs	Future Jobs	Difference
2018	2034	16081	16765	684	16081	16095	14

Table 6.10: TEMPro Default and Alternative Planning Assumptions (2019-2034)

Base Year	Forecast Year	Default Assumptions			Alternative Assumptions		
		Base Jobs	Future Jobs	Difference	Base Jobs	Future Jobs	Difference
2019	2034	16115	16765	650	16115	16115	0

6.2.7 The subsequent growth factors derived from the above are shown in **Table 6.11** and **Table 6.12** below.

Table 6.11 TEMPro Growth Factors 2018-2034

Level	Area	Local Growth Figure	
		AM	PM
W02000420	Wrexham 020	1.1249	1.1248

Table 6.12 TEMPro Growth Factors 2019-2034

Level	Area	Local Growth Figure	
		AM	PM
W02000420	Wrexham 020	1.1122	1.1121

6.2.8 The growth factors shown in **Table 6.11** and **6.12** above have been applied to the 2018/2019 Observed light vehicle flows resulting in the 2034 base flows and are shown in **Traffic Flow Diagrams 3 and 4**.

6.2.9 DfT derived Road Traffic Forecast (RTF) growth factors for the Wales region have been applied to heavy vehicles as TEMPro is not applicable to such vehicle classes as detailed in WebTAG guidance. The RTF calculation for heavy vehicles is provided in **Appendix H**, calculating a factor for both 2018 and 2019 observed flows. It is noted that through the latest RTF data available (2018), negative factors were calculated for future HGV growth. In order to avoid a reduction in HGVs, and to maintain our robust assessment, a growth factor of 1 has been applied.

6.3 Trip Distribution

6.3.1 Traffic generated by the development proposal has been distributed on to the highway network based on 2011 Census MTW data for car drivers using the Wrexham 020 MSOA, which contains the site as an area of workplace. Origin-destination pairs containing twenty trips or less were removed from the data, accounting for 12.18% of the total trips, to make the data more manageable and to eliminate less common and generally longer distance trips from the dataset.

6.3.2 The main commuter urban areas within each MSOA were identified and the most likely route from/to the site, referred to as the primary route. They were derived using web-based route planning software (Google Maps). Whilst some destinations may have more than one suitable route available, the most obvious routes (based on travel time and distance) have largely been chosen in order to concentrate the traffic forming a worst-case assessment, although where there are clear alternative routes due to an MSOA containing different trip attractors along different routes, secondary routes were identified.

- 6.3.3 A route through the study area has been identified and is shown in **Table 6.13** with a summary of the percentage of development trips that will be distributed along each also shown. This split distribution has then been applied to each site individually.

Table 6.13: Distribution Summary

Route	Example Destination	Route %
1B, 2A, 3A, 4B	South East Wrexham	57.7%
1A, 5A, 6A, 7B	Rhosrobin	42.3%
Total		100.0%

- 6.3.4 The distribution is shown diagrammatically in **Traffic Flow Diagram 17** with details of the distribution calculation and data provided in **Appendix I**. The distributed development traffic is shown in **Traffic Flow Diagrams 18 and 19**.
- 6.3.5 The trips associated with this development application are shown in **Traffic Flow Diagrams 18 and 19**. These have been added to the 'Without Dev 2034' flows to form the 'With Dev 2034' flows and are shown in **Traffic Flow Diagrams 20 and 21**.

6.4 Impact assessment

- 6.4.1 Having derived estimated traffic flows for the forecast year in the 'With' and 'Without Development' scenarios it is possible to compare expected traffic flows within the study area.
- 6.4.2 **Table 6.14** below provides a comparison of flows in the forecast year for the 'Without' and 'With Development' scenarios summarising the difference. This exercise has been carried out for each of the off-site junctions surveyed, again utilising the original development split for consistency.

Table 6.14: Comparison of Two-way Traffic Flows through Study Area Junctions Without and With Development

Junction	2034 AM Peak				2034 PM Peak			
	Without Dev	With Dev	Abs Diff	% Diff	Without Dev	With Dev	Abs Diff	% Diff
1. Bryn Lane/Oak Road	426	505	79	18.5%	584	647	63	10.8%
2. Bridge Rd/Redwither Rd/Coed Aben Rd	885	994	109	12%	990	1076	86	8.7%
3. Industrial Estate Road/Bryn Lane/Ash Rd North/Abenbury Way	2539	2618	79	3%	2364	2427	63	2.7%

6.4.3 The greatest impact of the developments in terms of percentage increase will be on the Bryn Lane/Oak Road junction, with an increase of 79 trips (18.5%) in the AM peak and 63 trips (10.8%) in the PM peak. The greatest increase in trips is seen on Bridge Road/Redwither Road/Coed Aben Road junctions, with an increase in 109 trips in the AM peak and 86 in the PM peak.

6.4.4 The DfT *Guidance on Transport Assessment* (GTA) suggests that an increase of 30 two-way trips is a useful point of reference regarding traffic impact at junctions, implying that any increase in trips less than this figure is unlikely to cause a detrimental impact. In order to carry out a fully robust assessment, the junctions listed above have been modelled in terms of capacity.

6.5 Junction Capacity Assessments

6.5.1 Industry standard software has been used to model the junctions, with Junctions 9 (version 9.0.2.5947). This software includes the PICADY module which is used to model priority-controlled junctions and crossroads junctions.

6.5.2 When interpreting the Junctions 9 results, the capacity of each arm or movement is calculated as the Ratio of Flow to Capacity (RFC) with 0.85 representing the practical capacity threshold of the arm and 1.00 representing the theoretical capacity threshold. It is above the practical capacity threshold where capacity problems can begin to occur while exceeding the theoretical capacity means that arms are over capacity.

6.5.3 Modelled queues are shown in passenger car units (PCUs), this being equivalent to a distance of 5.75m which is the length of road space (car length plus gap length) that a typical car occupies when queuing.

In order to convert the traffic flows into PCUs, which is the requisite input flow unit required in the modelling software, a factor of 2.0 has been applied to the heavy vehicle user class. Cars have a factor of 1.0. These factors are commonly accepted in transport modelling.

- 6.5.4 The junction geometry has been coded based on a combination of OS mapping and aerial photography.
- 6.5.5 Traffic flows have been input based on the 'ONE HOUR' (ODTAB) option, which synthesises a 'peak within a peak' at the middle of the time period modelled and is generally seen as being the worst-case form of assessment in terms of impact.
- 6.5.6 All model report outputs are included in **Appendix J**.
- 6.5.7 The results of the capacity assessment for each of the junctions are described below. The site access has been assessed for the 'With Development' scenario only.

Bryn Lane/Oak Road (priority)

- 6.5.8 The results of the capacity assessment are summarised in **Table 6.15**

Table 6.15: Junction Capacity Assessment Results

Arm	AM		PM	
	RFC	Q (PCU)	RFC	Q (PCU)
2019 Observed				
Bryn Lane (Left Turn)	0.15	0.2	0.09	0.1
Bryn Lane (Right Turn)	0.30	0.5	0.18	0.2
Oak Road (Eastern Arm)	0.05	0.1	0.15	0.2
2034 Without Development				
Bryn Lane (Left Turn)	0.17	0.2	0.10	0.1
Bryn Lane (Right Turn)	0.33	0.5	0.19	0.3
Oak Road (Eastern Arm)	0.05	0.1	0.16	0.2
2034 With Development				
Bryn Lane (Left Turn)	0.18	0.2	0.10	0.1
Bryn Lane (Right Turn)	0.46	0.9	0.28	0.4
Oak Road (Eastern Arm)	0.05	0.1	0.17	0.2

- 6.5.9 The results show that the junction will continue to operate with spare capacity, with the highest RFC being 0.46 on Bryn Lane (Right Turn) in the AM peak.

Bryn Lane/Ash Road North/Abenbury Road/Industrial Estate Road (roundabout)

- 6.5.10 The results of the capacity assessment are summarised in **Table 6.16**

Table 6.16: Junction Capacity Assessment Results

Arm	AM		PM	
	RFC	Q (PCU)	RFC	Q (PCU)
2019 Observed				
1 - Bryn Lane	0.28	0.4	0.29	0.4
2 - Ash Road North	0.12	0.2	0.64	1.8
3 - Abenbury Road	0.14	0.2	0.5	1.0
4 - Industrial Estate Road	0.72	2.7	0.17	0.2
2034 Without Development				
1 - Bryn Lane	0.39	0.7	0.33	0.5
2 - Ash Road North	0.14	0.2	0.73	2.7
3 - Abenbury Road	0.17	0.2	0.63	1.7
4 - Industrial Estate Road	0.81	4.4	0.19	0.3
2034 With Development				
1 - Bryn Lane	0.46	1.0	0.36	0.6
2 - Ash Road North	0.14	0.2	0.74	2.9
3 - Abenbury Road	0.17	0.3	0.64	1.9
4 - Industrial Estate Road	0.84	5.2	0.2	0.3

- 6.5.11 The results show that the junction will continue to operate with spare capacity, with the highest RFC being 0.84 on Industrial Estate Road in the AM peak.

Bridge Road North/Redwither Road (Priority)

- 6.5.12 The results of the capacity assessment are summarised in **Table 6.17**

Table 6.17: Junction Capacity Assessment Results

Arm	AM		PM	
	RFC	Q (PCU)	RFC	Q (PCU)
2018 Observed				
Bridge Road North (Left Turn)	0.02	0.0	0.04	0.0
Bridge Road North (Right Turn)	0.16	0.2	0.56	1.3
Redwither Road (Eastern Arm)	0.03	0.0	0.01	0.0
2034 Without Development				
Bridge Road North (Left Turn)	0.02	0.0	0.06	0.1
Bridge Road North (Right Turn)	0.17	0.2	0.63	1.7
Redwither Road (Eastern Arm)	0.03	0.0	0.02	0.0
2034 With Development				
Bridge Road North (Left Turn)	0.02	0.0	0.06	0.1
Bridge Road North (Right Turn)	0.19	0.3	0.67	2.0
Redwither Road (Eastern Arm)	0.03	0.1	0.02	0.0

- 6.5.13 The results show that the junction will continue to operate with spare capacity, with the highest RFC being 0.67 on Bridge Road North (Right Turn) in the PM peak.

Bridge Road/Coed Aben Road (priority)

- 6.5.14 The results of the capacity assessment are summarised in **Table 6.18**.

Table 6.18: Junction Capacity Assessment Results

Arm	AM		PM	
	RFC	Q (PCU)	RFC	Q (PCU)
2018 Observed				
Bridge Road (Left Turn)	0.16	0.3	0.29	0.4
Bridge Road (Right Turn)	0.72	2.7	0.47	1.0
Coed Aben Road	0.37	0.6	0.16	0.2
2034 Without Development				
Bridge Road (Left Turn)	0.25	0.4	0.34	0.5
Bridge Road (Right Turn)	0.83	4.4	0.53	1.2
Coed Aben Road	0.41	0.7	0.18	0.2
2034 With Development				
Bridge Road (Left Turn)	1.05	5.5	0.37	0.6
Bridge Road (Right Turn)	1.04	20.9	0.63	1.8
Coed Aben Road	0.42	0.8	0.18	0.3

- 6.5.15 The results show that the junction operates over theoretical capacity, with the highest RFC being 1.05 on Bridge Road (Left Turn) and the longest queue being Bridge Road (Right Turn) at circa 21 PCUs. It is important to note that these results are calculated for the 2034 future year only, this being 15 years post submission and as such is very much a worst-case scenario. It is also important to note that these results occur within the AM peak only, and as such would only potentially occur for a short period each day.
- 6.5.16 It should be acknowledged that limitations within the software algorithms show an almost exponential reduction in performance of a junction when the practical capacity threshold (0.85) is exceeded. This should be kept in mind when considering the PCU queues and RFC values for the junction.

Site Access/Oak Road (priority)

- 6.5.17 The results of the capacity assessment are summarised in **Table 6.18**

Table 6.18: Junction Capacity Assessment Results

Arm	AM		PM	
	RFC	Q (PCU)	RFC	Q (PCU)
2034 With Development				
Site Access	0.09	0.1	0.18	0.2
Oak Road (Western Arm)	0.13	0.2	0.11	0.2

- 6.5.18 The results show that the site access will continue to operate with spare capacity, with the highest RFC being 0.18 in the PM peak. In reference to **Section 4** and **Paragraph 4.2.9**, this provides further support and justification towards a standard priority junction being an appropriate access arrangement for the development.

6.6 Summary and Conclusion

- 6.6.1 This section has explained the traffic forecasting methodology and capacity assessment used to determine the suitability of the proposed site access and suitability of the surrounding highway network to accommodate the development proposal.
- 6.6.2 It has been demonstrated that the local highway network and proposed site access will operate within theoretical capacity and will therefore be able to accommodate the traffic likely to be generated by the development. The impact of the developments, when comparing the '2034 With Development' and the '2034 Without Development' scenario is negligible. The impact of the development can certainly not be considered severe.

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7 PRE-APPLICATION CONSULTATION

7.1 Introduction

- 7.1.1 A pre application response was received from WCBC highways at the start of September 2019. The comments from this pre application response have been applied where appropriate throughout the report, with some of the main comments which require a response addressed below. Highway comments are stated in *red italic text* with Primes response stated in black standard font.

7.2 Highway Comments

- 7.2.1 *Point 1 - The proposed access takes the form of a simple T-junction. However, based on the submitted TRICs data I traffic flows, DMRB would appear to recommend the provision of a right hand turning lane I ghost island. Further clarification on why a simple T-junction has been proposed will need to be provided.*

The provision of a right hand turning lane will impact on the junction of Abbey Road and may affect the junction with Bryn Lane. In this instance a right hand turning lane will also be required for the Abbey Road junction.

It would be considered preferable to access the site via a new roundabout located at the junction of Bryn lane I Oak Road rather than creating an additional access off Oak Road. I would recommend that this arrangement is considered prior to submitting a planning

- 7.2.2 Please refer to **Section 4.2**

- 7.2.3 *Point 2 - A pedestrian crossing I splitter island will be required across the proposed access*

- 7.2.4 Noted, please see Drawing **P19014-001E** in **Appendix E**.

- 7.2.5 *Point 3 - I understand that it is proposed to provide footpath links from the development site to Oak Road and to the existing public footpath (PROW No. 19- Abenbury). I would strongly recommend that you liaise with our Public Rights of Way Section on this matter- contact: Sean Hanratty on Tel: 01978 729761.*

- 7.2.6 Noted, Sean Hanratty was contacted on 01/10/19 via phone call, with a follow up email then sent.

- 7.2.7 *Point 4 - I would recommend that a suitable emergency access is provided from the site onto Oak Road. Such an access could also accommodate appropriate cycleway provision to support Active Travel.*

- 7.2.8 Noted, please see Section 4.4 and Drawing **P19014-001E** in **Appendix E**.

- 7.2.9 *Point 5 - Current public transport provision serving the industrial estate is poor. I would strongly recommend that you discuss the proposed development including potential funding for an improved bus service with our Public Transport Officer- Andrew Mytton on Tel: 01978 729760.*
- 7.2.10 A meeting took place on Monday 23rd September 2019, through which Prime was informed that Andrew Mytton has requested £25,000 per year (for 3 years) to fund local public transport services. Andrew Mytton was emailed on Tuesday 24th September 2019. The original email which was sent to Andrew can be viewed within **Appendix A** of this report. Due to time scales, Andrew was asked to respond by 11th October 2019. No response was received from Andrew to justify this requested funding.
- 7.2.11 In accordance to the Welsh Office document, Circular 13/97, Annex B, such contributions *‘should only be sought where they are necessary to make a proposal acceptable’* and are *‘fairly and reasonably related in scale and kind to the proposed development and reasonable in all other respects’*.
- 7.2.12 It is noted that bus service no.1E which served WIE, previously operated by Price Coaches, was withdrawn from service in early 2019, with bus service no.42, previously operated by Easy Coach, being withdrawn from service after 75 days of operation in September 2018. The service was withdrawn based on its commercial viability. In accordance to Circular 13/97, paragraph B12, it is stated that *‘developers should not be expected to pay for facilities which are needed solely in order to resolve existing deficiencies nor should attempts be made to extract excessive contributions to infrastructure costs from developers’*.
- 7.2.13 6 Circular 13/97, paragraph B12, continues to state that it could be acceptable *‘for an obligation to be sought where it would overcome an existing constraint which is materially exacerbated by the proposal’*. The development proposals for WIE are felt to not face any constraints as a result of the current existing bus service provision. The current 41a service arrives within the estate from approximately 06:00 with the last service departing the estate at circa 18:20, with an hourly frequency Monday to Saturday. Service 41b started within WIE April 2019, funded via HMP Berwyn, operating an hourly Sunday frequency. Combined, both routes together provide a viable option for commuters to the industrial estate 7 days a week, with the development site being within an approximate 10-minute walk of a bus stop.
- 7.2.14 Circular 13/97, paragraph B15, advises *‘to guard against attempting to secure a list or range of desirable benefits from developers, even if they consider such benefits to be related in some way to the proposed development’*. The paragraph further states that attempts to secure additional benefits may be counterproductive. This being that seeking *‘more than is justified’* may *‘frustrate worthwhile development proposals’*.

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- 7.2.15 Given the above, and the recent loss of services within WIE, it is not deemed necessary for such public transport funding to be sought. Current provision within WIE will likely accommodate the additional patronage to WIE associated with the development.
- 7.2.16 The use of other sustainable modes of transport are also liable to increase with the appointment of a future Travel Plan Coordinator. This is supported through Planning Policy Wales 10 (PPW10) paragraph 4.1.1, with the text stating support for sustainable developments which *'increases physical activity, improves health and helps to tackle the causes of climate change and airborne pollution'*. PPW10 emphasises the need for promotion of *'employment opportunities in both urban and rural areas'*, particularly in areas *'which are, or can be, easily reached by walking or cycling'*. It has been proven with Section 5 that the site can be cycled to within a recognised reasonable distance, with approximately half of Wrexham falling within a 5000m cycling range.
- 7.2.17 Figure 8 of PPW10 is noted as listing walking and cycling above public transport within a sustainable transport hierarchy, with the recent provision of a walking/cycling route along Bridge Road South adhering to this. Paragraph 4.1.16 states that *'Different approaches to sustainable transport will be required in different parts of Wales'*, with development needing to reflect local circumstances. It continues by stating that some areas, *'despite it having limited public transport accessibility, could apply the transport hierarchy by: first considering how the location and design of new development could encourage walking and cycling'*. The development site supports this statement, with access to the already good provision of footways within the estate facilitated for, and cycle storage facilities likely to be provided on site following a reserved matters application.
- 7.2.18 In accordance to the above PPW 10 and Circular 13/97, and the lack of a clear strategy from WCBC with regard to public transport improvements with WIE we suggest that the requested contributions are unjust, unrealistic and does not accord with various Transport Policy Initiatives within Wales.

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8 SUMMARY AND CONCLUSION

8.1.1 This Transport Assessment (TA) considers the highways and transportation implications associated with the outline planning application for up to 7 development plots with associated parking within Wrexham Industrial Estate (WIE). The below details the development split in terms of B1/B8 land use within the development:

- Plot 1 B1 - 4000sqm GFA;
- Plot 2 B1 – 5000sqm GFA;
- Plot 3 B8 – 2700sqm GFA;
- Plot 4 B8 – 4800sqm GFA;
- Plot 5 B8 - 2400sqm GFA;
- Plot 6 B8 – 2700sqm GFA; and
- Plot 7 B1 – 5000sqm GFA.

8.1.2 This document has been prepared in accordance with the Department for Transport's (DfT) Guidance on Transport Assessment (GTA) (March 2007) and Planning Practice Guidance. It considers the accessibility of the site and safety for all modes of travel from the private car to more sustainable modes such as walking, cycling and public transport.

8.1.3 The main vehicular access will be provided from Oak Road. The proposed footway will extend on to Oak Road and connect to the existing provision along the southern verge. The main vehicular access point will also serve as access for cyclists. The proposed access strategy is shown in **Drawing 19014-001E** contained within **Appendix E**.

8.1.4 An assessment has been undertaken of the site's level of accessibility by sustainable modes, from which it can be concluded that realistic options exist for access to local residential areas and local amenities on foot, by cycle and by public transport.

8.1.5 Occupiers of the proposed development plots will be made aware of the options available for sustainable modes of travel through the site's Travel Plan and also through Welcome Packs provided to employees at the developments. The Welcome Packs would not only highlight the location of nearby services and how these are accessible on foot, cycle or public transport but also the distance and likely travel time to such destinations.

8.1.6 An assessment of the capacity of the proposed site access and surrounding key junctions has been undertaken within **Section 6** of this report, with capacity assessment outputs available within **Appendix J**. These results confirm that the access will have ample capacity to accommodate the predicted traffic flows in 2034 with the development in place.

- 8.1.7 The development traffic will also have a negligible impact on the surrounding highway network, in particular the junctions mentioned within **Section 3** and assessed within **Section 6**.
- 8.1.8 A review of personal injury accidents that have occurred on the local highway network has been undertaken for the most recent five-year period that was available from WCBC. An analysis of those accidents showed that there does not appear to be a proliferation of accidents at any one location suggesting that highway safety is not an issue that would preclude the development of the site.

8.2 Conclusion

- 8.2.1 This report and the associated appendices conclude that that there are no highway safety concerns that would preclude the delivery of this development proposal, the site is accessible by a variety of modes of transport and that the development would have a minimal impact on the operation of the surrounding highway network.
- 8.2.2 As the proposal complies with local and national planning policy and guidance with respect to sustainable accessibility, safety and impact on the highway network, there are no highways or transportation related reasons why planning permission should not be granted. Should the highway authority have any concerns, we are happy to consult further with them
- .

APPENDIX A

WCBC SCOPING

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SCOPING CHECKLIST FOR: Wrexham Industrial Estate, Wrexham – The Oakes



HIGHWAY AUTHORITY: Wrexham County Borough Council

DATE PREPARED: 06/02/19

Of Ref	Item	Intention	LHA Comments
1	Level of planning approval sought? e.g. outline, full.	Full	
2	Size and description of development proposals	The site will comprise of circa 11 plots in total of B2/B8 use, with a cumulative indicative size of approximately 10,821sqm of B2/B8 use. See Figure 1a in Appendix I for location of site	
3	Description of existing land uses, existing trip distribution	Grassland– no existing trips assumed	
4	Does the development involve the relocation of an existing use?	No	
5	What transport based supporting documents will be produced?	Transport Assessment and Travel Plan	
6	Are traffic surveys of the existing conditions available or required?	Traffic surveys have recently been undertaken within WIE in 2018 for a series of planning applications submitted by FI Real Estate Management. It is proposed that some of this data be reused, and capacity assessments completed for the below junctions. • Bridge Rd North / Redwither Rd (priority); • Bridge Rd/Coed Aben Rd (priority); and • Clywedog Rd N/Coed Aben Rd (priority). The location for the traffic surveys are shown in Figure 1b in Appendix I.	
7	Details of any other developments to be taken into account.	It is noted that a number of planning applications have been recently submitted for B2/B8 uses on WIE by FI Real Estate Management. These development proposals are located at: • Site 2 – 25,069 sqft B2/B8 (Clywedog Rd N)	

SCOPING CHECKLIST FOR: Wrexham Industrial Estate, Wrexham – The Oakes



HIGHWAY AUTHORITY: Wrexham County Borough Council

DATE PREPARED: 06/02/19

		- Site 3 – 45,079 sqft B2/B8 (Clywedog Rd E) - Site 4 – 35,015 sqft B2 (Clywedog Rd N) - Site 5a – 69,986 sqft B2/B8 (Clywedog Rd S) - Site 5b – 27,071 sqft B2 (Clywedog Rd S) <u>Please confirm if any other developments should be considered</u>	
8	Details of any adjacent highway improvement proposals by others	Please advise if there are any highway improvement schemes that need to be taken account of.	
9	When are the critical periods for assessments?	Weekday AM and PM peaks derived from surveys mentioned above.	
10	When would the site be fully operational?	2024 (assumed)	
11	What are the assessment years?	Transport Assessment to be submitted. Previously undertaken surveys are proposed to be used. These will have 2018 (base flows only) and 2024 (with and without development) as the assessment years.	
12	Traffic growth factors?	This Transport Assessment will use TEMPRO growth will be used and manually adjusted with committed development (referenced in Point 7) removed from planning assumptions to remove double counting, with NTM adjustment applied (2018-2024).	
13	How will vehicular trip generation be derived for the proposal?	TRICS 7.4.4 database. Indicative vehicular trip rates and generation are represented in the table below, based upon indicative combined plot sizes:	

SCOPING CHECKLIST FOR: Wrexham Industrial Estate, Wrexham – The Oakes



HIGHWAY AUTHORITY: Wrexham County Borough Council

DATE PREPARED: 06/02/19

		Industrial Warehousing –6502sqm (B2/B8) <table><tr><th></th><th colspan="2">Arrivals</th><th colspan="2">Departures</th><th colspan="2">Total</th></tr><tr><th>Time</th><th>Rate</th><th>Flow</th><th>Rate</th><th>Flow</th><th>Rate</th><th>Flow</th></tr><tr><td>08:00-09:00</td><td>0.349</td><td>0.193</td><td>0.542</td><td>23</td><td>13</td><td>35</td></tr><tr><td>17:00-18:00</td><td>0.089</td><td>0.277</td><td>0.366</td><td>6</td><td>18</td><td>24</td></tr></table> Industrial Unit –4319sqm (B2) <table><tr><th></th><th colspan="2">Arrivals</th><th colspan="2">Departures</th><th colspan="2">Total</th></tr><tr><th>Time</th><th>Rate</th><th>Flow</th><th>Rate</th><th>Flow</th><th>Rate</th><th>Flow</th></tr><tr><td>08:00-09:00</td><td>0.385</td><td>0.094</td><td>0.479</td><td>17</td><td>4</td><td>21</td></tr><tr><td>17:00-18:00</td><td>0.056</td><td>0.426</td><td>0.482</td><td>2</td><td>18</td><td>21</td></tr></table> The TRICS output is attached in Appendix II Please confirm acceptance of the above trip rates. Noted that they have been accepted to previous schemes		Arrivals		Departures		Total		Time	Rate	Flow	Rate	Flow	Rate	Flow	08:00-09:00	0.349	0.193	0.542	23	13	35	17:00-18:00	0.089	0.277	0.366	6	18	24		Arrivals		Departures		Total		Time	Rate	Flow	Rate	Flow	Rate	Flow	08:00-09:00	0.385	0.094	0.479	17	4	21	17:00-18:00	0.056	0.426	0.482	2	18	21	
	Arrivals		Departures		Total																																																						
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17:00-18:00	0.056	0.426	0.482	2	18	21																																																					
14	How will non-car mode trip generation be derived for the proposal?	Method of Travel to Work information is to be used from 2011 Census data, alongside the TRICS derived trips, to determine the likely number of non-car movements generated by the development.																																																									
15	Would traffic from adjacent sites be attracted to the site? Pass-by traffic?	100% newly generated trips.																																																									
16	What is the assumed trip distribution?	The Transport Assessment will distribute trips generated by the site in accordance with Journey to Work information derived from 2011 Census data.																																																									
17	What is the extent of the accident study area to be considered?	See suggested study area in Figure 1b . Accident data has previously been obtained from WCBC for the industrial estate for the most up to date five-year period.																																																									
18	Capacity tests required for	A capacity assessment will be undertaken as part of this application. The junctions																																																									

SCOPING CHECKLIST FOR: Wrexham Industrial Estate, Wrexham – The Oakes



HIGHWAY AUTHORITY: Wrexham County Borough Council

DATE PREPARED: 06/02/19

	the proposed and following existing junctions	proposed for assessment are highlighted in section 6 as well as figure 1b , and will be assessed in accordance to the cumulative impact of the proposed site.	
19	Are adjacent junctions or links likely to become overloaded?	To be determined through capacity assessment	
20	Is a new or modified highway access likely?	It is proposed that the site would be accessed via: - a proposed 36m ICD roundabout at the Oak Road / Bryn Lane junction shown in figure 2 in Appendix I. Figure 2 highlights the proposed geometries and carriageway widths. <i>*Figure 2 was designed in accordance to DMRB TD16/93. Roundabout will be updated in accordance to DMRB TD16/07 standards</i> - An emergency access is proposed to the east of this roundabout (circa 230m), egressing to Oak Road, and is highlighted within Figure 3 in Appendix I (4m wide carriageway comprising of 2m footway and 2m cycleway, 6m radius, 2.4m x 120m visibility splays DMRB@40mph) <u>Comments welcome on suggested access arrangements at an early stage</u>	
21	What are the visibility requirements? Are those requirements met?	Current proposed roundabout design will be updated in accordance to DMRB TD16/07 standards, and will conform too up to date visibility standards	
22	What level of car parking is required?	Please advise on most current local guidance such that reference can be made in the Transport Assessment	
23	Are special provisions required for cyclists, pedestrians, those with a disability or public transport?	To be reviewed as part of the Transport Assessment	
24	What planning policy should the development comply with?	- Planning Policy Wales (Edition 7, July 2014); - North Wales Joint Local Transport Plan 2015; - Wrexham Local Development Plan2 (2013-2028); - Wrexham Unitary Development Plan 1996-2011;	

SCOPING CHECKLIST FOR: Wrexham Industrial Estate, Wrexham – The Oakes



HIGHWAY AUTHORITY: Wrexham County Borough Council

DATE PREPARED: 06/02/19

		• WCBC LPG 16; • Wrexham connected: Urban Mobility Plan 2016 <u>Please advise if any more documents should be taken into account.</u>	
25	Are there any other special circumstances relevant to this proposal?	<u>Please advise</u>	

ATTACHMENTS: -

APPENDIX I

FIGURES

FIGURE 1A – SITE LOCATION

FIGURE 1B - TRAFFIC SURVEY AND ACCIDENT STUDY AREA PLAN

FIGURE 2 – PROPOSED ROUNDABOUT

FIGURE 3 – PROPOSED EMERGENCY ACCESS

APPENDIX II

TRICS OUTPUT

Anthony Morley

From: Anthony Morley
Sent: 24 September 2019 09:42
To: Andrew Mytton
Cc: 'Phil Palmer'
Subject: The Oaks, Oak Road, Wrexham Industrial Estate - Public Transport funding

Good Morning Andrew,

A meeting was held yesterday between Prime and WCBC Highways. This meeting addressed comments which have been made for planning application ET/PP/DC/Pre/2019/031 (The Oaks, Oak Road, Wrexham Industrial Estate). It was highlighted during this meeting that yourself should be contacted in regards to public transport funding. The meeting highlighted that funding for £25,000 per year (for 3 years) was to be sought in line with the development.

As such, could you please provide Prime with justification for this funding by answering the below questions:

- What is the funding for?
- What scheme would this contribution be funding and how would the money be spent?
- Who else/what other developments are contributing?
- What other sources of funding have been secured?

Given timescales which we have been set, we will be continuing to address other comments made in relation to the application and updating our transport assessment. We would then kindly request that a response be received from yourself

on or before the Friday 11th October 2019.

Any questions do not hesitate to contact myself,

Best Regards,

Anthony Morley
Transport Planner

D: +44 (0)151 728 1868

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J10 Planning

1-3 Upper Eastgate Row
Eastgate Row North
Chester CH1 1LQ

Eich Cyf/Your Ref
Ein Cyf/Our ref
Dyddiad/Date
Gofynner am/Ask for
Rhif Cyswllt/Contact No
E-bost/E-mail

ET/PP/DC/Pre/2019/031
20th August 2019
Mr P Palmer
01978 729688
phil.palmer@wrexham.gov.uk

FAO: Justin Paul

Dear Sir

**The Oaks, Oak Road, Wrexham Industrial Estate , Wrexham.
Proposed Industrial Units (Plots 1 – 7)**

**Pre-application Consultation – Article 2(1) of the Town and Country Planning
(Development Management Procedure – Wales) Order 2012.**

I refer to your email / consultation dated 02/08/2019 in respect of the above and comment as follows:-

Access

The proposed development site is located on Oak Road which is an unclassified road subject to a 40mph.

Any proposed / existing accesses in this location would normally be required to provide visibility splays of 2.4 x 120m in both directions measured to the nearside edge of the adjoining highway in accordance with TAN 18 / DMRB Standards.

Submitted layout plan (Drg.No. P19014-001 C) indicates visibility splays of 4.5 m x 120m from the proposed access which is considered acceptable. I would recommend that all land required to provide these splays is dedicated to the Highway Authority for future maintenance.



Proposed Site Plan Drg. No. 003 F

Access

Any proposed access will need to provide a minimum 7.3m wide access width with 15m kerb radii. This has been demonstrated on the submitted layout plan.

The proposed access takes the form of a simple T-junction. However, based on the submitted TRICs data / traffic flows, DMRB would appear to recommend the provision of a right hand turning lane / ghost island. Further clarification on why a simple T-junction has been proposed will need to be provided.

The provision of a right hand turning lane will impact on the junction of Abbey Road and may affect the junction with Bryn Lane. In this instance a right hand turning lane will also be required for the Abbey Road junction.

It would be considered preferable to access the site via a new roundabout located at the junction of Bryn lane / Oak Road rather than creating an additional access off Oak Road. I would recommend that this arrangement is considered prior to submitting a planning application.

A pedestrian crossing / splitter island will be required across the proposed access.

Any proposed new access in this location will require Stage 1, 2 & 3 Safety Audits. I would recommend that Stage 1 & 2 Safety Audits are submitted as part of any planning application to ensure a safe and satisfactory access can be provided.

Appropriate dropped kerb crossing points will need to be provided further along Oak Road in order to provide safe pedestrian access to the existing bus stop / shelter on the opposite side of the road.

The applicant will be required to enter into a s.38 / 278 agreement with the Council to carry out any access / footway works.

Footpath links

I understand that it is proposed to provide footpath links from the development site to Oak Road and to the existing public footpath (PROW No. 19 – Abenbury). I would strongly recommend that you liaise with our Public Rights of Way Section on this matter – contact: Sean Hanratty on Tel: 01978 729761.

Emergency Access / Cycleway Links

I would recommend that a suitable emergency access is provided from the site onto Oak Road. Such an access could also accommodate appropriate cycleway provision to support Active Travel. Insufficient information has been provided in terms of both emergency access provision and how cycleway links will be provided to existing cycleway infrastructure in this area. Further details will need to be provided as part of any future planning application

Layout

The submitted layout plan appears to indicate 2m wide footways on both sides of the internal estate road which is considered acceptable.

The proposed turning head is not laid out to adoptable standards. The proposed factory unit accesses appear to be laid out to a non-standard specification and appear to include trees planted within visibility splays. Based on the submitted layout, we would not wish to adopt such a layout. In this instance, the proposed internal estate road would need to be managed in perpetuity by a private management company.

Adequate parking and turning provision would need to be provided for each industrial unit in accordance with LPGN 16 requirements. The proposed parking provision allocated to each unit in respect of Class B1 / B8 use appears to represent 100% provision which is considered adequate. Further details / layout plans in respect of parking and turning provision for each industrial unit will need to be provided.

Transport Assessment

The proposed access takes the form of a simple T-junction. However, based on the submitted TRICs data / traffic flows, DMRB would appear to recommend the provision of a right hand turning lane / ghost island. Further clarification on why a simple T-junction has been proposed will need to be provided.

The provision of a right hand turning lane will impact on the junction of Abbey Road and may affect the junction with Bryn Lane. In this instance a right hand turning lane will also be required for the Abbey Road junction.

A pedestrian crossing / splitter island will be required across the proposed access.

It would be considered preferable to access the site via a new roundabout located at the junction of Bryn lane / Oak Road rather than creating an additional access off Oak Road. I would recommend that this arrangement is considered prior to submitting a planning application.

Any proposed new access in this location will require Stage 1, 2 & 3 Safety Audits. I would recommend that Stage 1 & 2 Safety Audits are submitted as part of any planning application to ensure a safe and satisfactory access can be provided.

Swept Path Details Drg. Nos. P19014-003 & P19014-004

The swept path details indicated for a 16.5m HGV entering / exiting the site access and turning head are considered acceptable.

Suitable turning areas within the each factory unit service yard will be required to accommodate the turning movements of a 16.5m HGV. The number of HGVs permitted on site at any one time will need to be limited in order to maintain sufficient space for turning. This could be controlled by a suitable planning condition ie/ Service & Delivery Management Plan.

Public Transport Provision

Current public transport provision serving the industrial estate is poor. I would strongly recommend that you discuss the proposed development including potential funding for an improved bus service with our Public Transport Officer – Andrew Mytton on Tel: 01978 729760.

Surface Water Drainage

A suitable scheme to dispose of highway surface water run-off within the site will need to be submitted and approved. This will need to be assessed / approved by our Flood management Officer – Neil Taunt.

No private surface water run off shall be permitted to flow onto the adjoining highway. An Aco drain or similar shall be provided across the access to intercept such run-off.

Details of the how the new section of highway forming the access / bellmouth will be drained will need to be provided.

Proposed Lighting

Any proposed internal lighting scheme must not provide any disabling glare / distraction to drivers on the adjoining highway. This could be controlled by a suitable planning condition. The proposed development may well require additional lighting columns to illuminate the adoptable section of the new access. I would recommend that the applicant indicates this detail on a revised layout plan. I would recommend that the applicant liaises with our Street Lighting Section – contact Paul Rogers on Tel: 01978 729673 on this matter.

Service and Delivery Management Plan (SDMP)

I would recommend that any proposed planning application includes a suitable Service and Delivery Management Plan including the following details:-

- Details of staff numbers employed, number of visitors per day, number of HGVs visiting site per day, maximum number of HGVs permitted on site at any one time.
- Statement that no parking or stacking of vehicles (ie/ either staff vehicles or HGVs) shall occur on the public highway. Details of how deliveries will be managed to avoid the above will need to be included in a SDMP.

Construction Traffic Management Plan - including details of contractor parking

In order to construct the proposed scheme, the applicant will need to submit a Construction Traffic Management Plan including details of contractor parking for further approval. This could be included as a planning condition should an application be supported.

You are advised that the above comments are those of an officer of the council and do not commit the Council in any way with regard to the determination of any formal planning application that may be submitted. You are also advised that the above comments take account of policies and guidance adopted by the Council at the present time and which remain open to continuous review.

Yours faithfully



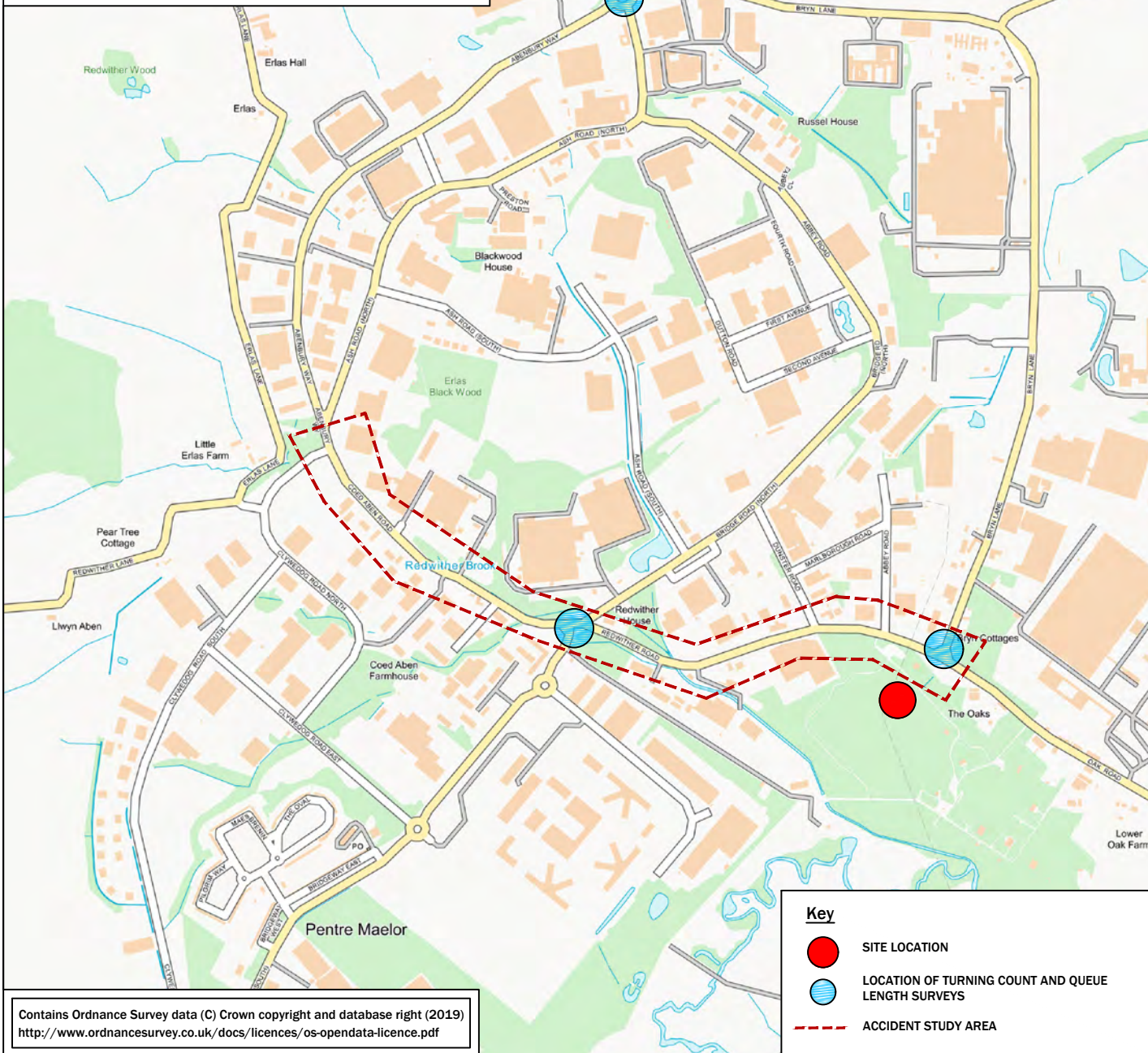
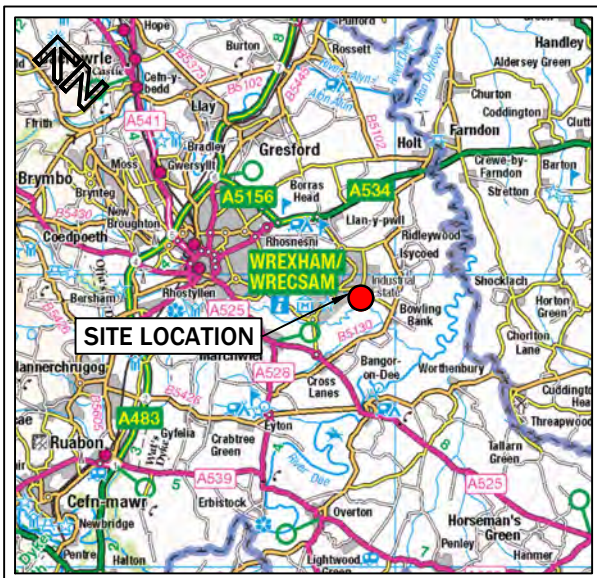
 Chief Officer, Environment & Technical

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APPENDIX B

FIGURE 1 – SITE LOCATION PLAN/ACCIDENT STUDY AREA

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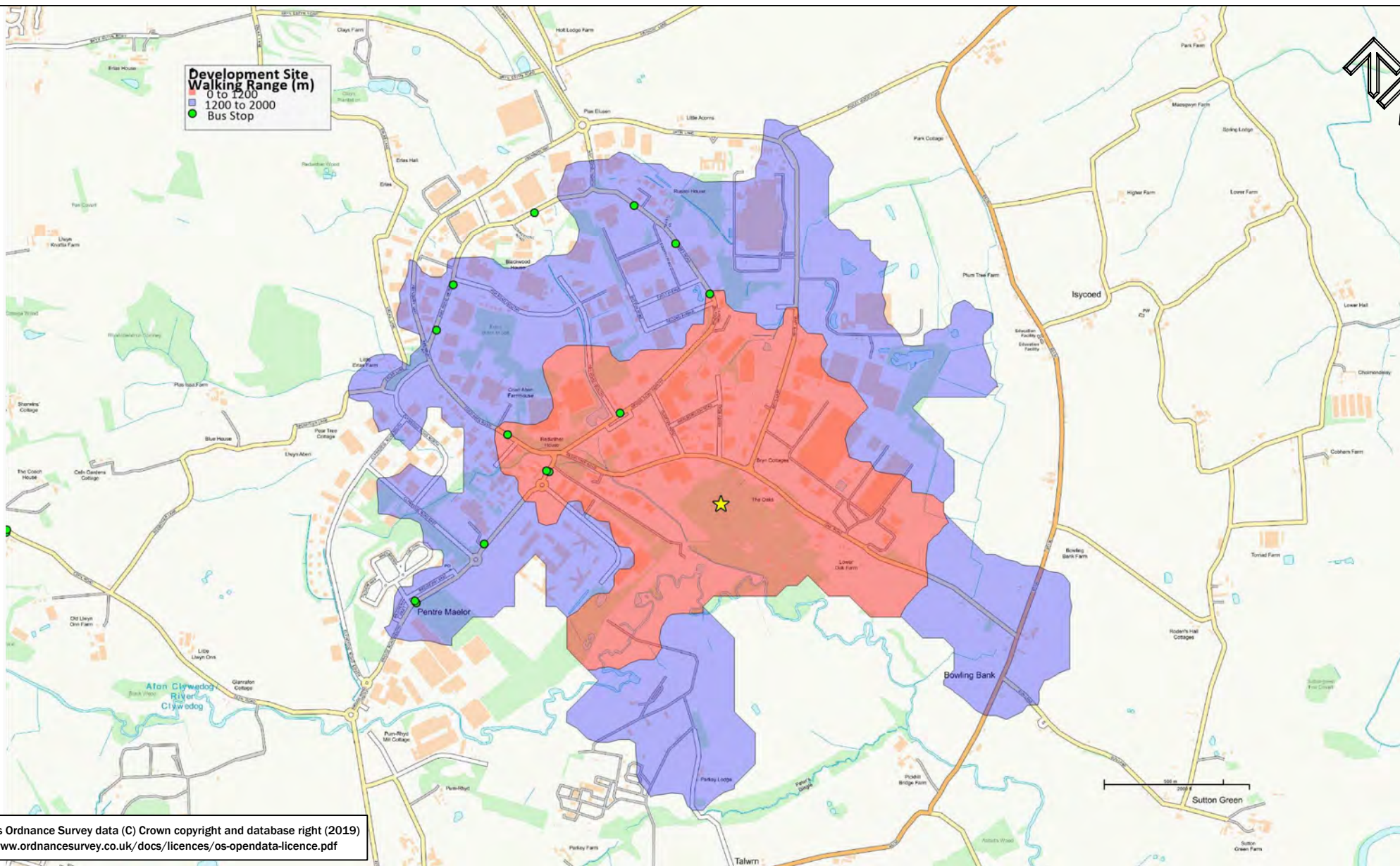
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Title	SITE, TRAFFIC SURVEY LOCATION PLAN & ACCIDENT STUDY AREA	

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FIGURE 2 – WALKING ISOCHRONE

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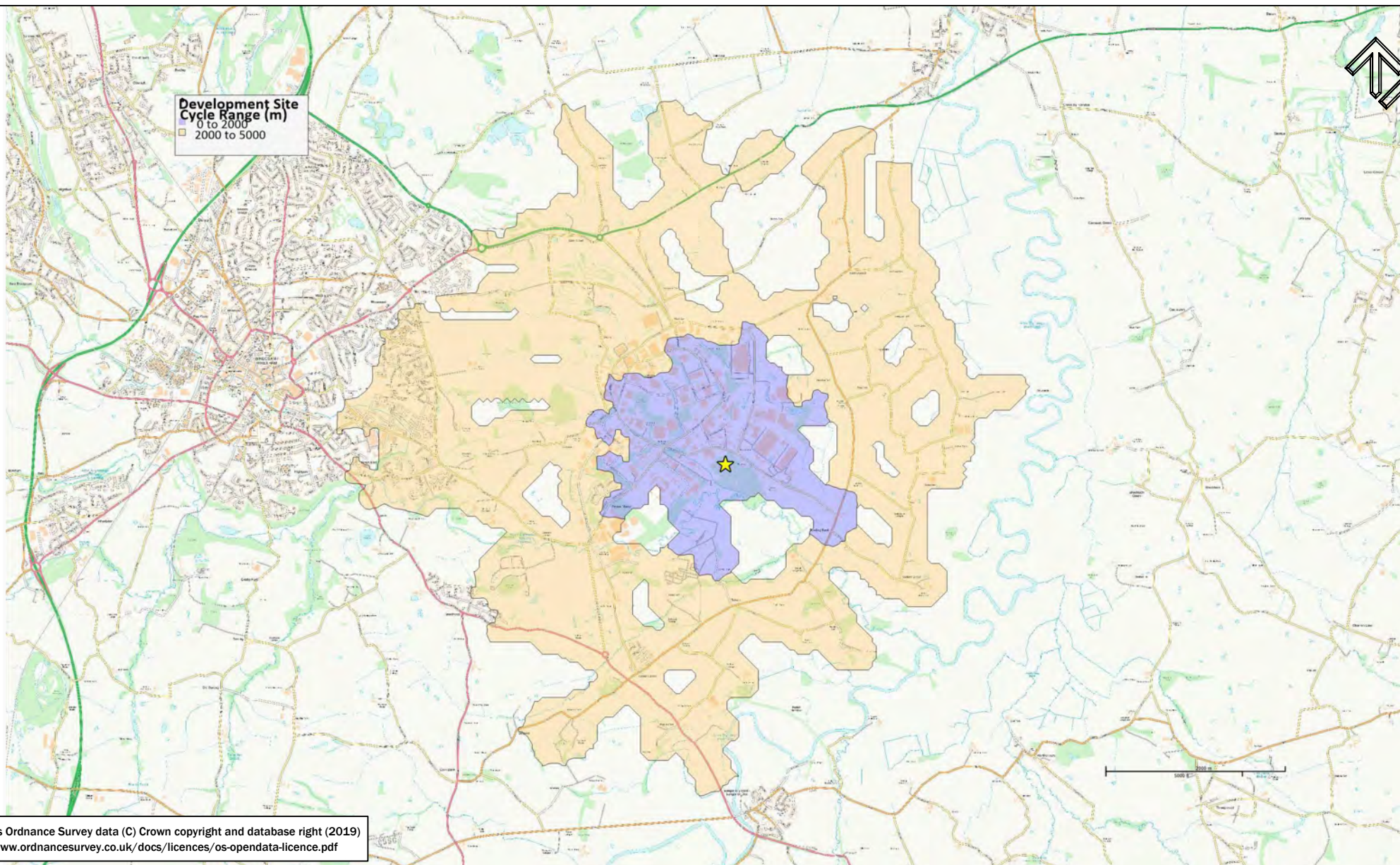
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Title	WALKING ISOCHRON

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FIGURE 3 – CYCLING ISOCHRONE

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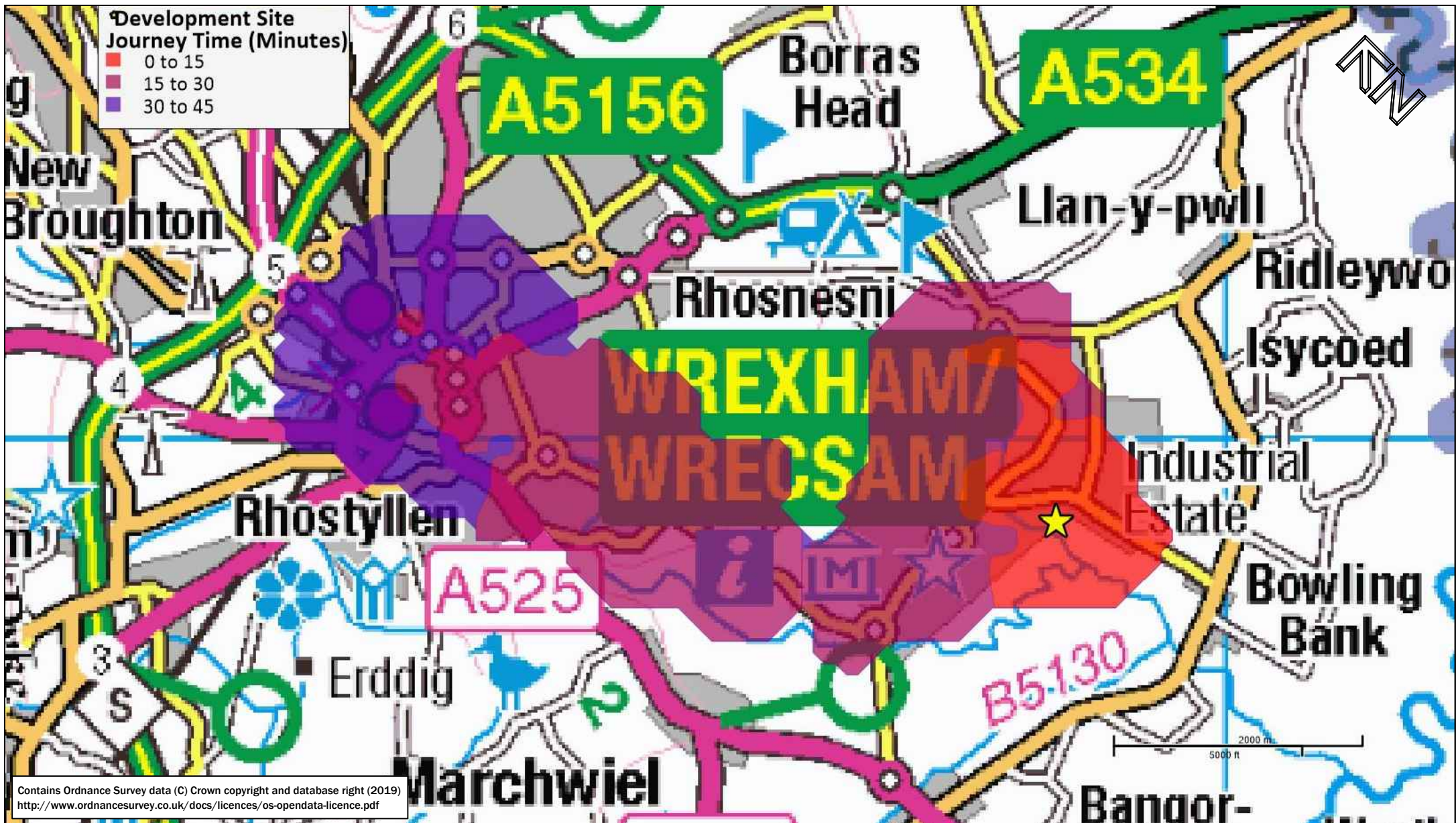
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Title	CYCLING ISOCHRONE

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FIGURE 4 – BUS JOURNEY TIME ISOCHRONE

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Project	WREXHAM INDUSTRIAL ESTATE - THE OAKS SITE
Title	BUS JOURNEY TIME ISOCHRONES

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APPENDIX C

TRAFFIC FLOW DIAGRAM

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Traffic Flow Diagrams			
Reference	Scenario	Peak	Derivation
1	Traffic Flow Diagram 1 - 2018/2019 Observed Flows	AM (0730-0830)	Raw Data
2	Traffic Flow Diagram 2 - 2018/2019 Observed Flows	PM (1615-1715)	Raw Data
3	Traffic Flow Diagram 3 - 2034 Base Flows	AM (0730-0830)	1*TEMPro
4	Traffic Flow Diagram 4 - 2034 Base Flows	AM (1615-1715)	2*TEMPro
5	Traffic Flow Diagram 5 - Committed Development Flows	AM (0730-0830)	EP/CD/P/2018/1084
6	Traffic Flow Diagram 6 - Committed Development Flows	PM (1615-1715)	EP/CD/P/2018/1084
7	Traffic Flow Diagram 7 - Committed Development Flows	AM (0730-0830)	EP/CD/P/2018/1085
8	Traffic Flow Diagram 8 - Committed Development Flows	PM (1615-1715)	EP/CD/P/2018/1085
9	Traffic Flow Diagram 9 - Committed Development Flows	AM (0730-0830)	EP/CD/P/2018/1086
10	Traffic Flow Diagram 10 - Committed Development Flows	PM (1615-1715)	EP/CD/P/2018/1086
11	Traffic Flow Diagram 11 - Committed Development Flows	AM (0730-0830)	EP/CD/P/2018/1087
12	Traffic Flow Diagram 12 - Committed Development Flows	PM (1615-1715)	EP/CD/P/2018/1087
13	Traffic Flow Diagram 13 - Total Committed Development Flows	AM (0730-0830)	5+7+9+11
14	Traffic Flow Diagram 14 - Total Committed Development Flows	PM (1615-1715)	6+8+10+12
15	Traffic Flow Diagram 15 - 2034 Without Development Flows	AM (0730-0830)	3+13
16	Traffic Flow Diagram 16 - 2034 Without Development Flows	PM (1615-1715)	4+14
17	Traffic Flow Diagram 17 - Distribution	BOTH	MTW Census
18	Traffic Flow Diagram 18 - Development Flows	AM (0730-0830)	17*TRICS
19	Traffic Flow Diagram 19 - Development Flows	PM (1615-1715)	17*TRICS
20	Traffic Flow Diagram 20 - 2034 With Development Flows	AM (0730-0830)	15+18
21	Traffic Flow Diagram 21 - 2034 With Development Flows	PM (1615-1715)	16+19

Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 1 - 2018/2019 Observed Flows

Peak

AM (0730-0830)

Notes:

All flows are in vehicles

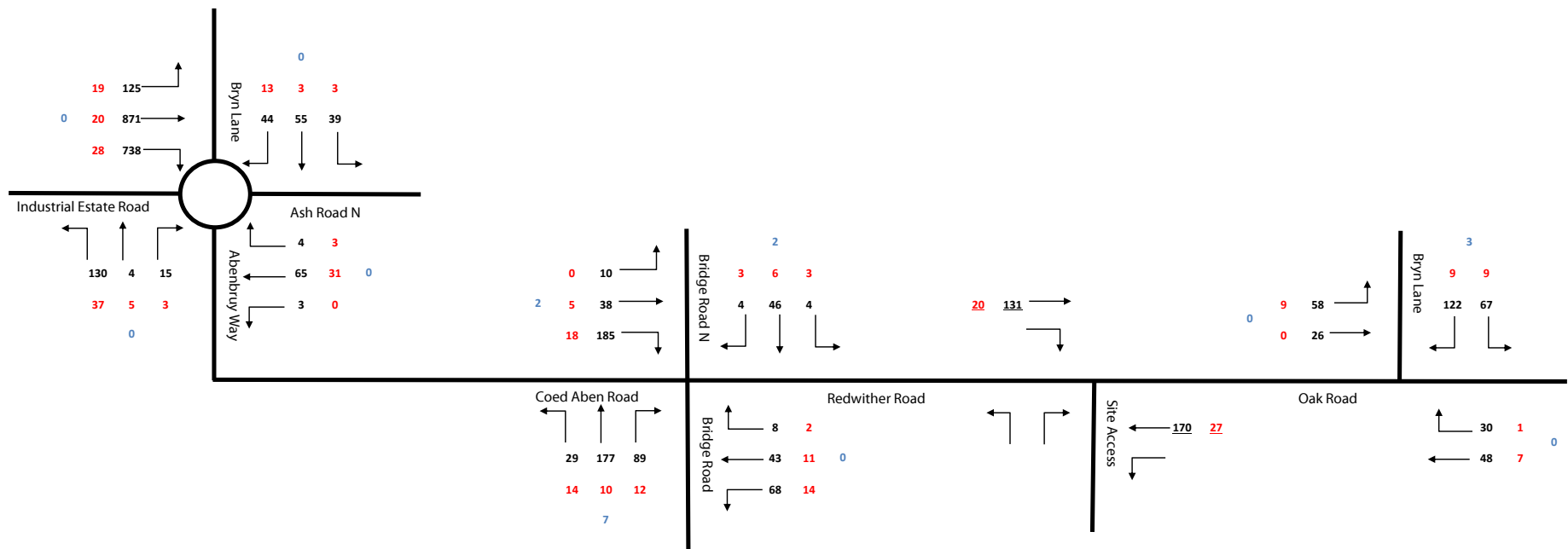
Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Observed queues in blue

Interpolated flows assumed worse case

Coed Aben Rd/Redwither Rd/Bridge Rd N/Bridge Rd Junction- 2018 Flows



Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 2 - 2018/2019 Observed Flows
Peak: PM (1615-1715)
Notes: All flows are in vehicles

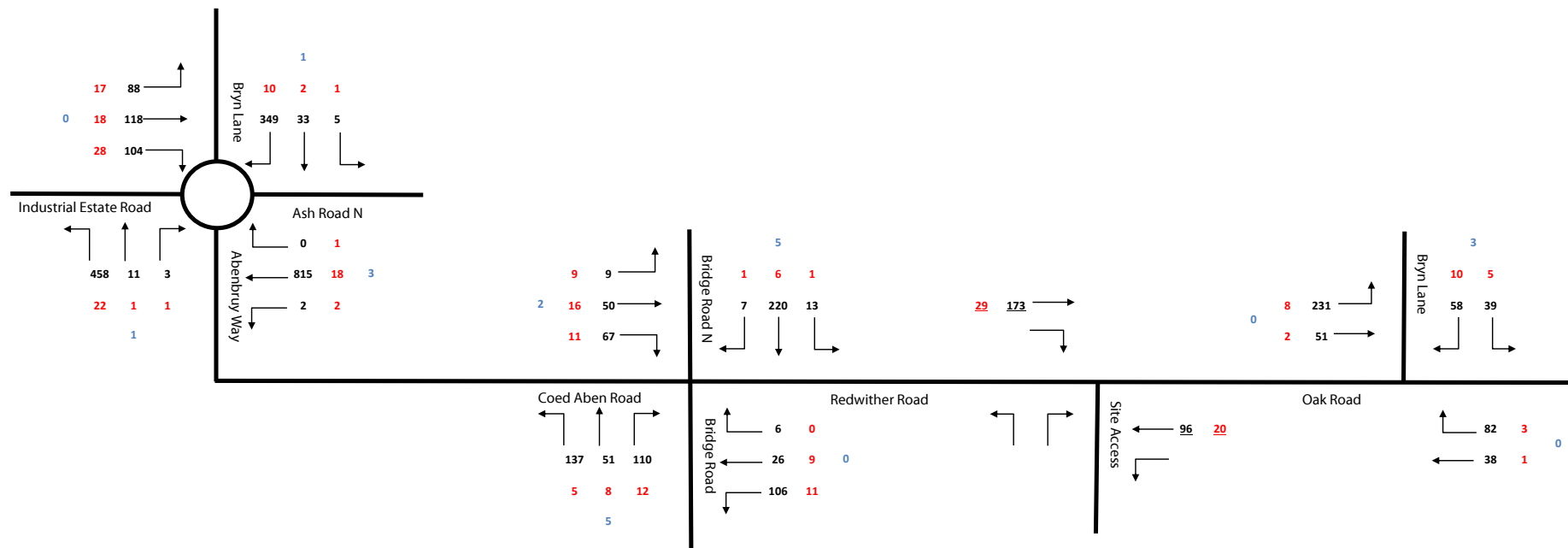
Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Observed queues in blue

Interpolated flows assumed worse case

Coed Aben Rd/Redwither Rd/Bridge Rd N/Bridge Rd Junction- 2018 Flows



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 3 - 2034 Base Flows

Peak

AM (0730-0830)

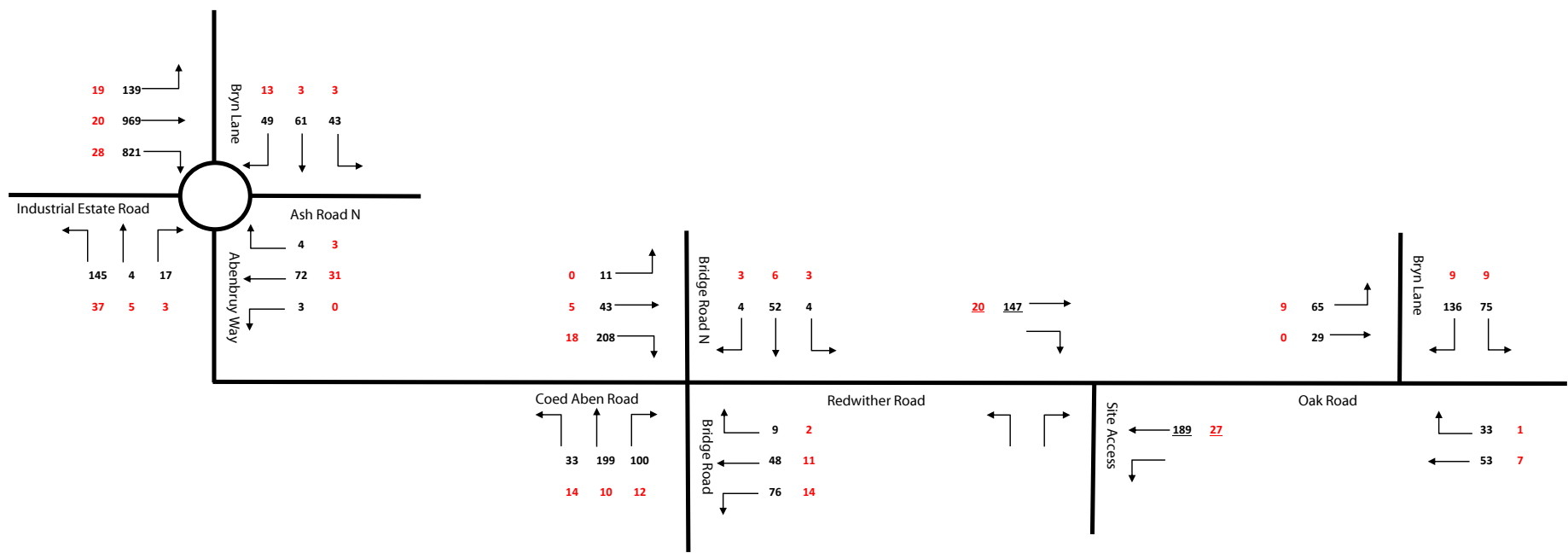
Notes:

All flows are in vehicles

Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Interpolated flows assumed worse case



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 4 - 2034 Base Flows

Peak

AM (1615-1715)

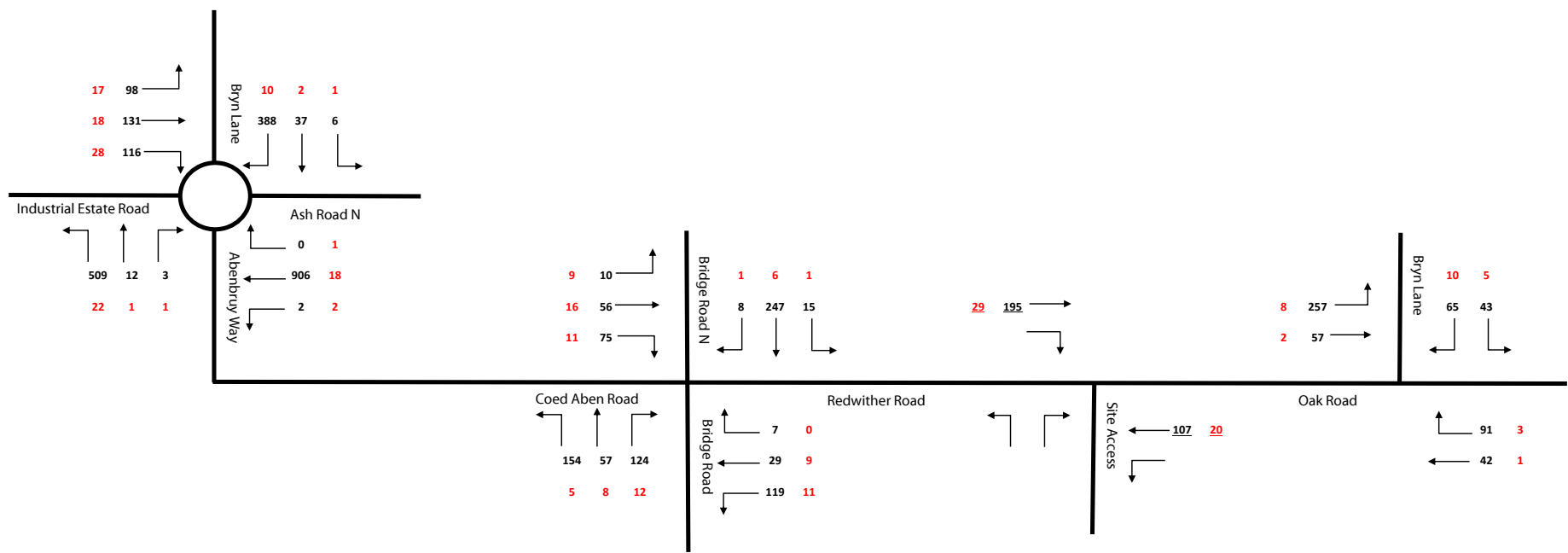
Notes:

All flows are in vehicles

Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Interpolated flows assumed worse case

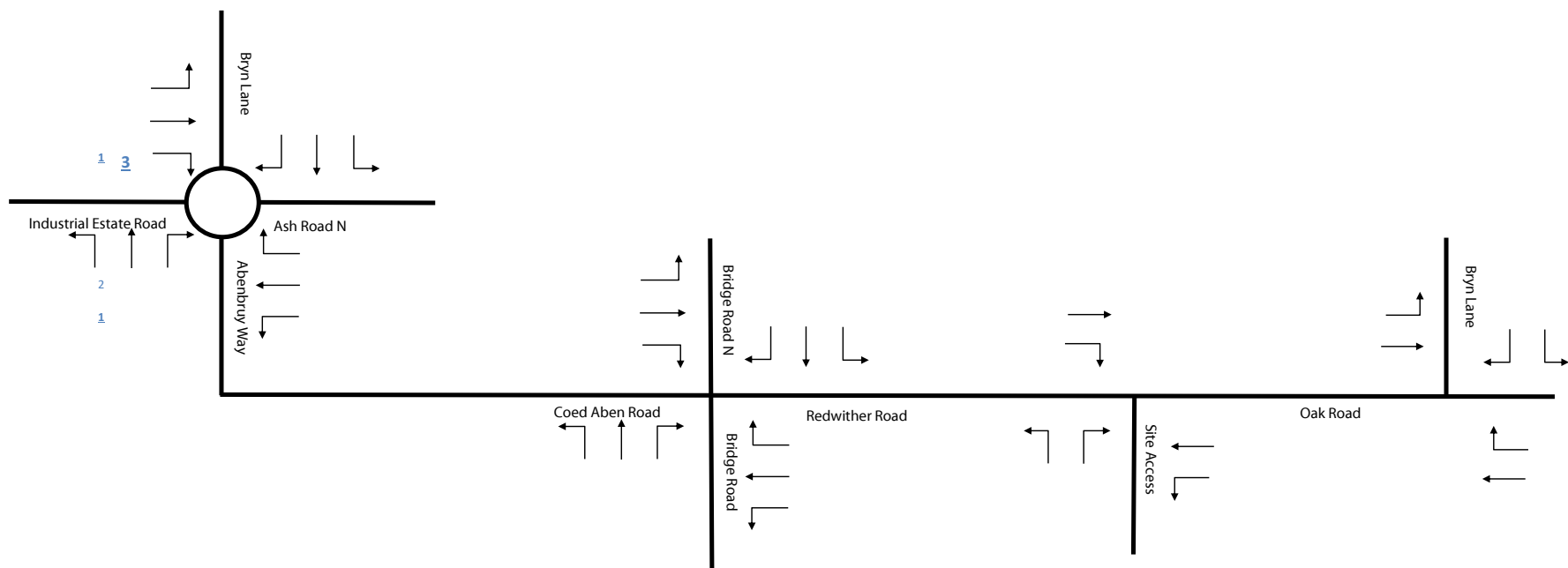


Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 5 - Committed Development Flows
Peak	AM (0730-0830)
Notes:	All flows are in vehicles

Planning Application - EP/CD/P/2018/1084

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

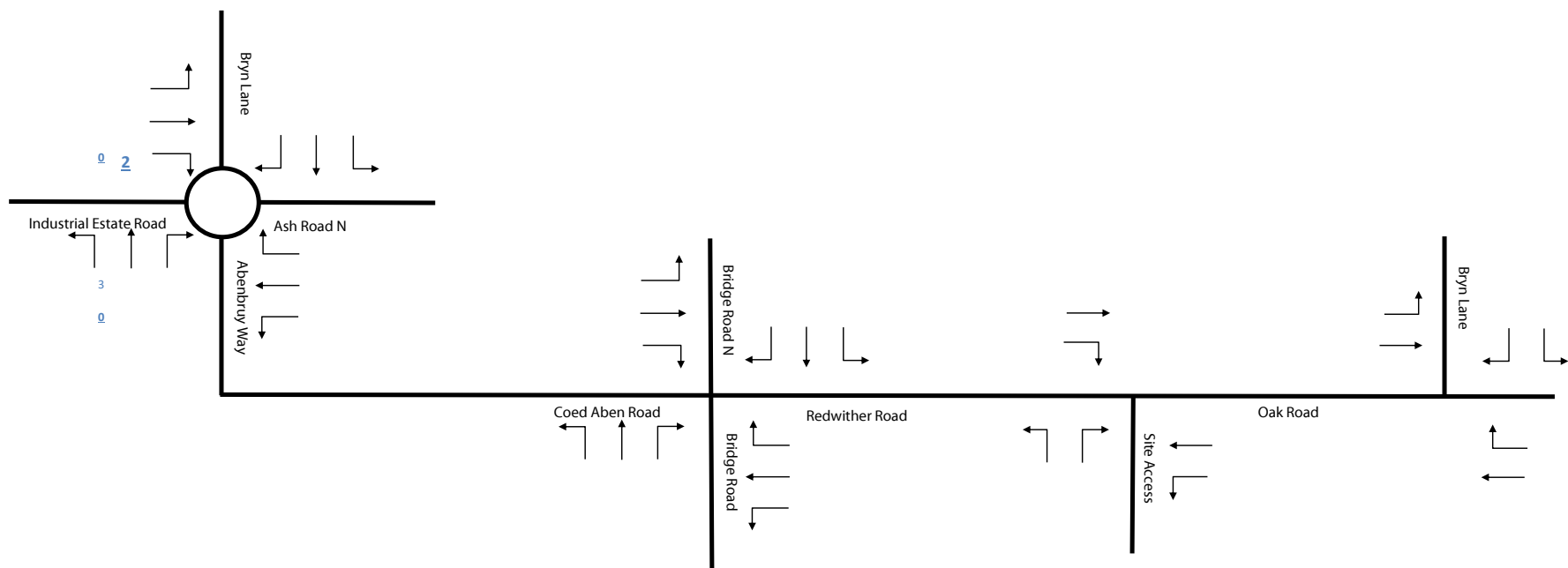


Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 6 - Committed Development Flows
Peak	PM (1615-1715)
Notes:	All flows are in vehicles

Planning Application - EP/CD/P/2018/1084

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

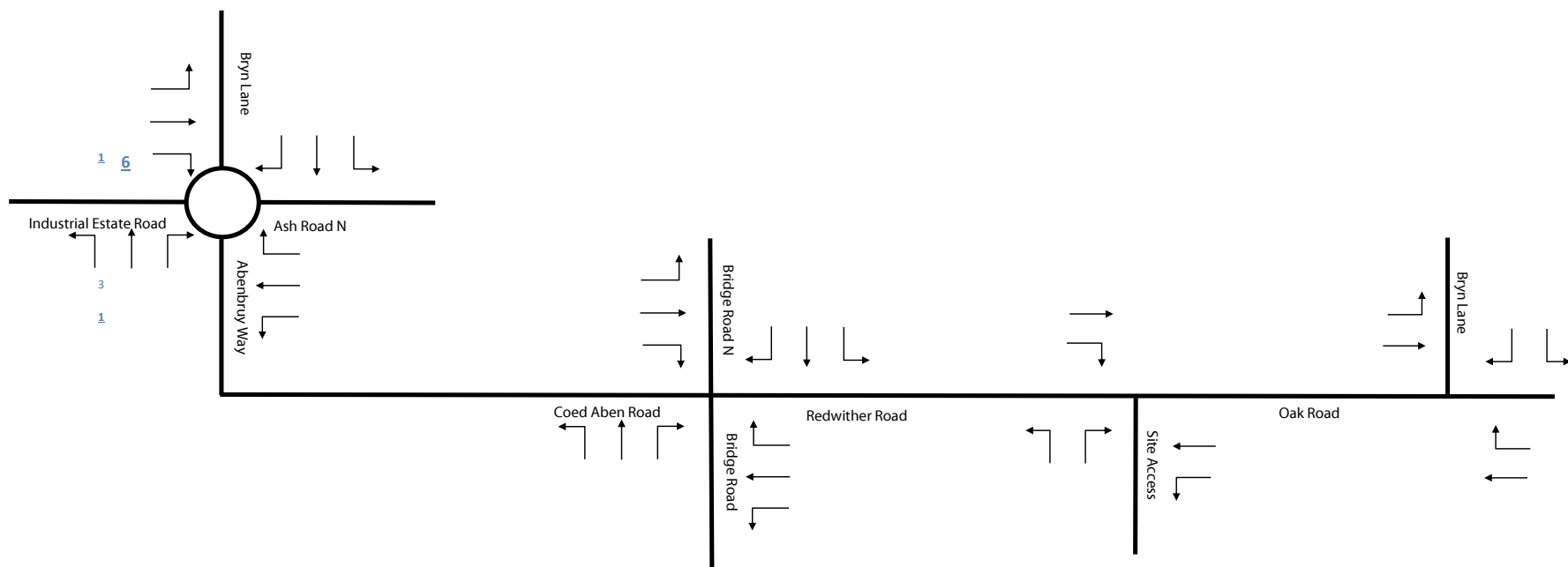


Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 7 - Committed Development Flows
Peak	AM (0730-0830)
Notes:	All flows are in vehicles

Planning Application - EP/CD/P/2018/1085

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

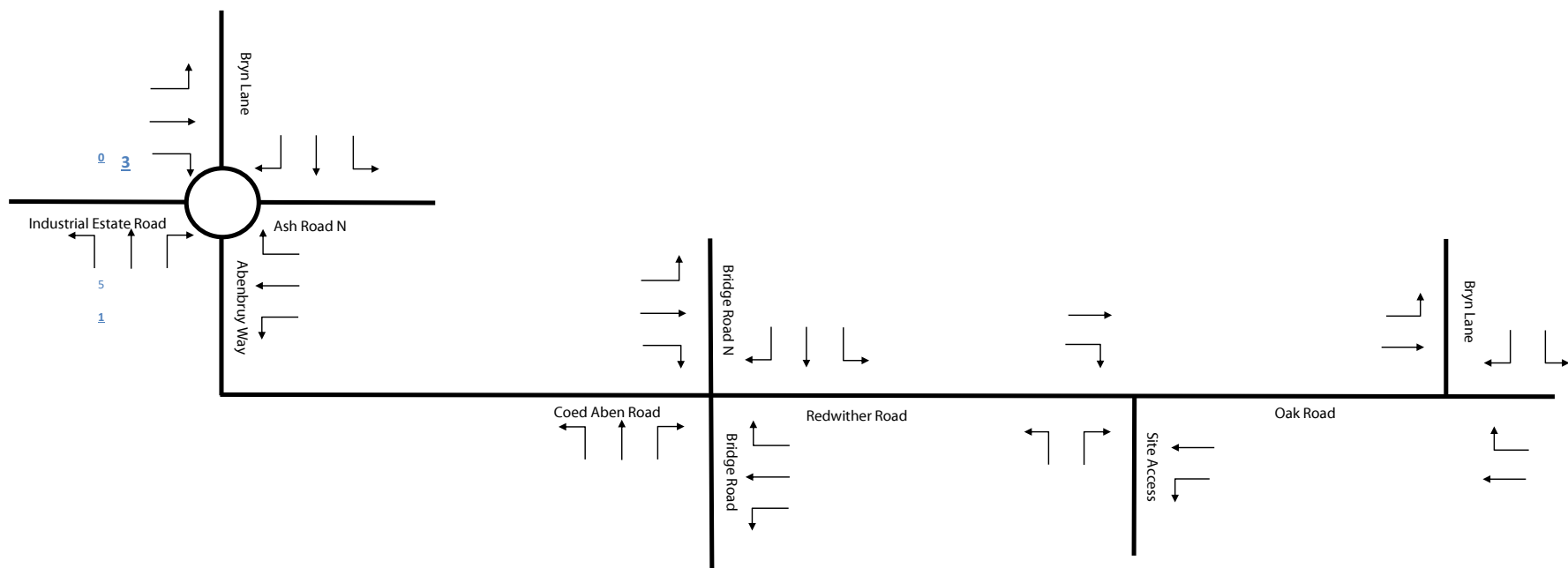


Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 8 - Committed Development Flows
Peak	PM (1615-1715)
Notes:	All flows are in vehicles

Planning Application - EP/CD/P/2018/1085

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

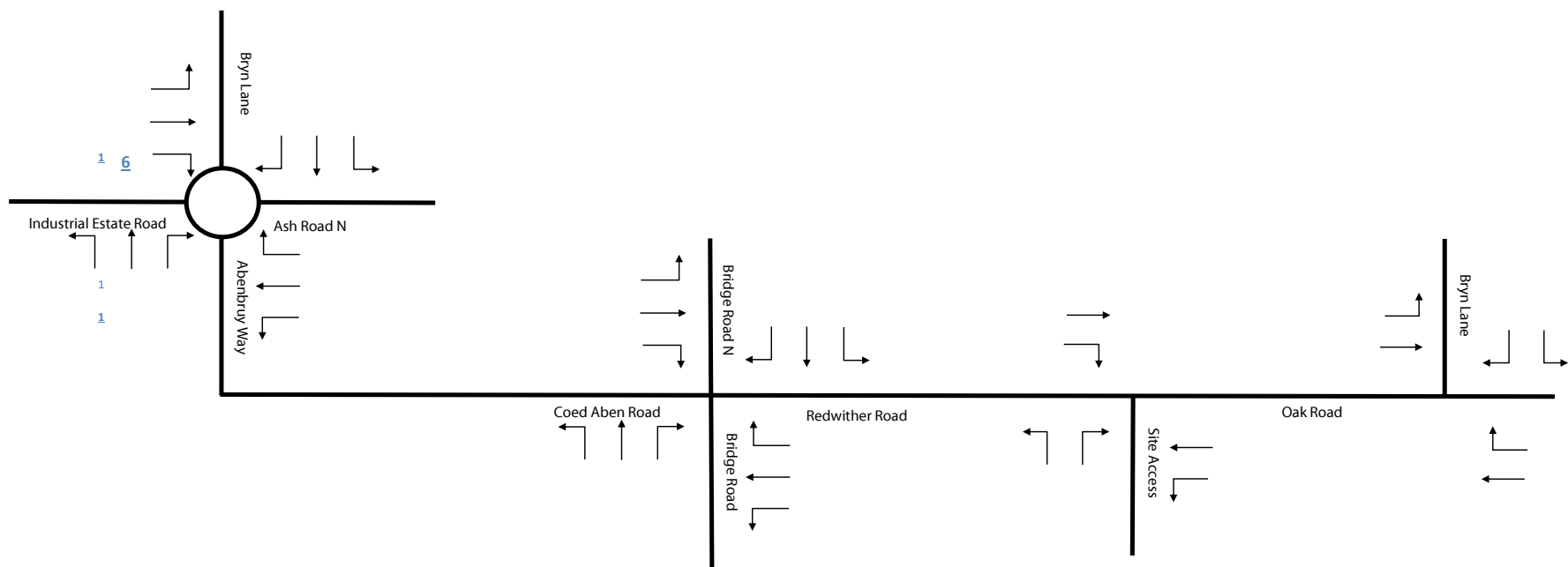


Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 9 - Committed Development Flows
Peak: AM (0730-0830)
Notes: All flows are in vehicles

Planning Application - EP/CD/P/2018/1086

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

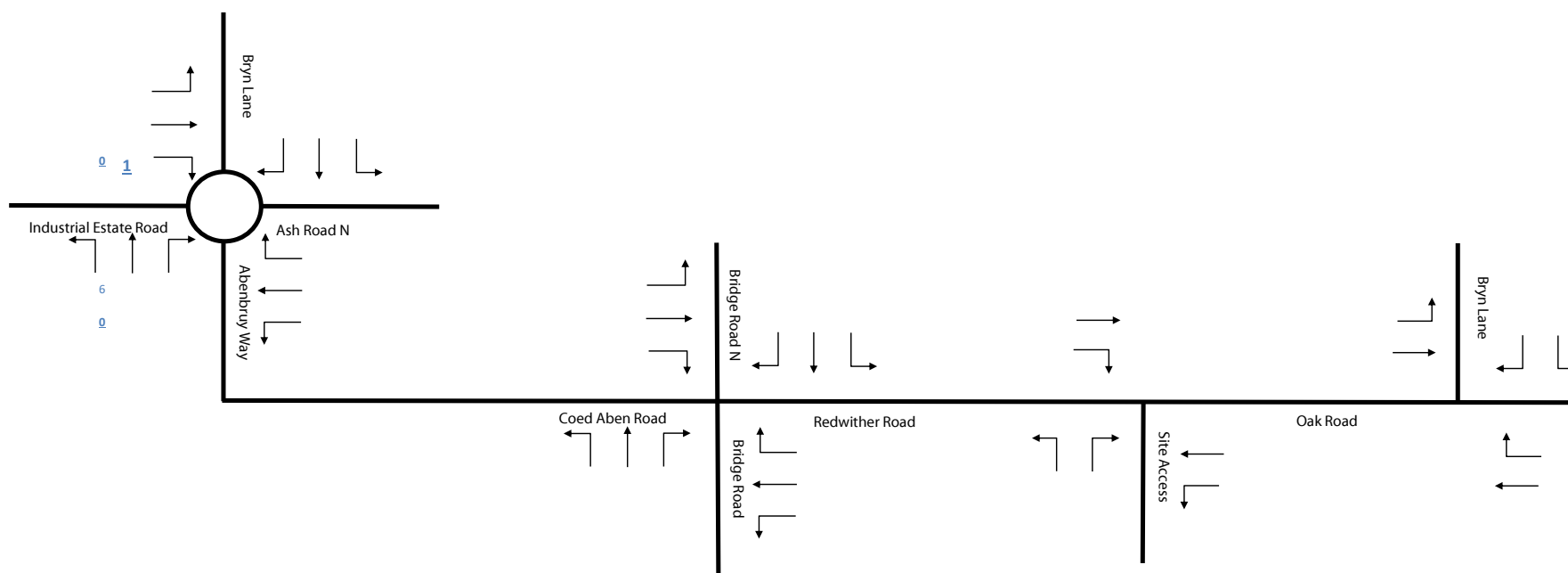


Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 10 - Committed Development Flows
Peak: PM (1615-1715)
Notes: All flows are in vehicles

Planning Application - EP/CD/P/2018/1086

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 11 - Committed Development Flows

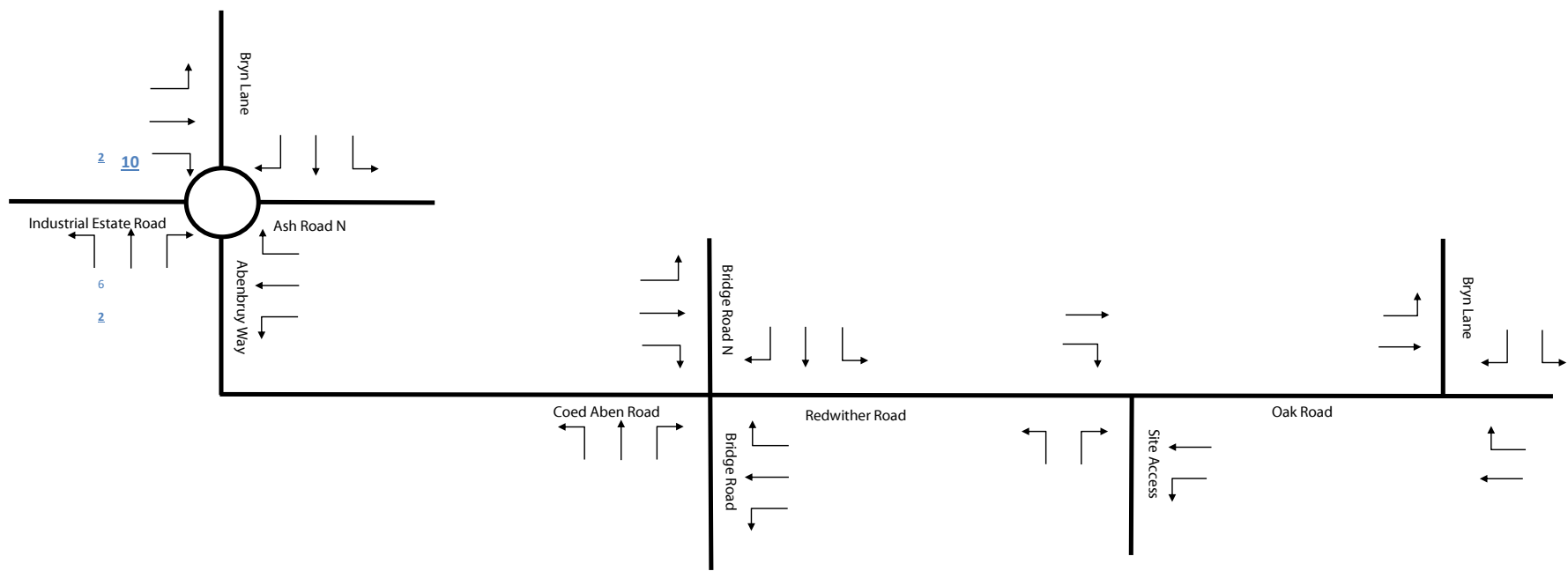
Peak

AM (0730-0830)

Notes:

All flows are in vehicles

Planning Application - EP/CD/P/2018/1087
 Blue text assumed and extrapolated through network
 Heavy Vehicles (HGVs and buses)

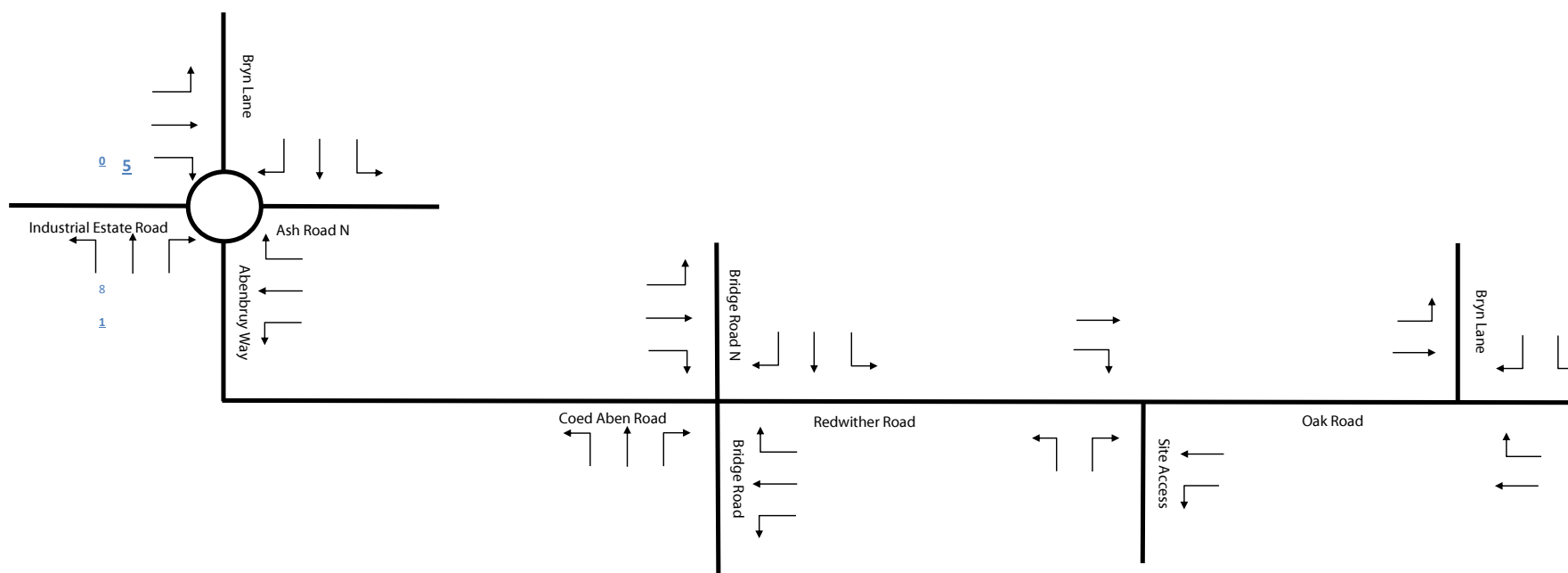


Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 12 - Committed Development Flows
Peak: PM (1615-1715)
Notes: All flows are in vehicles

Planning Application - EP/CD/P/2018/1087

Blue text assumed and extrapolated through network

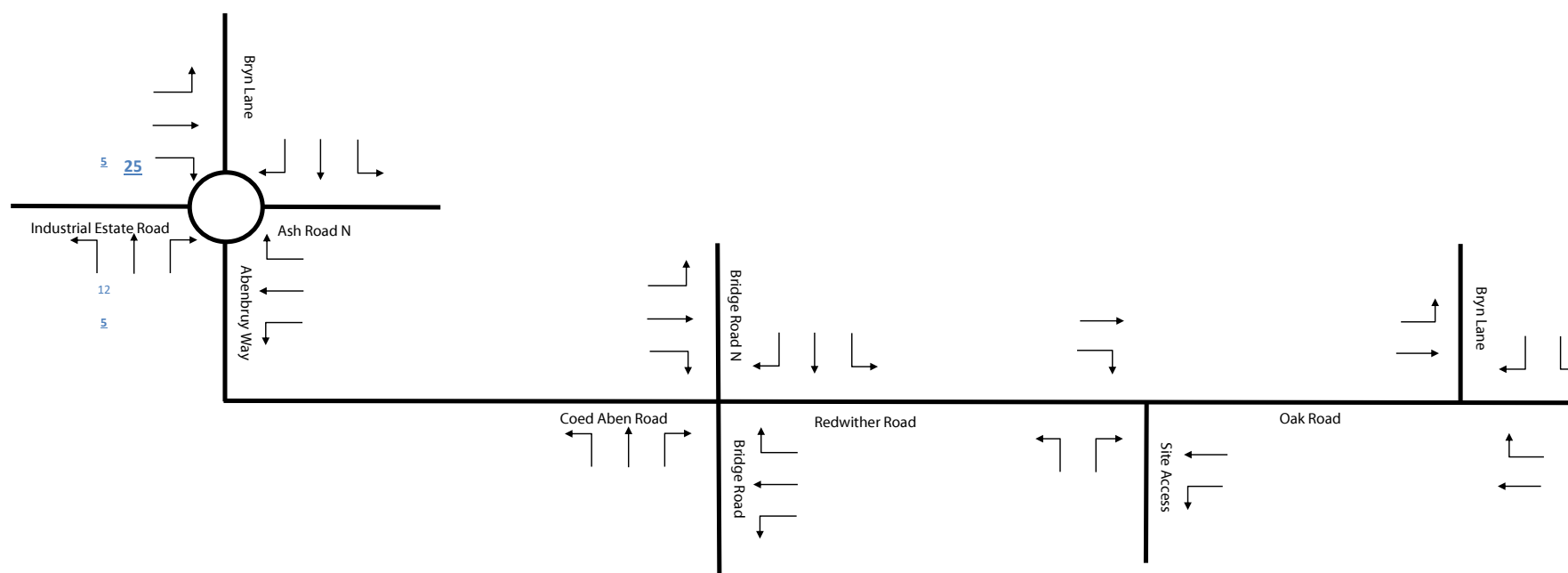
Heavy Vehicles (HGVs and buses)



Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 13 - Total Committed Development Flows
Peak	AM (0730-0830)
Notes:	All flows are in vehicles

Blue text assumed and extrapolated through network

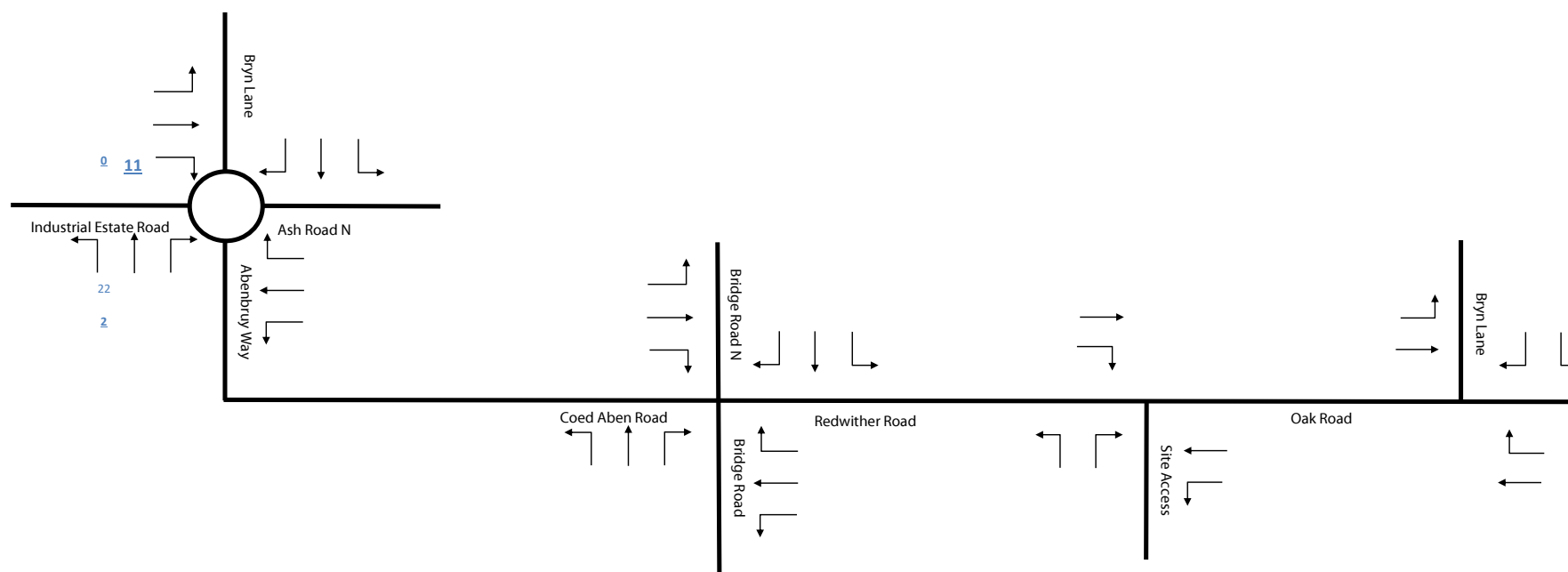
Heavy Vehicles (HGVs and buses)



Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 14 - Total Committed Development Flows
Peak	PM (1615-1715)
Notes:	All flows are in vehicles

Blue text assumed and extrapolated through network

Heavy Vehicles (HGVs and buses)

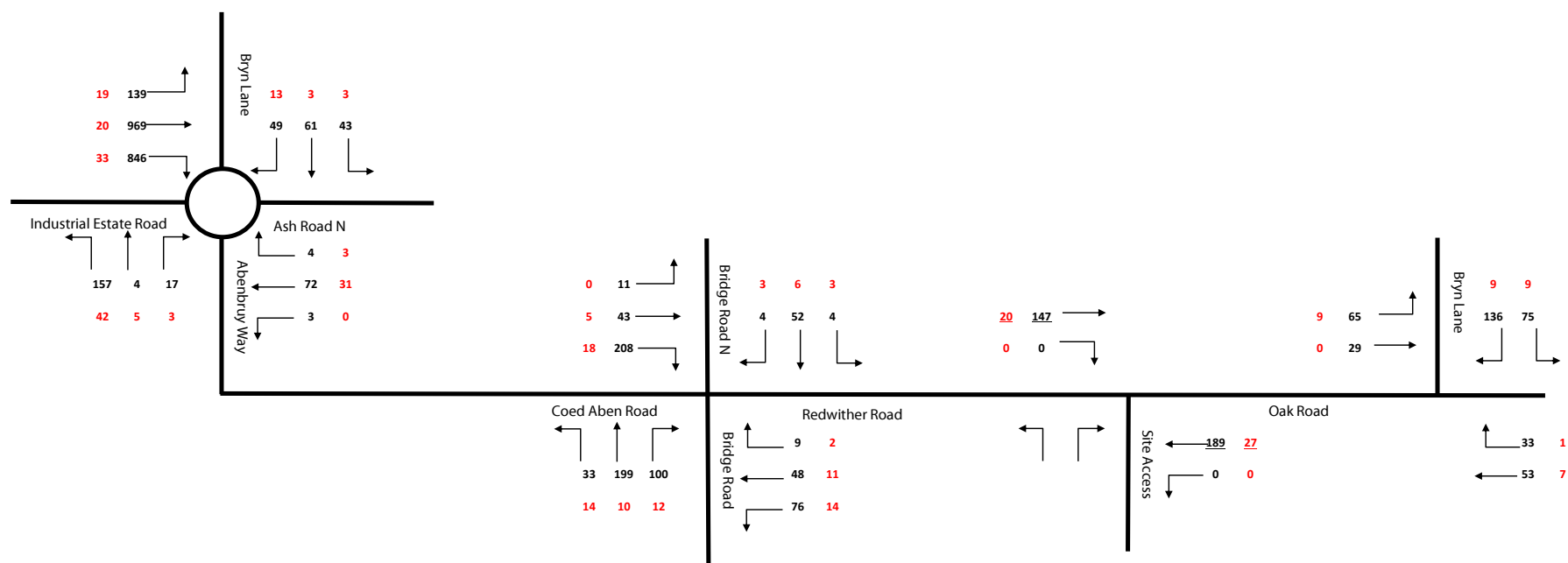


Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 15 - 2034 Without Development Flows
Peak: AM (0730-0830)
Notes: All flows are in vehicles

Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Interpolated flows assumed worse case

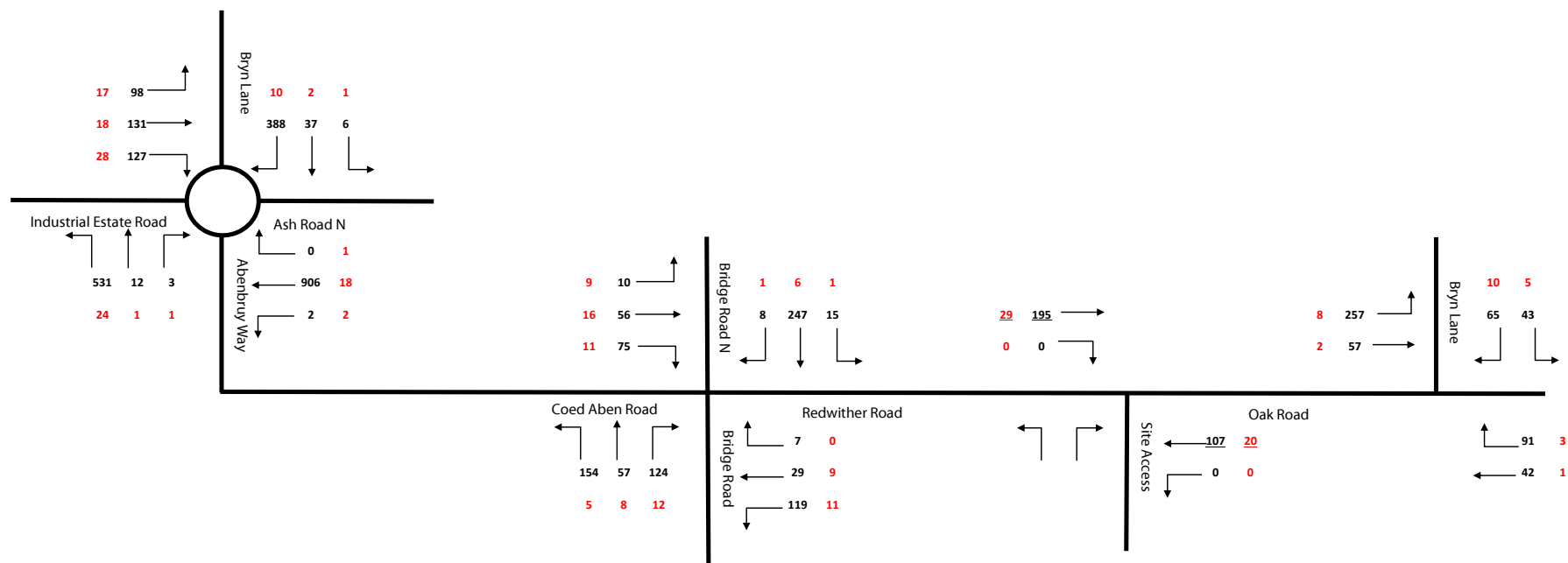


Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 16 - 2034 Without Development Flows
Peak: PM (1615-1715)
Notes: All flows are in vehicles

Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

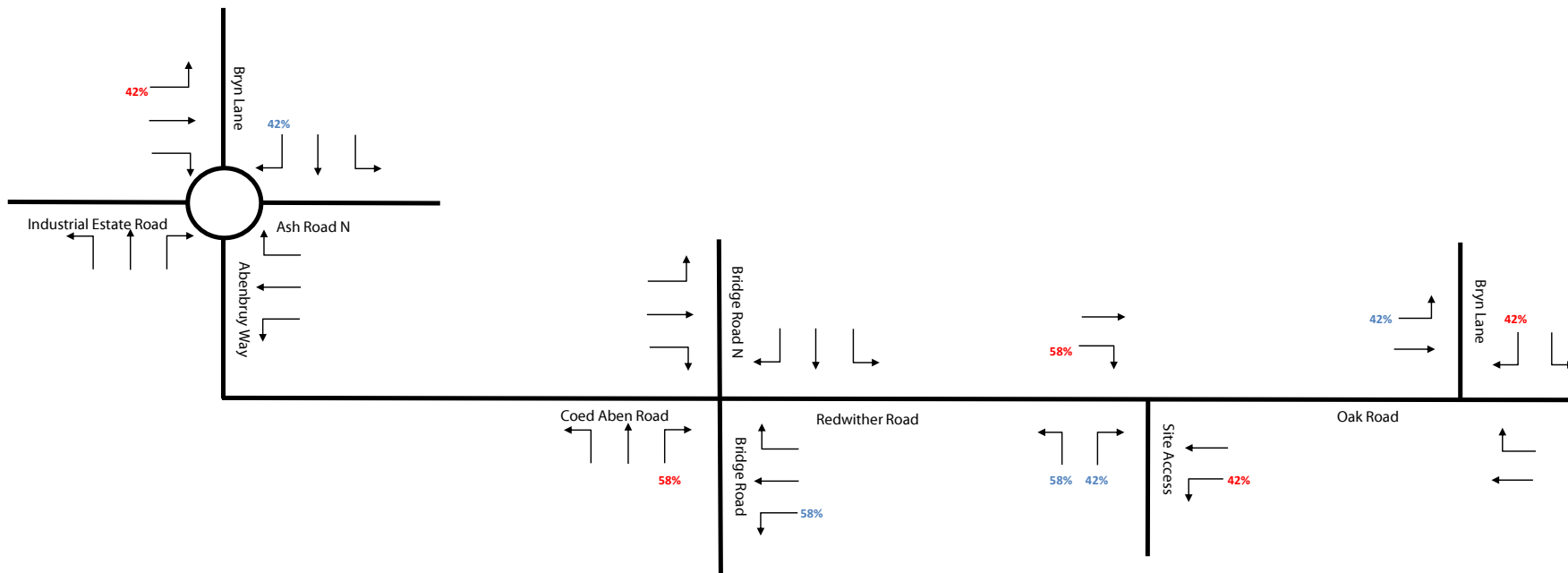
Interpolated flows assumed worse case



Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 17 - Distribution
Peak: BOTH
Notes: All flows are in vehicles

Arrivals

Departures



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 18 - Development Flows

Peak

AM (0730-0830)

Notes:

All flows are in vehicles

Cars

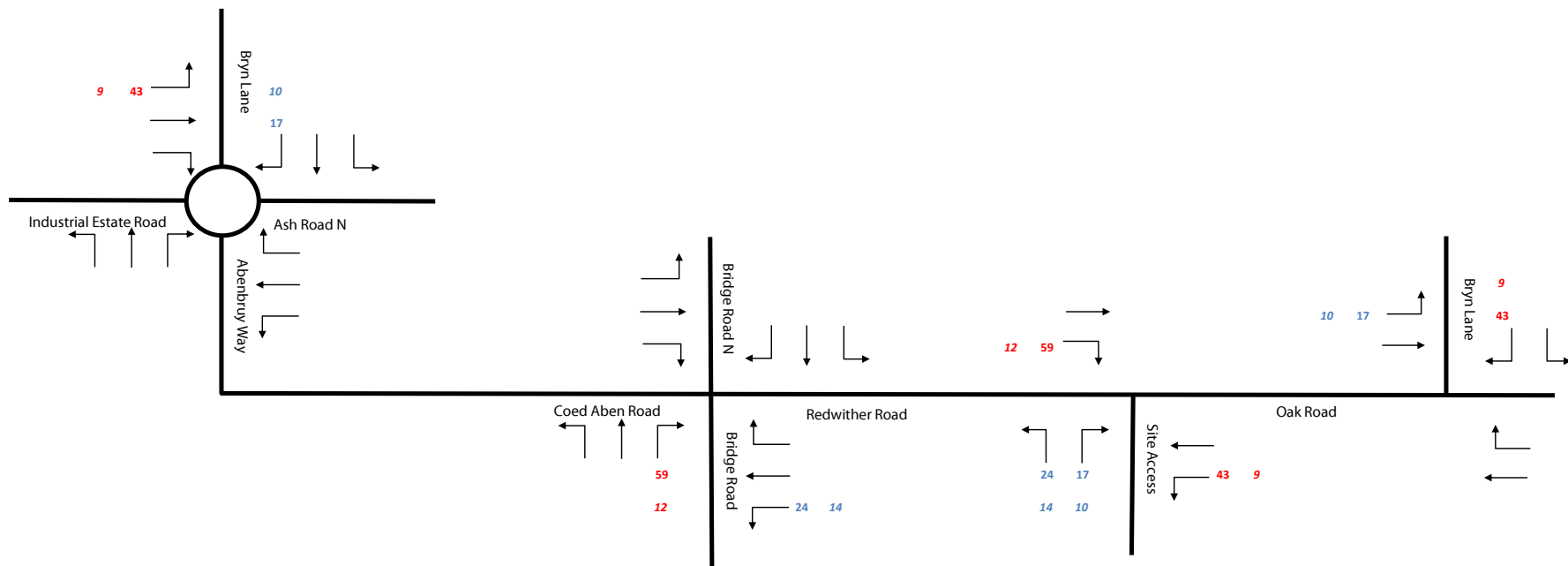
Arrivals 102

Departures 41

HGVs (Italics)

Arrivals 21

Departures 24



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 19 - Development Flows

Peak

PM (1615-1715)

Notes:

All flows are in vehicles

Cars

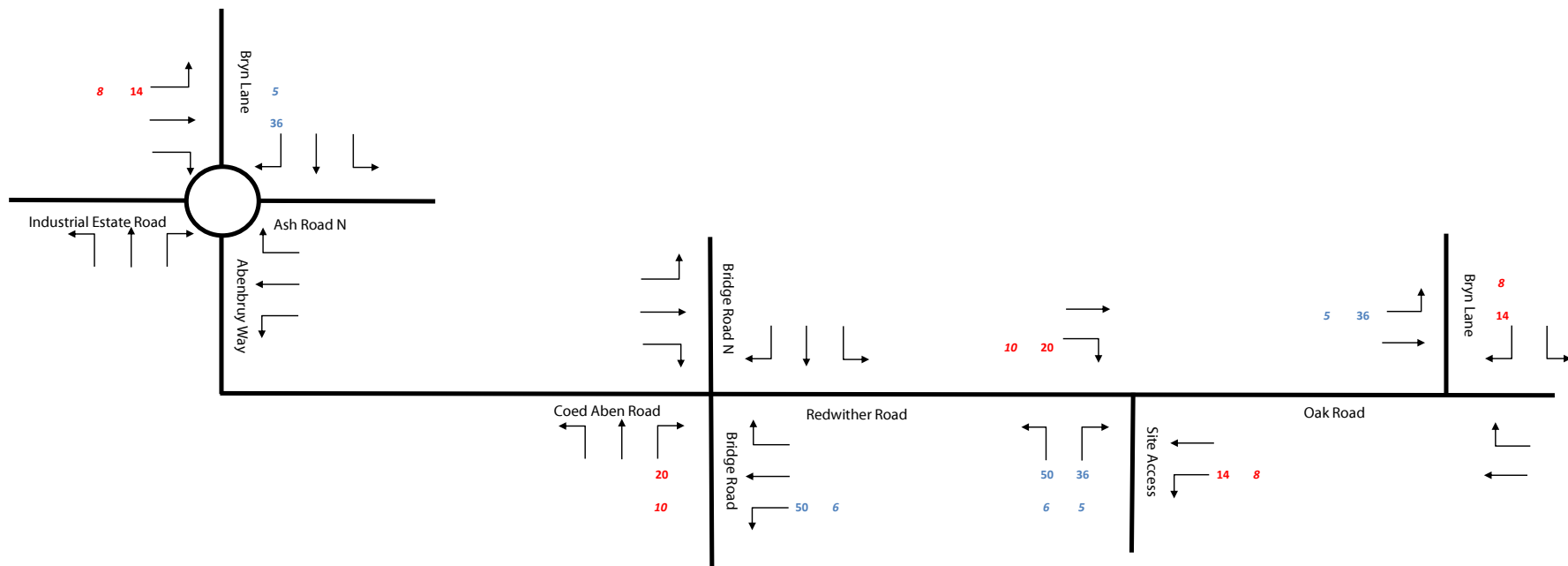
Arrivals 34

Departures 86

HGVs (Italics)

Arrivals 18

Departures 11



Project:

Wrexham Industrial Estate

Scenario:

Traffic Flow Diagram 20 - 2034 With Development Flows

Peak

AM (0730-0830)

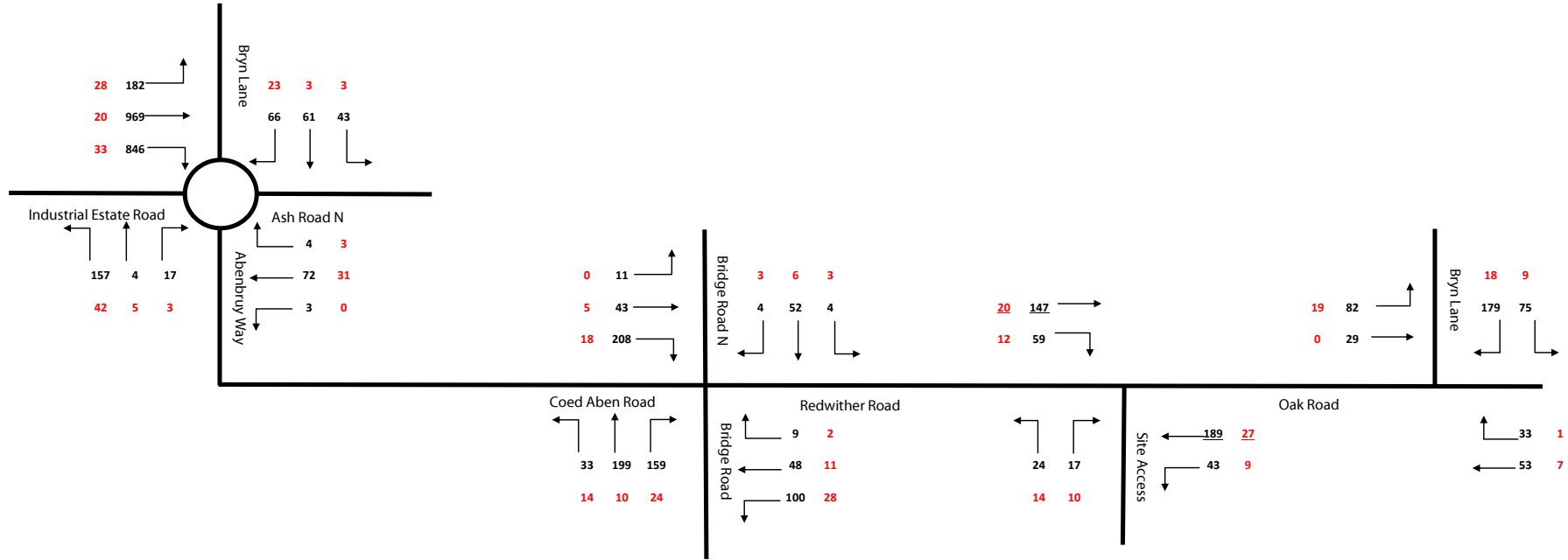
Notes:

All flows are in vehicles

Light Vehicles (cars & LGVs) in black

Heavy Vehicles (HGVs & buses) in red

Interpolated flows assumed worse case



Project:

Wrexham Industrial Estate

Scenario:

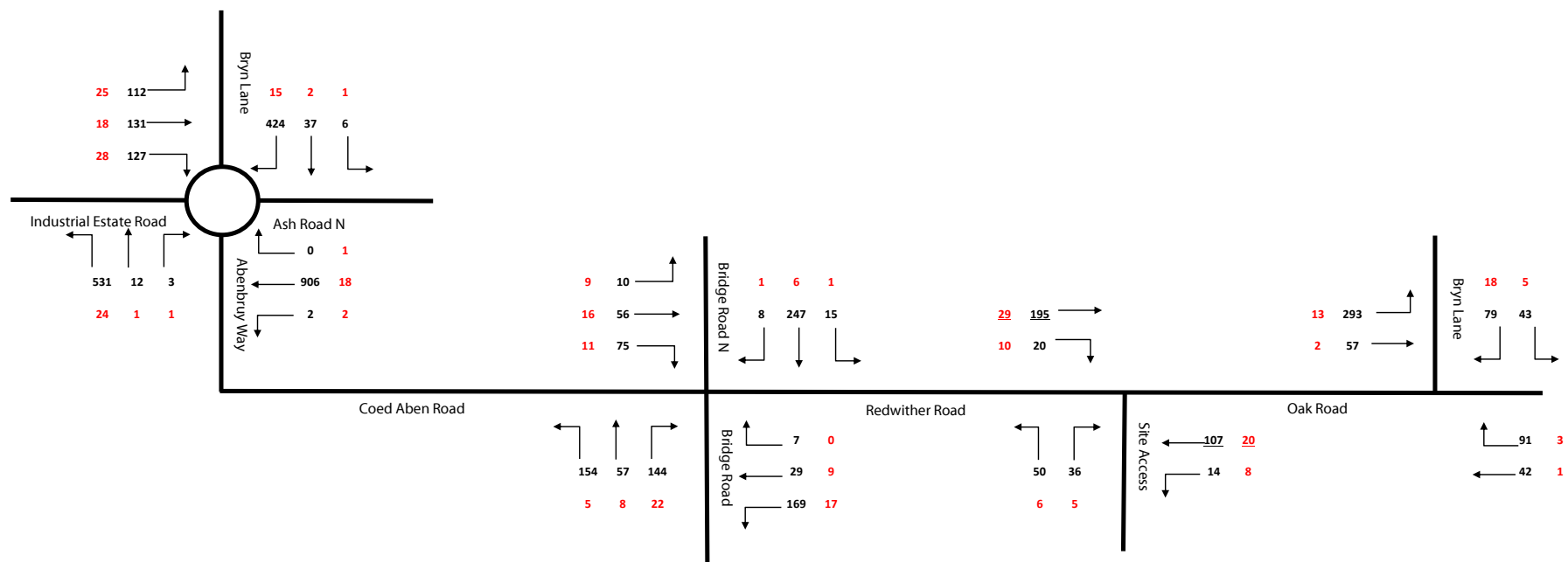
Traffic Flow Diagram 21 - 2034 With Development Flows

Peak

PM (1615-1715)

Notes:

All flows are in vehicles
Light Vehicles (cars & LGVs) in black
Heavy Vehicles (HGVs & buses) in red
Interpolated flows assumed worse case



APPENDIX D

ACCIDENT DATA

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Full Details Report Summary -

Accidents Found Date Range: 01/03/2016 - 01/03/2016
Grid Coordinate Range: 337945,349519 - 337945,349519

Accident Severity

	2016	Total
Slight	1	1
Total	1	1

Casualty Severity

	2016	Total
Slight	1	1
Total	1	1

Casualty KSI

	2016	Total
Slight	1	1
Total	1	1

DATA 1/3/16.

1.3 Accident Reference:U030106 Slight Unclassified Road BRIDGE ROAD, at its Junction with Accident 1 of 1
 Unclassified Road COED-ABEN ROAD, WREXHAM INDUSTRIAL
 1.7 Date & 1.9 Time.....Tuesday 01/03/2016 15:30 WREXHAM 1.15 Speed limit.....30 Mph
 1.11 Grid co-ordinates.....337945/349519 1.14 Road type.....Single c'way
 1.10 Local Authority.....Wrexham 1.16 Junction detail.....T or Staggered junction
 1.12/1.13 1st road identity..U 1.17 Junction control.....Stop sign
 1.18/1.19 2nd road identity..U 1.24 Special conditions...None
 1.22 Weather.....Fine 1.25 Carriageway hazards..None
 1.21 Light conditions.....Daylight 1.5 Number of vehicles...2
 1.20a Crossing(human).....No Human control within 50m 1.6 Number of casualties.1
 1.20b Crossing(physical).....No crossing facility within 5 1.23 Surface.....Wet

Contributory Factors

Participant	Confidence	Did a police officer attend?
		No - reported over the counter

Accident Description

VEH2 WAITING TO PULL OUT OF JUNCTION, VEH1 FAILED TO STOP IN TIME AND COLLIDED WITH REAR OF VEH2.

2 Vehicles

2.4 Veh ref no.....1	2.16 First impact.....Front
2.17 Other vehicle.....2	2.12 Hit object in c'way..None
2.5 Vehicle class.....Van/Goods < 3.5t	2.14 Hit object off c'way.None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location.On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to....South North west	2.22 Driver age.....26
2.7 Manoeuvres.....Going ahead other	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Not contacted
2.6 Towing.....No	2.29 Journey purpose.....Journey as part of work
2.28 Foreign vehicle....Not foreign	

2.4 Veh ref no.....2	2.16 First impact.....Back
2.17 Other vehicle.....1	2.12 Hit object in c'way..None
2.5 Vehicle class.....Car	2.14 Hit object off c'way.None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location.On main carriageway	2.21 Driver gender.....Female
2.8 Movement from/to....South North west	2.22 Driver age.....37
2.7 Manoeuvres.....Waiting to go ahead but held up	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Not contacted
2.6 Towing.....No	2.29 Journey purpose.....Other
2.28 Foreign vehicle....Not foreign	

1 Casualty

3.5 Cas ref no.....1	3.15 Car passenger.....Front
3.6 Casualty class.....Passenger	3.16 PSV passenger.....No
3.7 Gender.....Female	3.14 Seat belt usage.....Worn but not independently
3.8 Age.....59	@a#i\$adol pupil.....Other
3.18 Casualty postcode...	(3.19 School)
3.9 Severity.....Slight	3.10 Pedestrian location..Not a pedestrian
3.4 Vehicle no.....2	3.11 Pedestrian movement..Not a pedestrian
3.12 Ped Direction.....Not a pedestrian	3.19 Roadworker injured...No

Full Details Report Summary -

Accidents Found Date Range: 16/12/2015 - 16/12/2015

Grid Coordinate Range: 338762,349465 - 338762,349465

Accident Severity

	2015	Total
Slight	1	1
Total	1	1

Casualty Severity

	2015	Total
Slight	2	2
Total	2	2

Casualty KSI

	2015	Total
Slight	2	2
Total	2	2

DATE - 16/12/15

1.3 Accident Reference: S191714 Slight Unclassified Road REDWITHER ROAD, at its Junction Accident 1 of 1
with Unclassified Road BRYN LANE, WREXHAM
1.7 Date & 1.9 Time.....Wednesday 16/12/2015 17:20 1.15 Speed limit.....40 Mph
1.11 Grid co-ordinates.....338762/349465 1.14 Road type.....Single c'way
1.10 Local Authority.....Wrexham 1.16 Junction detail.....T or Staggered junction
1.12/1.13 1st road identity..U 1.17 Junction control.....Give way sign or uncontrolled
1.18/1.19 2nd road identity..U 1.24 Special conditions...None
1.22 Weather.....Fine 1.25 Carriageway hazards..None
1.21 Light conditions.....Dark/lights lit 1.5 Number of vehicles...2
1.20a Crossing(human).....No Human control within 50m 1.6 Number of casualties.2
1.20b Crossing(physical).....No crossing facility within 5 1.23 Surface.....Dry

Contributory Factors

Failed to look properly (Driver/Rider - Error)
Failed to judge other person's path/speed (Driver/Rider - Error)
Careless/Reckless (Driver/Rider - Behaviour)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Possible	
Vehicle 001	Possible	
Vehicle 001	Possible	Yes

Accident Description

VEH1 & 2 TRAVELLING TOWARDS EACH OTHER, VEH1 HAS THEN TURNED RIGHT ACROSS PATH OF VEH2 CAUSING COLLISION.

2 Vehicles

2.4 Veh ref no.....1	2.16 First impact.....Front
2.17 Other vehicle.....2	2.12 Hit object in c'way..None
2.5 Vehicle class.....Car	2.14 Hit object off c'way..None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location.On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to....South east North east	2.22 Driver age.....45
2.7 Manoeuvres.....Turning right	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Negative
2.6 Towing.....No	2.29 Journey purpose.....Journey as part of work
2.28 Foreign vehicle.....Not foreign	

2.4 Veh ref no.....2	2.16 First impact.....Front
2.17 Other vehicle.....1	2.12 Hit object in c'way..None
2.5 Vehicle class.....Car	2.14 Hit object off c'way..None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location.On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to....North west South east	2.22 Driver age.....56
2.7 Manoeuvres.....Going ahead other	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Negative
2.6 Towing.....No	2.29 Journey purpose.....Journey as part of work
2.28 Foreign vehicle.....Not foreign	

2 Casualties

3.5 Cas ref no.....1	3.15 Car passenger.....No
3.6 Casualty class.....Driver or Rider	3.16 PSV passenger.....No
3.7 Gender.....Male	3.14 Seat belt usage.....Unknown
3.8 Age.....45	3.13 School pupil.....Other
3.18 Casualty postcode...	(3.19 School)
3.9 Severity.....Slight	3.10 Pedestrian location..Not a pedestrian
3.4 Vehicle no.....1	3.11 Pedestrian movement..Not a pedestrian
3.12 Ped Direction.....Not a pedestrian	3.19 Roadworker injured...No

3.5 Cas ref no.....2	3.15 Car passenger.....No
3.6 Casualty class.....Driver or Rider	3.16 PSV passenger.....No
3.7 Gender.....Male	3.14 Seat belt usage.....Unknown
3.8 Age.....56	3.13 School pupil.....Other
3.18 Casualty postcode...	(3.19 School)
3.9 Severity.....Slight	3.10 Pedestrian location..Not a pedestrian
3.4 Vehicle no.....2	3.11 Pedestrian movement..Not a pedestrian
3.12 Ped Direction.....Not a pedestrian	3.19 Roadworker injured...No

Full Details Report Summary -

Accidents Found Date Range: 22/07/2014 - 22/07/2014

Grid Coordinate Range: 337423,349899 - 337423,349899

Accident Severity

	2014	Total
Serious	1	1
Total	1	1

Casualty Severity

	2014	Total
Serious	1	1
Total	1	1

Casualty KSI

	2014	Total
Adult KSI	1	1
Total	1	1

DATA 22/7/14

1.3 Accident Reference:R112306 Serious Unclassified Road ABENBURY WAY, at its Junction with Accident 1 of 1
Unclassified Road CLYWEDOG ROAD NORTH, WREXHAM
1.7 Date & 1.9 Time.....Tuesday 22/07/2014
1.11 Grid co-ordinates.....337423/349899
1.10 Local Authority.....Wrexham
1.12/1.13 1st road identity..U
1.18/1.19 2nd road identity..U
1.22 Weather.....Fine
1.21 Light conditions.....Daylight
1.20a Crossing(human).....No Human control within 50m
1.20b Crossing(physical).....No crossing facility within 5
1.15 Speed limit.....30 Mph
1.14 Road type.....Single c'way
1.16 Junction detail.....Other Junction
1.17 Junction control.....Give way sign or uncontrolled
1.24 Special conditions...None
1.25 Carriageway hazards..None
1.5 Number of vehicles...1
1.6 Number of casualties..1
1.23 Surface.....Dry

Contributory Factors

Poor turn or manoeuvre (Driver/Rider - Error)
Loss of control (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	
Vehicle 001	Possible	Yes

Accident Description

VEH 1 TRAVELLING ALONG ABENBURY WAY. WEATHER GOOD, ROAD SURFACE GOOD AND DRY, TRAFFIC FLOW LIGHT. VEH 1 HAS COMMENCED MANOEUVRE TO TURN RIGHT. FOR UNKNOWN REASON RIDER OF VEH 1 HAS LOST CONTROL AND HAS FELL OFF HIS BIKE ONTO HARD TARMAC SURFACE

1 Vehicle

2.4 Veh ref no.....1	2.16 First impact.....Offside
2.17 Other vehicle.....0	2.12 Hit object in c'way..None
2.5 Vehicle class.....M/cycle 50 - 125cc	2.14 Hit object off c'way..None
2.10 Junction location...Mid junction	2.18 Parts damaged..... / /
2.9 Restricted location..On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to....North west South west	2.22 Driver age.....46
2.7 Manoeuvres.....Turning right	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Negative
2.6 Towing.....No	2.29 Journey purpose.....Commuting to/from work
2.28 Foreign vehicle....Not foreign	

1 Casualty

3.5 Cas ref no.....1	3.15 Car passenger.....No
3.6 Casualty class.....Driver or Rider	3.16 PSV passenger.....No
3.7 Gender.....Male	3.14 Seat belt usage.....Not applicable
3.8 Age.....46	3.13 School pupil.....Other
3.18 Casualty postcode...	(3.19 School)
3.9 Severity.....Serious	3.10 Pedestrian location..Not a pedestrian
3.4 Vehicle no.....1	3.11 Pedestrian movement..Not a pedestrian
3.12 Ped Direction.....Not a pedestrian	3.19 Roadworker injured...No

Full Details Report Summary -

Accidents Found Date Range: 24/09/2013 - 24/09/2013

Grid Coordinate Range: 337424,349953 - 337424,349953

Accident Severity

	2013	Total
Slight	1	1
Total	1	1

Casualty Severity

	2013	Total
Slight	1	1
Total	1	1

Casualty KSI

	2013	Total
Slight	1	1
Total	1	1

DATE - 24/9/13

1.3 Accident Reference: P158771 Slight Coed Aben Road J/W Ash Road North, Wrexham Accident 1 of 1

1.7 Date & 1.9 Time.....Tuesday 24/09/2013 10:30	1.15 Speed limit.....40 Mph
1.11 Grid co-ordinates.....337424/349953	1.14 Road type.....Single c'way
1.10 Local Authority.....Wrexham	1.16 Junction detail.....T or Staggered junction
1.12/1.13 1st road identity..U	1.17 Junction control.....Give way sign or uncontrolled
1.18/1.19 2nd road identity..U	1.24 Special conditions...None
1.22 Weather.....Fine	1.25 Carriageway hazards..None
1.21 Light conditions.....Daylight	1.5 Number of vehicles...2
1.20a Crossing(human).....No Human control within 50m	1.6 Number of casualties..1
1.20b Crossing(physical).....No crossing facility within 5	1.23 Surface.....Dry

Contributory Factors

Failed to look properly (Driver/Rider - Error)
Failed to judge other person's path/speed (Driver/Rider - Error)

Participant	Confidence	Did a police officer attend?
Vehicle 001	Very likely	
Vehicle 001	Possible	Yes

Accident Description

Veh1 Approaching Junction Failed to See Veh2 ahead and Collided with Rear.

2 Vehicles

2.4 Veh ref no.....1	2.16 First impact.....Front
2.17 Other vehicle.....2	2.12 Hit object in c'way..None
2.5 Vehicle class.....Car	2.14 Hit object off c'way..None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location..On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to...North North west	2.22 Driver age.....25
2.7 Manoeuvres.....Turning left	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Negative
2.6 Towing.....No	2.29 Journey purpose.....Other
2.28 Foreign vehicle.....Not foreign	

2.4 Veh ref no.....2	2.16 First impact.....Back
2.17 Other vehicle.....1	2.12 Hit object in c'way..None
2.5 Vehicle class.....Car	2.14 Hit object off c'way..None
2.10 Junction location...Approaching or parked on approach	2.18 Parts damaged..... / /
2.9 Restricted location..On main carriageway	2.21 Driver gender.....Male
2.8 Movement from/to...North North west	2.22 Driver age.....33
2.7 Manoeuvres.....Waiting to turn left	2.27 Driver postcode.....
2.11 Skidding.....No	2.24 Hit and Run.....No
2.13 Left c'way.....Did not leave c'way	2.23 Breath test.....Negative
2.6 Towing.....No	2.29 Journey purpose.....Other
2.28 Foreign vehicle.....Not foreign	

1 Casualty

3.5 Cas ref no.....1	3.15 Car passenger.....No
3.6 Casualty class.....Driver or Rider	3.16 PSV passenger.....No
3.7 Gender.....Male	3.14 Seat belt usage.....Unknown
3.8 Age.....33	3.13 School pupil.....Other
3.18 Casualty postcode..	(3.19 School)
3.9 Severity.....Slight	3.10 Pedestrian location..Not a pedestrian
3.4 Vehicle no.....2	3.11 Pedestrian movement..Not a pedestrian
3.12 Ped Direction.....Not a pedestrian	3.19 Roadworker injured...No



2018 data is provisional and is subject to change

Crash Date: Friday, March 23, 2018

Time of Crash: 8:31:00 AM

Crash Reference: 201860W036124

Highest Injury Severity: Slight

Road Number: U0

Number of Casualties: 2

Highway Authority: Wrexham

Number of Vehicles: 2

Local Authority: Wrexham County Borough

OS Grid Reference: 338773 349452

Weather Description: Fine without high winds

Road Surface Description: Dry

Speed Limit: 40

Light Conditions: Daylight: regardless of presence of streetlights

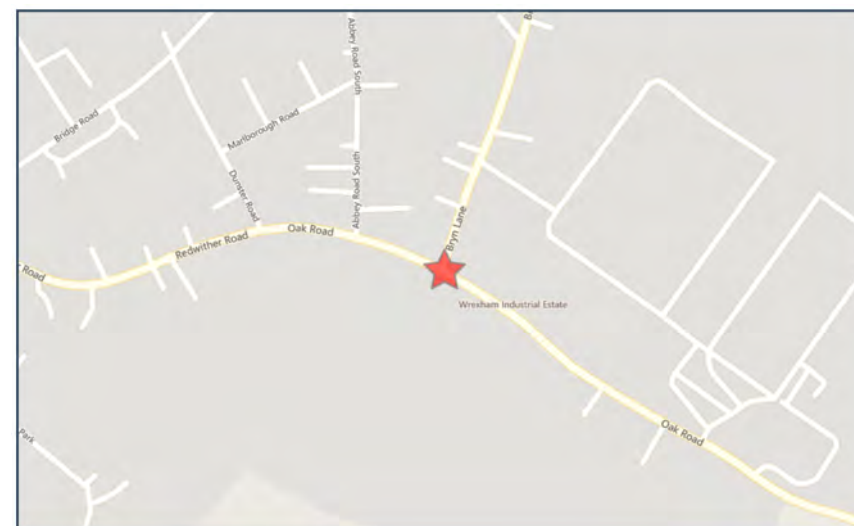
Carriageway Hazards: None

Junction Detail: T or staggered junction

Junction Pedestrian Crossing: No physical crossing facility within 50 metres

Road Type: Single carriageway

Junction Control: Give way or uncontrolled



For more information about the data please visit: www.crashmap.co.uk/home/aboutthedata and www.crashmap.co.uk/home/definitions



2018 data is provisional and is subject to change

Vehicles involved

Vehicle Ref	Vehicle Type	Vehicle Age	Driver Gender	Driver Age Band	Vehicle Manoeuvre	First Point of Impact	Journey Purpose	Hit Object - On Carriageway	Hit Object - Off Carriageway
2	Taxi/Private hire car	-1	Male	25-34	Vehicle proceeding normally along the carriageway, not on a bend	Unknown	Journey as part of work	None	None
1	Car (excluding private hire)	-1	Female	45-54	Vehicle is in the act of turning right	Unknown	Commuting to/from work	None	None

Casualties

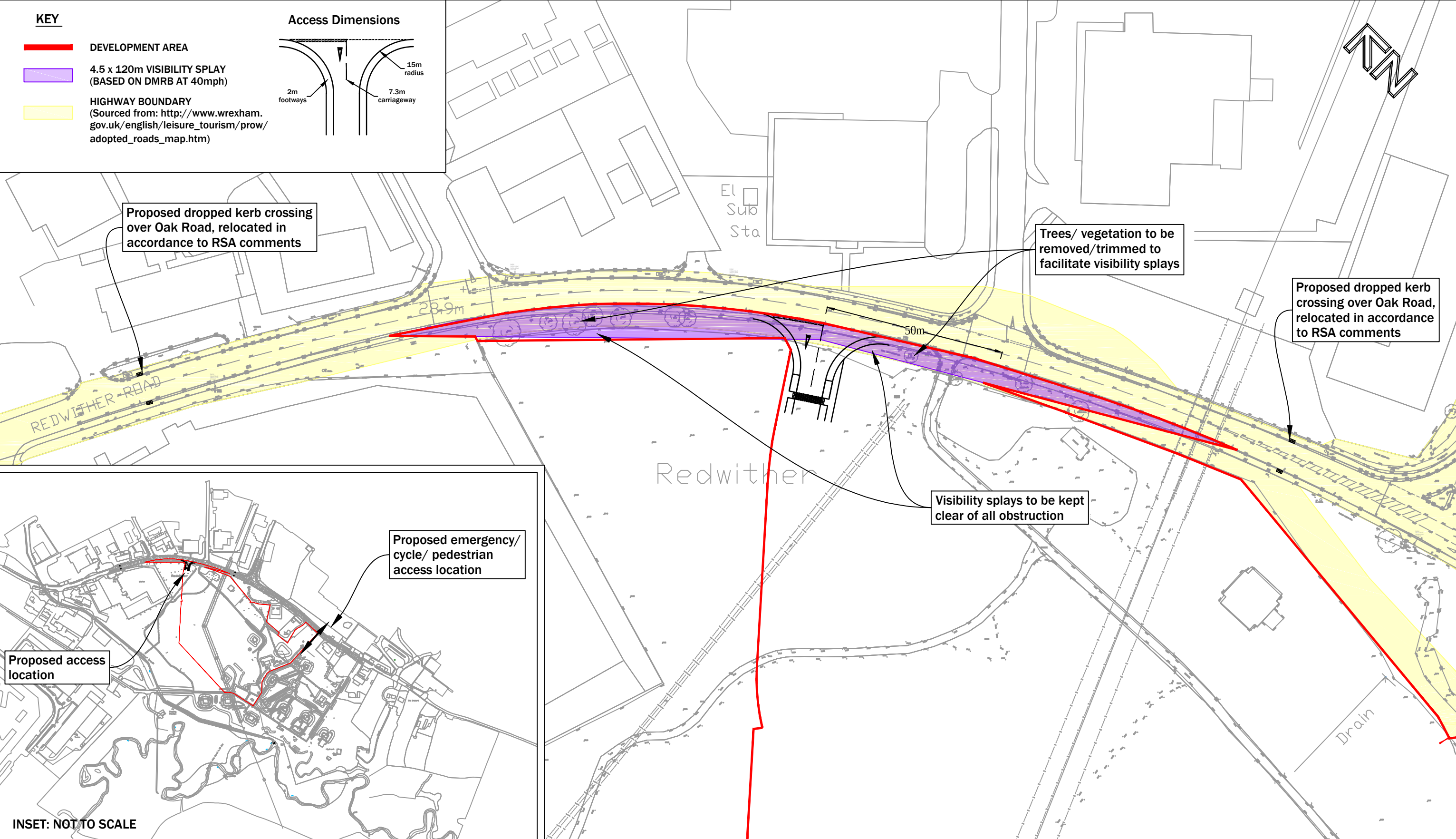
Vehicle Ref	Casualty Ref	Injury Severity	Casualty Class	Gender	Age Band	Pedestrian Location	Pedestrian Movement
1	1	Slight	Driver or rider	Female	45-54	Unknown or other	Unknown or other
2	2	Slight	Driver or rider	Male	25-34	Unknown or other	Unknown or other

For more information about the data please visit: www.crashmap.co.uk/home/aboutthedata and www.crashmap.co.uk/home/definitions

APPENDIX E

TECHNICAL DRAWING P19014-001E

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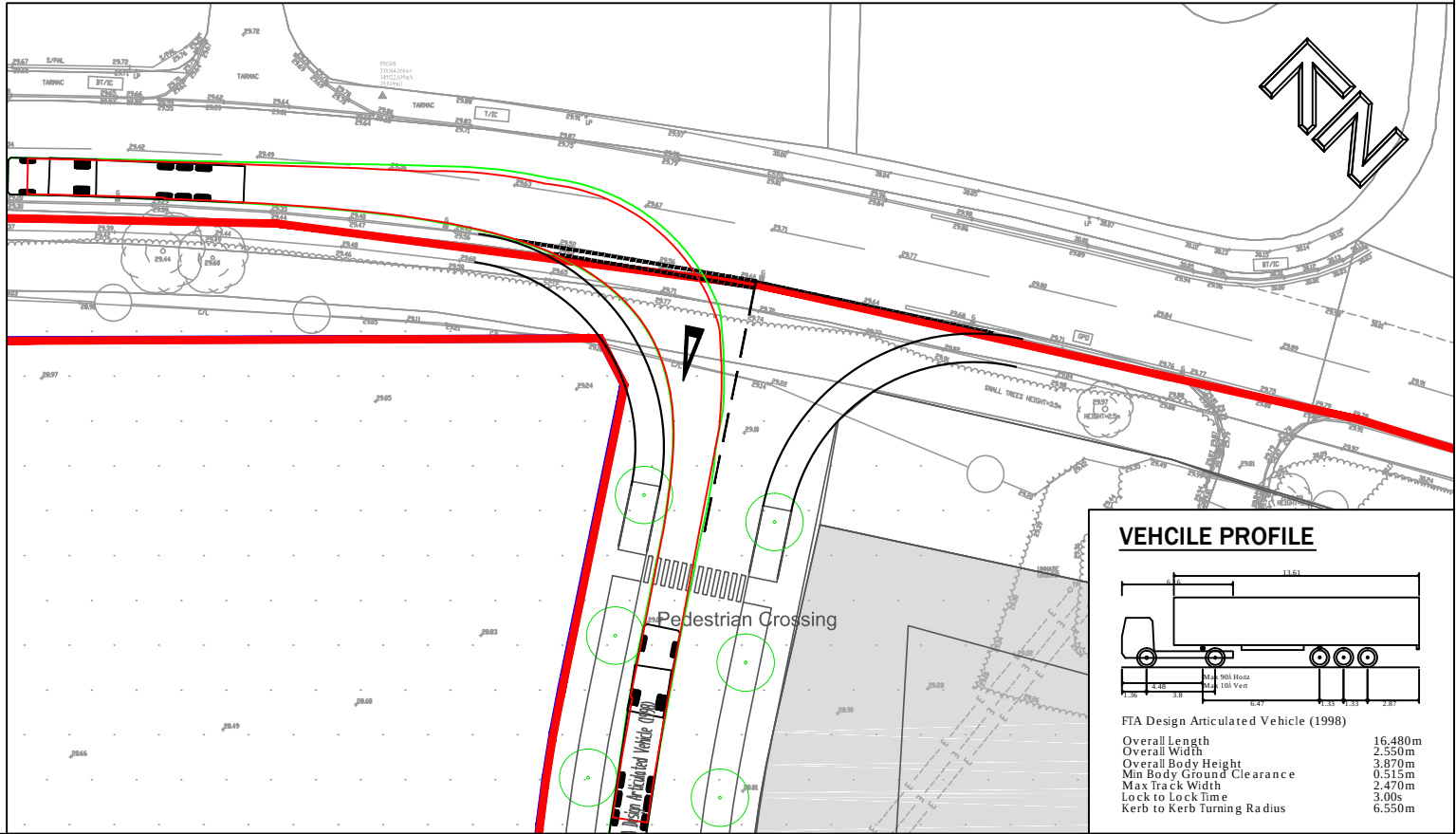
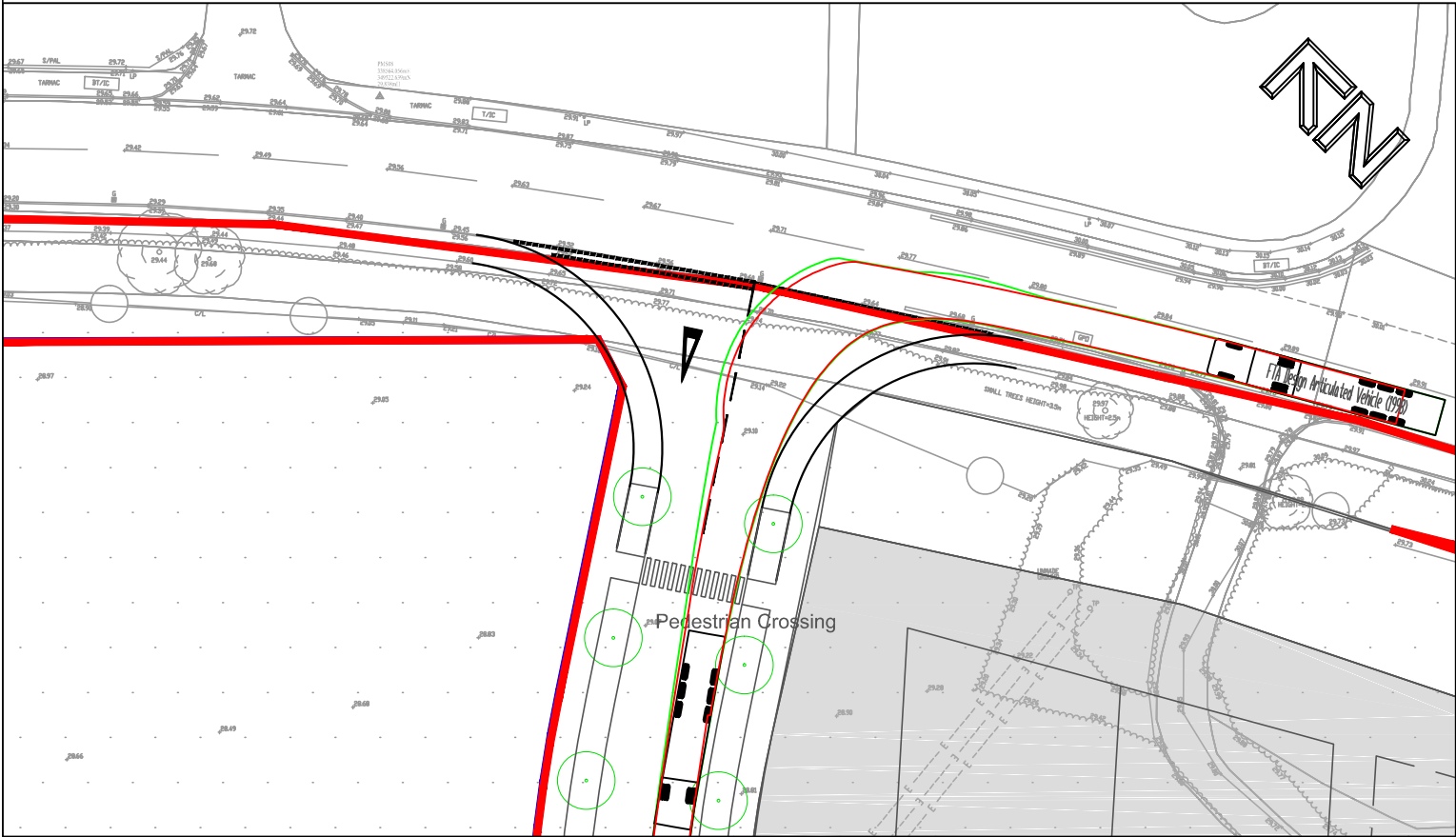
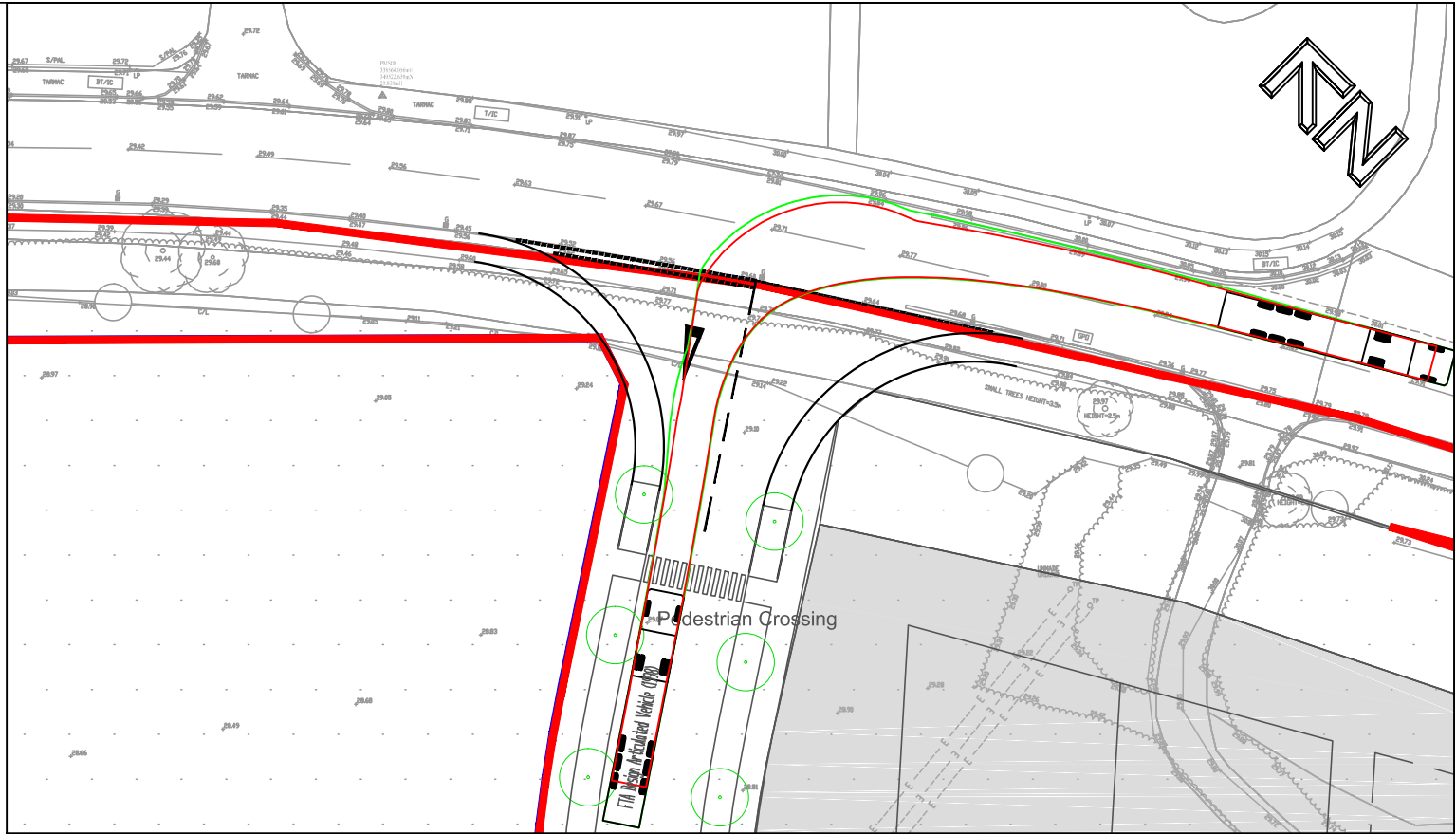
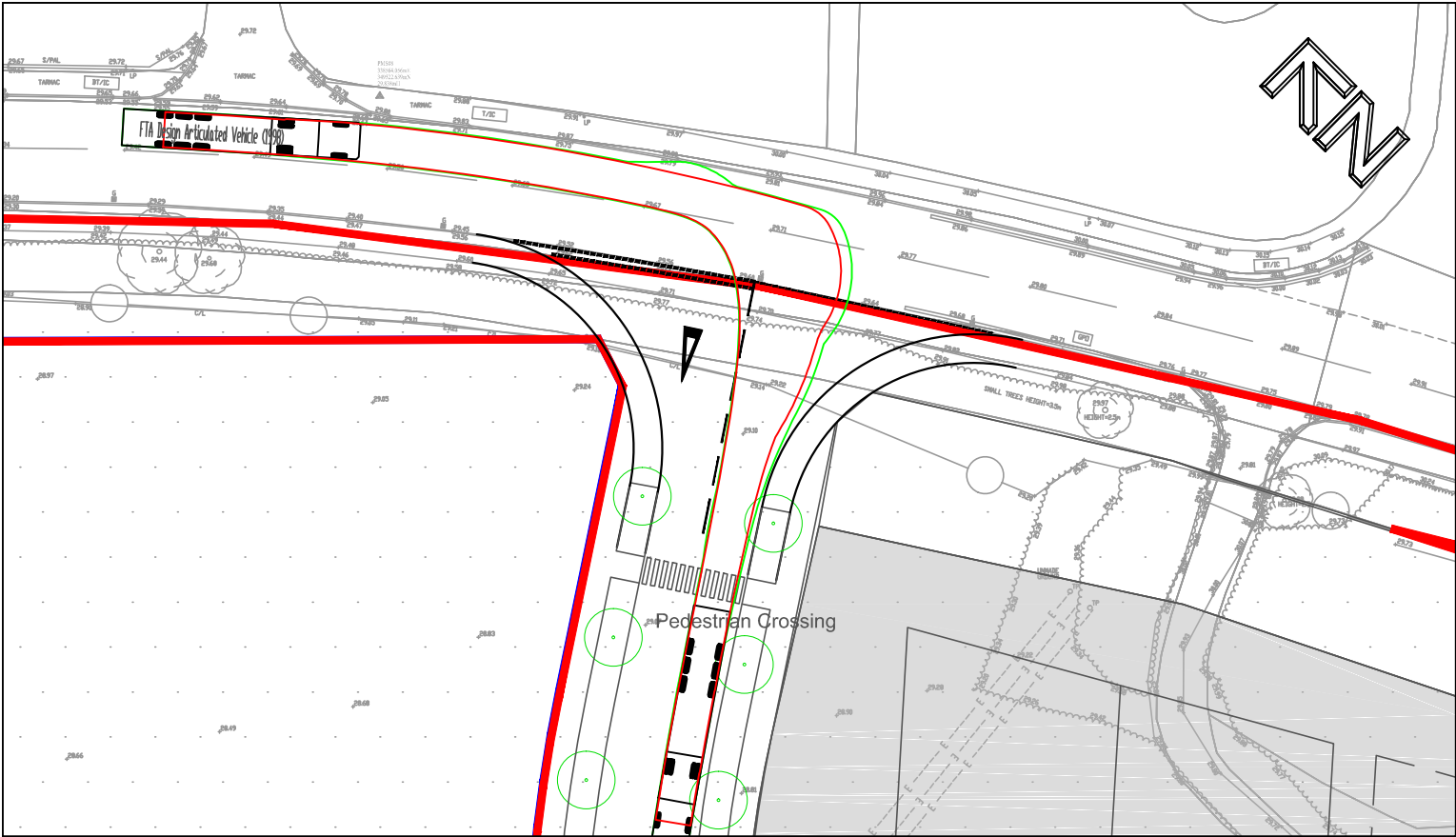


 9 Hurricane Court Liverpool International Business Park Estuary Boulevard Liverpool L24 8RL www.primetp.co.uk 0151 728 1860	E D C B A	16.10.19 27.09.19 20.05.19 19.03.19 28.02.19	VB VB VB VB VB	REVISED SITE BOUNDARY/RSA COMMENTS CHANGES FOLLOWING WCBC COMMENTS UPDATED TO MASTERPLAN REV F TOPO ADDED SITE BOUNDARY DWG ADDED	Project	THE OAKS, WREXHAM INDUSTRIAL ESTATE	Drawn by AM	Issue date 29 OCT 2019
	Rev	Date	By	Revision notes			Scale(s) 1:1000 @A3	
	Status				FINAL	Title	PROPOSED ACCESS STRATEGY	
							Drawing No P19014-001E	

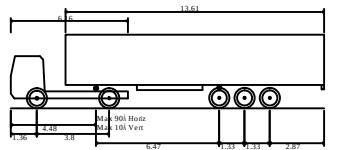
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TECHNICAL DRAWING P19014-003

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VEHICLE PROFILE



FTA Design Articulated Vehicle (1998)
Overall Length 16.480m
Overall Width 2.550m
Overall Body Height 3.870m
Min Body Ground Clearance 0.515m
Max Track Width 2.470m
Lock to Lock Time 3.00s
Kerb to Kerb Turning Radius 6.550m



9 Hurricane Court
Liverpool International Business Park | Estuary Boulevard | Liverpool | L24 8RL
www.primetp.co.uk | 0151 728 1860

*	*	*	*
Rev	Date	By	Revision notes
Status			

INFORMATION

Project	THE OAKS, WREXHAM INDUSTRIAL ESTATE
Title	SWEPT PATH ANALYSIS - ACCESS ALL MOVEMENTS

Drawn by VB	Issue date 20 MAY 2019
Scale(s)	1:500 @ A3

Drawing No	P19014-003
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APPENDIX F

ROAD SAFETY AUDIT

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THE OAKS, WREXHAM INDUSTRIAL ESTATE PROPOSED ACCESS STRATEGY

STAGE 1 ROAD SAFETY AUDIT

610/2019/143/01

21 October 2019

six:TEN Highways & Traffic Ltd
Unit 17 Lea Green Business Park
Eurolink, St Helens
Merseyside
WA9 4TR

t 0151 510 2937
m 07985 283074
e contact@610traffic.co.uk
www.610traffic.co.uk

REV	ISSUE STATUS	PREPARED BY/DATE	CHECKED BY/DATE	APPROVED BY/DATE
0	DRAFT	Jon Preston 19 October 2019	Naresh Madhavan 19 October 2019	
1	FINAL	Jon Preston 21 October 2019	Naresh Madhavan 21 October 2019	Jon Preston 21 October 2019

Disclaimer note

The client has confirmed that it is entering into the agreement under which this report is being prepared on its own behalf and not on behalf of, or for the benefit of any other party and has agreed that in any event of any claim arising out of or in connection with that agreement and/or the report itself it shall be entitled to recover from six:TEN Highways & Traffic Limited only the losses, if any, it has itself suffered.

This report therefore is for the private and confidential use of the client for whom it was prepared solely for the purposes requested by the client. It should not be reproduced in whole or in part or relied upon by any third party for any use whatsoever without the express written authority of six:TEN Highways & Traffic Limited.

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3.0	PERSONAL INJURY COLLISION HISTORY	3
4.0	TRAFFIC FLOW DATA	3
5.0	DEPARTURES FROM STANDARD	3

AUDITOR'S EVALUATION

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1.0 INTRODUCTION

1.1 This report is a preliminary design Stage 1 Road Safety Audit (RSA) carried out on the proposed access strategy at Oak Road, Wrexham Industrial Estate at the request of Prime Transport Planning, who are Project Sponsor and have approved the audit team. The local highway authority is Wrexham County Borough Council.

1.2 The RSA team, staff members from six:TEN Highways & Traffic Ltd, present at the RSA were:

Jon Preston MCIHT MSoRSA
Audit Team Leader

Naresh Madhavan MCIHT MSoRSA EU RSA Cert of Competence
Audit Team Member

We confirm that no member of the Audit Team has been involved with the design process.

1.3 A site visit was carried out on 16 October 2019 between 10:15 and 10:45hrs. The weather during the site visit was partially cloudy with a wet carriageway surface.

1.4 The RSA brief issued to the team comprised various elements listed at Appendix Two.

1.5 The terms of reference of the RSA are as described in the Design Manual for Roads and Bridges GG119 – Road Safety Audit. This standard has been used for guidance only. The RSA team has examined and reported only the road safety issues of the scheme as presented and has not examined or verified the compliance of the design to any other criteria.

1.6 All of the problems described in this report are considered by the RSA team to require action in order to improve the safety of the scheme and minimise collision occurrence. However, if any of the problems or recommendations within this Road Safety Audit report are not accepted, a copy of the signed exception report from the Overseeing Organisation should be sent to the Road Safety Audit Team Leader.

1.7 A plan showing the location of road safety problems raised in this report is included in Appendix Three.

2.0 PROPOSALS

The scheme involves the following highway works:

- The provision of a major/minor priority junction on Oak Road, to provide access to a proposed industrial development;
- Footways on the proposed access to link into the existing facilities on Oak Road; and
- Uncontrolled pedestrian dropped crossings with tactile paving on the proposed access road and on Oak Road to the west of Dunster Road and to the east of Abbey Road South.

3.0 PERSONAL INJURY COLLISION HISTORY

- 3.1 Personal injury collision data for the five-year period 2014 to 2018 was obtained from www.crashmap.co.uk. The location plan is shown in Appendix Five.
- 3.2 There has been two recorded personal injury collisions on Oak Road during the five-year period, both classed as slight in severity.
- 3.3 Both collisions occurred at the junction of Oak Road and Bryn Road, involved two vehicles and resulted in injuries to two casualties.

4.0 TRAFFIC FLOW AND SPEED DATA

- 4.1 Forecast traffic flow data was provided to the audit team and the 2034 With Development flows are shown in Appendix Six.
- 4.2 Vehicle speed data was not provided to the audit team, however, during the site visit vehicle speeds were observed to be moderate.

5.0 DEPARTURES FROM STANDARD

- 5.1 No Departures from Standard have been highlighted to the RSA team.

6.0 MATTERS ARISING FROM THIS (STAGE 1) ROAD SAFETY AUDIT

6.1 Location: Proposed uncontrolled pedestrian crossing west of Dunster Road

Problem

Summary: Waiting bus may obscure pedestrian/driver intervisibility

The proposed uncontrolled pedestrian crossing on Oak Road to the west of Dunster Road is located adjacent to an existing bus stop. A bus waiting at the bus stop will obstruct intervisibility between a pedestrian crossing from the north and eastbound drivers. This may increase the risk of pedestrian/vehicular collisions, if a pedestrian chooses to cross in front of a waiting bus. (Photo 10.1)

Recommendation

The proposed uncontrolled pedestrian crossing or existing bus stop should be relocated to a suitable position to ensure a bus waiting at the bus stop does not obscure intervisibility between pedestrians and approaching drivers.

6.2 Location: Proposed uncontrolled pedestrian crossing east of Abbey Road South

Problem

Summary: Existing trees/vegetation may obscure pedestrian/driver intervisibility

The intervisibility between pedestrians crossing from the south at the proposed uncontrolled pedestrian crossing to the east of Abbey Road South and westbound drivers may be obscured by existing trees/vegetation on the southern side of Oak Road. This reduction of intervisibility may increase the risk of pedestrian/vehicular collisions as crossing pedestrians fail to sufficiently appreciate approaching traffic and vice versa. (Photo 10.2)

Recommendation

The appropriate pedestrian/driver intervisibility should be checked to ensure the existing trees/vegetation are not located within the visibility splay. The proposed pedestrian dropped crossing should be relocated or the trees/vegetation removed if it is found to be located within the pedestrian/driver intervisibility splay.

APPENDIX ONE**7.0 ROAD SAFETY AUDIT TEAM STATEMENT**

We certify that the audit has been carried out generally in accordance with the requirements set out in GG119. The problems identified have been noted in this report together with associated safety improvement suggestions which we recommend should be studied for implementation.

AUDIT TEAM LEADER

Jon Preston MCIHT MSoRSA
Director
six:TEN Highways & Traffic Ltd

Signed:



Date: 21 October 2019

AUDIT TEAM MEMBER

Naresh Madhavan MCIHT MSoRSA EU RSA Cert of Comp.
Traffic & Road Safety Engineer
six:TEN Highways & Traffic Ltd

Signed:



Date: 21 October 2019

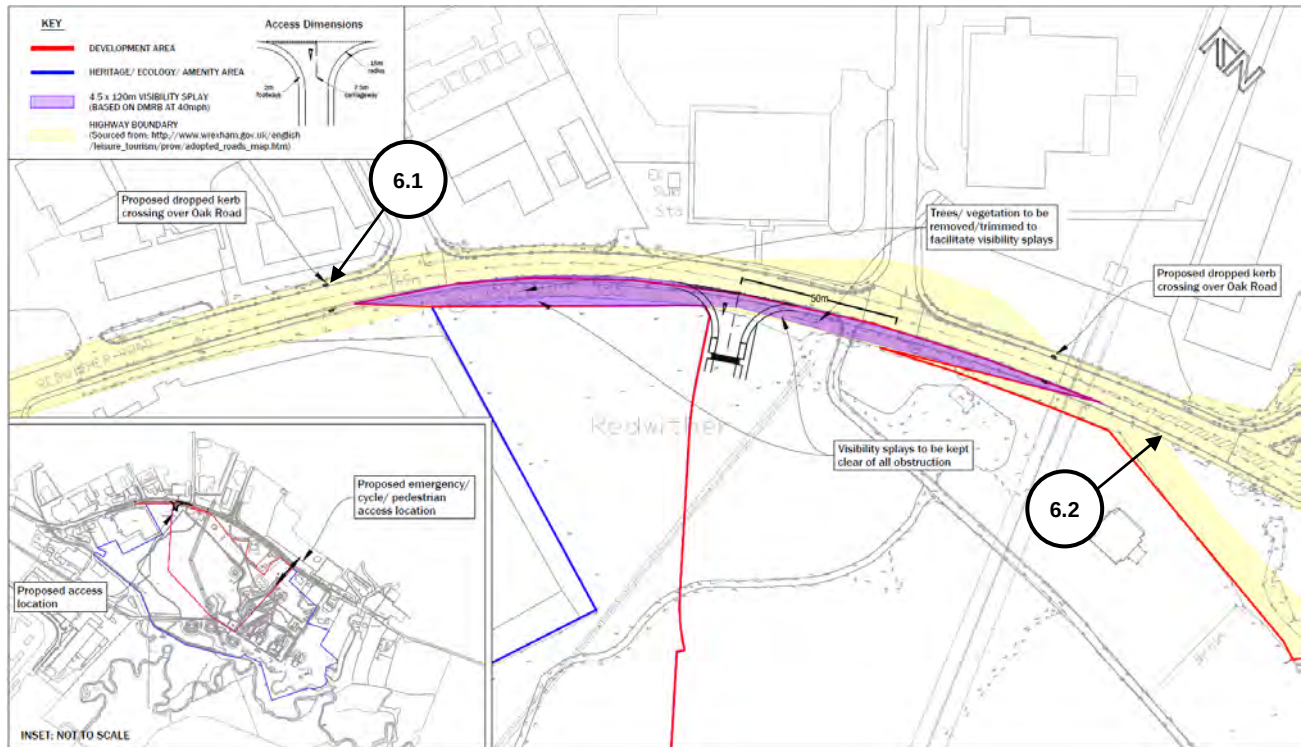
APPENDIX TWO

8.0 LIST OF DRAWINGS AND DOCUMENTS PROVIDED TO THE AUDIT TEAM

- P19014-001D Proposed Access Strategy
- P19014-002 Swept Path Analysis
- Forecast Traffic Flow data.
- Five Year Personal Injury Collision Data (2014-2018).

APPENDIX THREE

9.0 PROBLEM LOCATION PLAN



APPENDIX FOUR

10.0 PHOTOGRAPHS



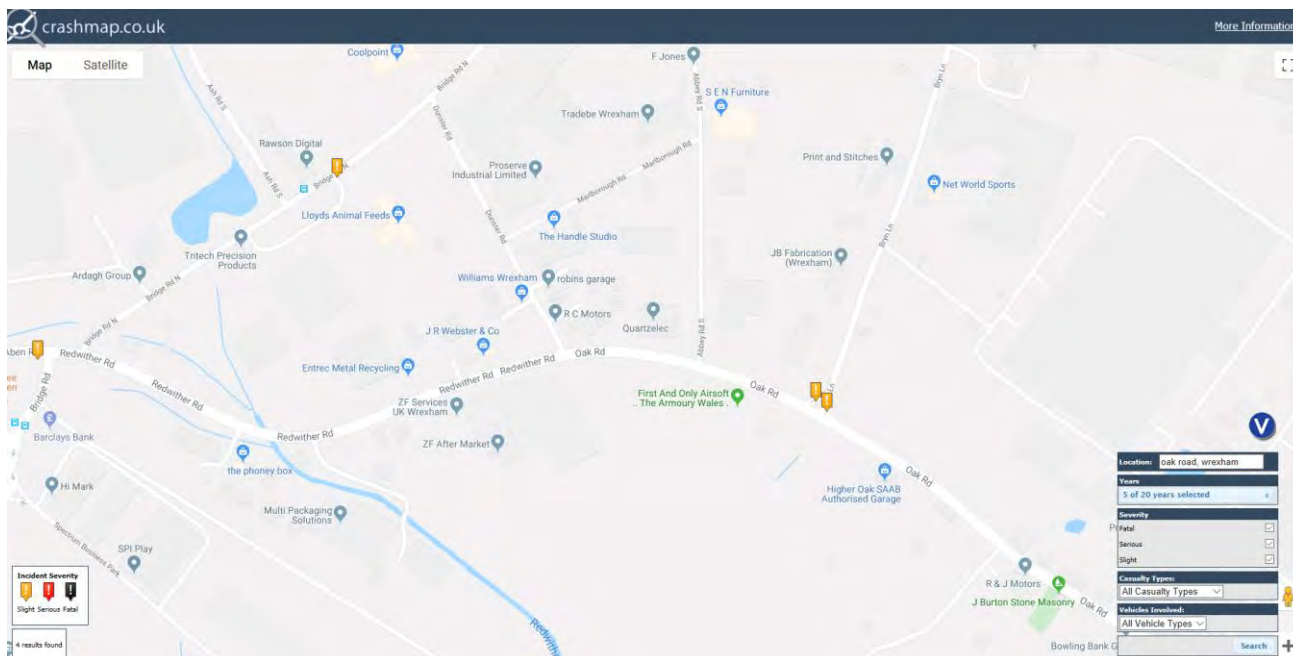
10.1 Existing bus stop adjacent to proposed uncontrolled pedestrian crossing on northern side of Oak Road to the west of Dunster Road



10.2 Approximate view from proposed uncontrolled pedestrian crossing on southern side of Oak Road to east of Abbey Road South

APPENDIX FIVE

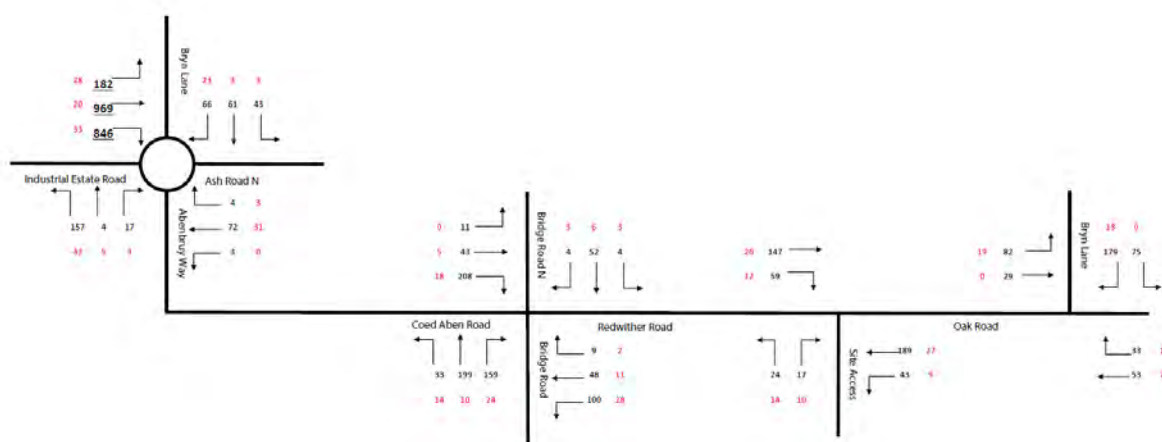
11.0 PERSONAL INJURY COLLISION LOCATION PLAN



APPENDIX SIX

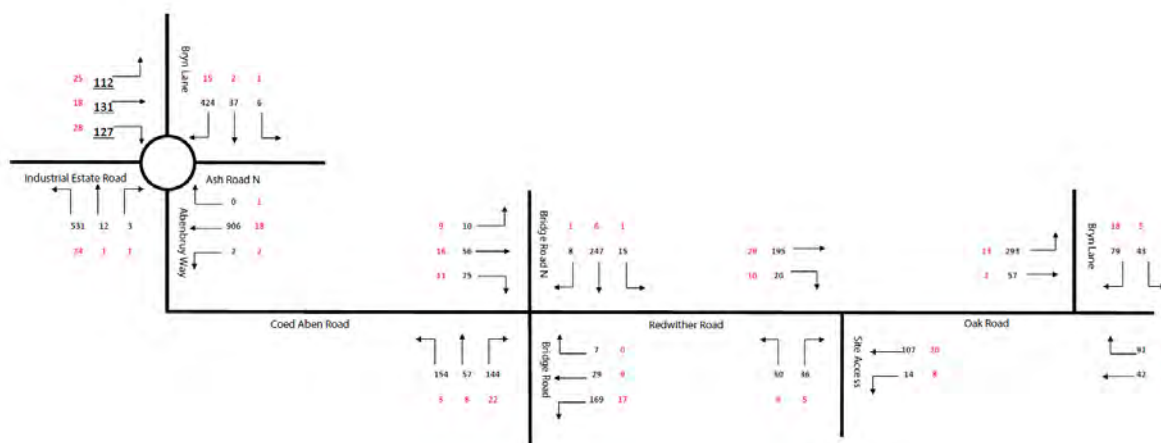
12.0 TRAFFIC FLOW DATA

Project:	Wrexham Industrial Estate
Scenario:	Traffic Flow Diagram 20 - 2034 With Development Flows
Peak:	AM (0730-0830)
Notes:	All flows are in vehicles
	Light Vehicles (cars & LGVs) in black
	Heavy Vehicles (HGVs & buses) in red



12.1 2034 With Development Traffic Flow Data (AM peak 07:30 – 08:30)

Project: Wrexham Industrial Estate
Scenario: Traffic Flow Diagram 21 - 2034 With Development Flows
Peak: PM (1615-1715)
Notes: All flows are in vehicles
 Light Vehicles (cars & LGVs) in black
 Heavy Vehicles (HGVs & buses) in red



12.2 2034 With Development Traffic Flow Data (PM Peak 16:15 – 17:15)

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APPENDIX G

TRICS OUTPUT

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Calculation Reference: AUDIT-753001-180518-0547

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
 Category : C - INDUSTRIAL UNIT
 VEHICLES

Selected regions and areas:

02	SOUTH EAST	
	HC HAMPSHIRE	1 days
	HF HERTFORDSHIRE	1 days
03	SOUTH WEST	
	DV DEVON	1 days
04	EAST ANGLIA	
	SF SUFFOLK	1 days
06	WEST MIDLANDS	
	HE HEREFORDSHIRE	1 days
	WM WEST MIDLANDS	1 days
08	NORTH WEST	
	CH CHESHIRE	1 days
	LC LANCASHIRE	1 days
11	SCOTLAND	
	EB CITY OF EDINBURGH	1 days
	FI FIFE	1 days
	SR STIRLING	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area
 Actual Range: 1100 to 8000 (units: sqm)
 Range Selected by User: 300 to 8000 (units: sqm)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/07 to 06/07/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	3 days
Tuesday	2 days
Thursday	4 days
Friday	2 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	11 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Edge of Town Centre	1
Suburban Area (PPS6 Out of Centre)	3
Edge of Town	7

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Industrial Zone	9
Commercial Zone	1
Development Zone	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

B1	8 days
B2	2 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,001 to 5,000	1 days
5,001 to 10,000	3 days
10,001 to 15,000	2 days
15,001 to 20,000	2 days
20,001 to 25,000	1 days
25,001 to 50,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

50,001 to 75,000	2 days
75,001 to 100,000	3 days
100,001 to 125,000	1 days
125,001 to 250,000	5 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	4 days
1.1 to 1.5	7 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	11 days
----	---------

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	11 days
-----------------	---------

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1	CH-02-C-03 BRUNEL ROAD LYME GREEN BUS. PARK MACCLESFIELD Edge of Town Development Zone Total Gross floor area: 6658 sqm Survey date: MONDAY 19/09/16	OFFICE FURNITURE	CESHIRE	Survey Type: MANUAL
2	DV-02-C-02 GRACE ROAD SOUTH MARSH BARTON TRAD. EST. EXETER Suburban Area (PPS6 Out of Centre) Industrial Zone Total Gross floor area: 3513 sqm Survey date: THURSDAY 06/07/17	ENERGY RECOVERY FACILITY	DEVON	Survey Type: MANUAL
3	EB-02-C-01 DRYDEN ROAD LOANHEAD EDINBURGH Edge of Town Industrial Zone Total Gross floor area: 1200 sqm Survey date: MONDAY 16/06/08	BREWERY	CITY OF EDINBURGH	Survey Type: MANUAL
4	FI-02-C-01 HALBEATH PLACE DUNFERMLINE Suburban Area (PPS6 Out of Centre) Industrial Zone Total Gross floor area: 4900 sqm Survey date: FRIDAY 20/04/07	REFRIGERATION	FIFE	Survey Type: MANUAL
5	HC-02-C-01 JAYS CLOSE BASINGSTOKE Edge of Town Industrial Zone Total Gross floor area: 3000 sqm Survey date: THURSDAY 16/06/16	ENGINEERING COMPANY	HAMPSHIRE	Survey Type: MANUAL
6	HE-02-C-02 COLLEGE ROAD BURCOTT HEREFORD Edge of Town Commercial Zone Total Gross floor area: 1880 sqm Survey date: TUESDAY 22/10/13	THERMAL PROCESSING	HEREFORDSHIRE	Survey Type: MANUAL
7	HF-02-C-01 BRIDGE ROAD EAST WELWYN GARDEN CITY Suburban Area (PPS6 Out of Centre) Industrial Zone Total Gross floor area: 1800 sqm Survey date: THURSDAY 17/07/08	INDUSTRIAL UNIT	HERTFORDSHIRE	Survey Type: MANUAL
8	LC-02-C-02 ESSEX STREET RED SCAR IND ESTATE PRESTON Edge of Town Centre Industrial Zone Total Gross floor area: 8000 sqm Survey date: THURSDAY 10/05/12	RECYCLING CO.	LANCASHIRE	Survey Type: MANUAL
9	SF-02-C-01 ANSON ROAD MARTLESHAM HEATH IPSWICH Edge of Town Industrial Zone Total Gross floor area: 1100 sqm Survey date: FRIDAY 12/07/13	JOINERY	SUFFOLK	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

10	SR-02-C-01	SPECIALIST MODEL MAKING	STIRLING
	BORROWMEADOW ROAD		
	STIRLING		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	2350 sqm	
	Survey date: MONDAY	16/06/14	Survey Type: MANUAL
11	WM-02-C-03	INDUSTRIAL GLASS	WEST MIDLANDS
	DOWNING STREET		
	SMETHWICK		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	5070 sqm	
	Survey date: TUESDAY	06/11/12	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
DC-02-C-07	to high trips
RE-02-C-01	too Low
WM-02-C-02	too Low

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT
VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00	1	2350	0.298	1	2350	0.043	1	2350	0.341
07:00 - 08:00	11	3588	0.385	11	3588	0.061	11	3588	0.446
08:00 - 09:00	11	3588	0.385	11	3588	0.094	11	3588	0.479
09:00 - 10:00	11	3588	0.248	11	3588	0.114	11	3588	0.362
10:00 - 11:00	11	3588	0.152	11	3588	0.114	11	3588	0.266
11:00 - 12:00	11	3588	0.109	11	3588	0.124	11	3588	0.233
12:00 - 13:00	11	3588	0.170	11	3588	0.175	11	3588	0.345
13:00 - 14:00	11	3588	0.172	11	3588	0.195	11	3588	0.367
14:00 - 15:00	11	3588	0.109	11	3588	0.127	11	3588	0.236
15:00 - 16:00	11	3588	0.111	11	3588	0.167	11	3588	0.278
16:00 - 17:00	11	3588	0.076	11	3588	0.319	11	3588	0.395
17:00 - 18:00	11	3588	0.056	11	3588	0.426	11	3588	0.482
18:00 - 19:00	9	3580	0.022	10	3457	0.130	9	3580	0.152
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:	2.293			2.089			4.382		

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

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The Company accepts no responsibility for loss which may arise from reliance on data contained in the TRICS Database. [No warranty of any kind, express or implied, is made as to the data contained in the TRICS Database.]

Parameter summary

Trip rate parameter range selected:	1100 - 8000 (units: sqm)
Survey date date range:	01/01/07 - 06/07/17
Number of weekdays (Monday-Friday):	11
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	3

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/C - INDUSTRIAL UNIT

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	11	3588	0.018	11	3588	0.020	11	3588	0.038
08:00 - 09:00	11	3588	0.046	11	3588	0.033	11	3588	0.079
09:00 - 10:00	11	3588	0.038	11	3588	0.035	11	3588	0.073
10:00 - 11:00	11	3588	0.041	11	3588	0.033	11	3588	0.074
11:00 - 12:00	11	3588	0.035	11	3588	0.043	11	3588	0.078
12:00 - 13:00	11	3588	0.046	11	3588	0.058	11	3588	0.104
13:00 - 14:00	11	3588	0.030	11	3588	0.030	11	3588	0.060
14:00 - 15:00	11	3588	0.023	11	3588	0.020	11	3588	0.043
15:00 - 16:00	11	3588	0.020	11	3588	0.015	11	3588	0.035
16:00 - 17:00	11	3588	0.010	11	3588	0.018	11	3588	0.028
17:00 - 18:00	11	3588	0.005	11	3588	0.008	11	3588	0.013
18:00 - 19:00	10	3457	0.003	10	3457	0.000	10	3457	0.003
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.315			0.313			0.628

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	1100 - 8000 (units: sqm)
Survey date date range:	01/01/07 - 06/07/17
Number of weekdays (Monday-Friday):	11
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	3

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Calculation Reference: AUDIT-753001-180518-0557

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
 Category : F - WAREHOUSING (COMMERCIAL)
 VEHICLES

Selected regions and areas:

02	SOUTH EAST	
	HC HAMPSHIRE	1 days
	KC KENT	1 days
	SC SURREY	1 days
03	SOUTH WEST	
	CW CORNWALL	1 days
04	EAST ANGLIA	
	SF SUFFOLK	1 days
05	EAST MIDLANDS	
	DS DERBYSHIRE	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE	
	WY WEST YORKSHIRE	1 days
08	NORTH WEST	
	LC LANCASHIRE	1 days
09	NORTH	
	CB CUMBRIA	1 days
	TV TEES VALLEY	1 days
10	WALES	
	BG BRIDGEND	1 days
11	SCOTLAND	
	ML MIDLOTHIAN	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Gross floor area
 Actual Range: 634 to 11200 (units: sqm)
 Range Selected by User: 634 to 13000 (units: sqm)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/07 to 22/09/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday	2 days
Tuesday	5 days
Wednesday	2 days
Friday	3 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	12 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Edge of Town Centre	2
Suburban Area (PPS6 Out of Centre)	2
Edge of Town	8

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Industrial Zone	7
Commercial Zone	1
Residential Zone	1
Built-Up Zone	1
No Sub Category	2

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:

Use Class:

B8 11 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,000 or Less	1 days
1,001 to 5,000	2 days
5,001 to 10,000	4 days
10,001 to 15,000	3 days
15,001 to 20,000	1 days
25,001 to 50,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	2 days
25,001 to 50,000	1 days
50,001 to 75,000	1 days
75,001 to 100,000	2 days
125,001 to 250,000	4 days
250,001 to 500,000	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	5 days
1.1 to 1.5	7 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No 12 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present 12 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1	BG-02-F-01	LOGISTICS COMPANY	BRIDGEND
	PARC CRESCENT		
	WATERTON IND. EST.		
	BRIDGEND		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	3050 sqm	
	Survey date: MONDAY	13/10/14	Survey Type: MANUAL
2	CB-02-F-01	DOMINO'S PIZZA	CUMBRIA
	COWPER ROAD		
	GILWILLY IND. ESTATE		
	PENRITH		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	2950 sqm	
	Survey date: TUESDAY	10/06/14	Survey Type: MANUAL
3	CW-02-F-01	WAREHOUSING	CORNWALL
	A390		
	THREEMILESTONE		
	NEAR TRURO		
	Edge of Town		
	No Sub Category		
	Total Gross floor area:	5150 sqm	
	Survey date: TUESDAY	18/09/07	Survey Type: MANUAL
4	DS-02-F-01	ARMADILLO S. STORAGE	DERBYSHIRE
	FORRESTERS BUSINESS P..		
	SINFIN LANE		
	DERBY		
	Edge of Town Centre		
	Commercial Zone		
	Total Gross floor area:	1900 sqm	
	Survey date: TUESDAY	05/07/11	Survey Type: MANUAL
5	HC-02-F-01	WAREHOUSING	HAMPSHIRE
	MAURETANIA ROAD		
	NURSLING INDUSTRIAL ESTATE		
	SOUTHAMPTON		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	4000 sqm	
	Survey date: WEDNESDAY	21/11/07	Survey Type: MANUAL
6	KC-02-F-02	COMMERCIAL WAREHOUSING	KENT
	MILLS ROAD		
	QUARRY WOOD		
	AYLESFORD		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	11200 sqm	
	Survey date: FRIDAY	22/09/17	Survey Type: MANUAL
7	LC-02-F-02	WAREHOUSING	LANCASHIRE
	CHORLEY ROAD		
	WALTON-LE-DALE		
	PRESTON		
	Suburban Area (PPS6 Out of Centre)		
	Residential Zone		
	Total Gross floor area:	1200 sqm	
	Survey date: FRIDAY	22/06/07	Survey Type: MANUAL
8	ML-02-F-01	WINDOWS	MIDLOTHIAN
	UNIT 53		
	MAYFIELD IND. ESTATE		
	DALKEITH		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	750 sqm	
	Survey date: WEDNESDAY	04/05/11	Survey Type: MANUAL
9	SC-02-F-04	WAREHOUSING	SURREY
	PRETORIA ROAD		
	CHERTSEY		
	Edge of Town		
	No Sub Category		
	Total Gross floor area:	4460 sqm	
	Survey date: TUESDAY	27/11/07	Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

10	SF-02-F-03	ROAD HAULAGE	SUFFOLK
	CENTRAL AVENUE		
	WARREN HEATH		
	IPSWICH		
	Edge of Town		
	Industrial Zone		
	Total Gross floor area:	4700 sqm	
	Survey date: FRIDAY	18/09/15	Survey Type: MANUAL
11	TV-02-F-03	ELECTRICAL COMPONENTS	TEES VALLEY
	UNIT 8,NAVIGATOR COURT		
	STOCKTON-ON-TEES		
	Suburban Area (PPS6 Out of Centre)		
	Industrial Zone		
	Total Gross floor area:	634 sqm	
	Survey date: TUESDAY	28/06/11	Survey Type: MANUAL
12	WY-02-F-01	ELECTRONICS DISTRIBUTION	WEST YORKSHIRE
	MORTIMER STREET		
	CLECKHEATON		
	Edge of Town Centre		
	Built-Up Zone		
	Total Gross floor area:	1507 sqm	
	Survey date: MONDAY	19/09/16	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

VEHICLES

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00	1	2950	0.102	1	2950	0.000	1	2950	0.102
06:00 - 07:00	1	2950	0.136	1	2950	0.034	1	2950	0.170
07:00 - 08:00	12	3458	0.296	12	3458	0.125	12	3458	0.421
08:00 - 09:00	12	3458	0.349	12	3458	0.193	12	3458	0.542
09:00 - 10:00	12	3458	0.217	12	3458	0.200	12	3458	0.417
10:00 - 11:00	12	3458	0.178	12	3458	0.176	12	3458	0.354
11:00 - 12:00	12	3458	0.188	12	3458	0.183	12	3458	0.371
12:00 - 13:00	12	3458	0.193	12	3458	0.166	12	3458	0.359
13:00 - 14:00	12	3458	0.195	12	3458	0.195	12	3458	0.390
14:00 - 15:00	12	3458	0.190	12	3458	0.193	12	3458	0.383
15:00 - 16:00	12	3458	0.181	12	3458	0.241	12	3458	0.422
16:00 - 17:00	12	3458	0.169	12	3458	0.292	12	3458	0.461
17:00 - 18:00	12	3458	0.089	12	3458	0.277	12	3458	0.366
18:00 - 19:00	11	3636	0.045	11	3636	0.108	11	3636	0.153
19:00 - 20:00	1	2950	0.203	1	2950	0.203	1	2950	0.406
20:00 - 21:00	1	2950	0.102	1	2950	0.136	1	2950	0.238
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.833			2.722			5.555

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	634 - 11200 (units: sqm)
Survey date date range:	01/01/07 - 22/09/17
Number of weekdays (Monday-Friday):	12
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 02 - EMPLOYMENT/F - WAREHOUSING (COMMERCIAL)

OGVS

Calculation factor: 100 sqm

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate	No. Days	Ave. GFA	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00	1	2950	0.000	1	2950	0.000	1	2950	0.000
06:00 - 07:00	1	2950	0.068	1	2950	0.000	1	2950	0.068
07:00 - 08:00	12	3458	0.031	12	3458	0.065	12	3458	0.096
08:00 - 09:00	12	3458	0.077	12	3458	0.080	12	3458	0.157
09:00 - 10:00	12	3458	0.058	12	3458	0.072	12	3458	0.130
10:00 - 11:00	12	3458	0.051	12	3458	0.041	12	3458	0.092
11:00 - 12:00	12	3458	0.075	12	3458	0.075	12	3458	0.150
12:00 - 13:00	12	3458	0.063	12	3458	0.039	12	3458	0.102
13:00 - 14:00	12	3458	0.077	12	3458	0.058	12	3458	0.135
14:00 - 15:00	12	3458	0.089	12	3458	0.039	12	3458	0.128
15:00 - 16:00	12	3458	0.080	12	3458	0.058	12	3458	0.138
16:00 - 17:00	12	3458	0.063	12	3458	0.039	12	3458	0.102
17:00 - 18:00	12	3458	0.019	12	3458	0.029	12	3458	0.048
18:00 - 19:00	11	3636	0.015	11	3636	0.035	11	3636	0.050
19:00 - 20:00	1	2950	0.000	1	2950	0.203	1	2950	0.203
20:00 - 21:00	1	2950	0.000	1	2950	0.102	1	2950	0.102
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			0.766			0.935			1.701

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	634 - 11200 (units: sqm)
Survey date range:	01/01/07 - 22/09/17
Number of weekdays (Monday-Friday):	12
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

APPENDIX H

RTF CALCULATION

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Vehicle Type	Road Type	Country	Region	Traffic - Billion Vehicle miles (bvm)							
				2015	2020	2025	2030	2035	2040	2045	2050
Car	Principal A	Wales	Wales	3.9924	4.2238	4.4117	4.5816	4.7582	4.9183	5.0657	5.2008
LGV	Principal A	Wales	Wales	0.6871	0.7447	0.7741	0.8130	0.8685	0.9243	0.9710	1.0078
HGV	Principal A	Wales	Wales	0.1422	0.1401	0.1395	0.1391	0.1403	0.1417	0.1431	0.1441
PSV	Principal A	Wales	Wales	0.0499	0.0449	0.0449	0.0449	0.0449	0.0449	0.0449	0.0449
Total	Principal A	Wales	Wales	4.8716	5.1536	5.3702	5.5786	5.8119	6.0292	6.2246	6.3977

HGV								
Year	5 Year Value	5 Year Diff	Linear Diff	Increment	1 Year Value	Check	Factor	
2015	0.1422	-0.0020	-0.0004					
2016				1	0.1418			
2017				2	0.1414			
2018				3	0.1410			
2019				4	0.1406			
2020	0.1401	-0.0006	-0.0001	5	0.1401	0.0000		
2021				1	0.1400			
2022				2	0.1399			
2023				3	0.1398			
2024				4	0.1396			
2025	0.1395	-0.0004	-0.0001	5	0.1395	0.0000		
2026				1	0.1394			
2027				2	0.1393			
2028				3	0.1393			
2029				4	0.1392			
2030	0.1391	0.0012	0.0002	5	0.1391	0.0000		
2031				1	0.1393			
2032				2	0.1396			
2033				3	0.1398			
2034				4	0.1400		2018	2019
2035	0.1403	0.0015	0.0003	5	0.1403	0.0000	0.993330854	0.996211
2036				1	0.1405			
2037				2	0.1408			
2038				3	0.1411			
2039				4	0.1414			
2040	0.1417	0.0013	0.0003	5	0.1417	0.0000		
2041				1	0.1420			
2042				2	0.1423			
2043				3	0.1425			
2044				4	0.1428			
2045	0.1431	0.0010	0.0002	5	0.1431	0.0000		
2046				1	0.1433			
2047				2	0.1435			
2048				3	0.1437			
2049				4	0.1439			
2050	0.1441			5	0.1441	0.0000		

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APPENDIX I

MTW CALCUATION

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Trips	MSOA Name	LAD	Region	Local Area	Pri.Route	Pri %	Sec.Route	Sec %	Ter.Route	Ter %	Quat.Route	Quat %	Notes	Junction	A	B	C	Turn	D
W02000420	834 Wrexham 020	Wrexham	Wales	Wrexham Industrial Estate	18, 2A, 3A, 4B	4.42%	1A, 5A, 6A, 7B	4.42%											
W02000089	576 Wrexham 012	Wrexham	Wales	Whitgate Industrial Estate, Wrexham South Estate	18, 2A, 3A, 4B	6.10%													
W02000080	566 Wrexham 003	Wrexham	Wales	Rhosoban, Llay	1A, 5A, 6A, 7B	3.00%	1B, 2A, 3A, 4B	3.00%						1 Main Site Access (priority)	Left	Right			
W02000085	525 Wrexham 008	Wrexham	Wales	Little Acton, Glyndwr University, Wrexham Tennis Centre	18, 2A, 3A, 4B	2.78%	1A, 5A, 6A, 7B	2.78%						2 Clywedog Rd E / Bridge Rd / Bridge Rd S (roundabout)	1st exit	2nd exit	3rd exit		
W02000083	482 Wrexham 006	Wrexham	Wales	Coedpoeth, Brymbo, Tanyfron	18, 2A, 3A, 4B	3.57%	1A, 5A, 6A, 7B	1.53%						3 Clywedog Rd S / Bridge Rd S (roundabout)	1st exit	2nd exit	3rd exit		
W02000088	441 Wrexham 011	Wrexham	Wales	Puleston Industrial Estate, Wrexham Maelor Hospital, Wrexham Technology Park	18, 2A, 3A, 4B	4.67%								4 Bridge Rd S / Cefn Rd /Bedwell Rd	1st exit	2nd exit	3rd exit		
W02000082	435 Wrexham 005	Wrexham	Wales	New Broughton, southsea, Brynteg, Pentre Broughton, cerney	1A, 5A, 6A, 7B	3.68%	1B, 2A, 3A, 4B	0.92%						5 Spectrum Business Park / Bridge Rd	1st exit	2nd exit	3rd exit		
W02000081	367 Wrexham 004	Wrexham	Wales	summerhill, Sydatir, Gwensyllt	1A, 5A, 6A, 7B	3.89%								6 Bridge Rd / Coad Aben Rd (priority)	left	right			
W02000084	351 Wrexham 007	Wrexham	Wales	Borras, Rhosnesni	18, 2A, 3A, 4B	1.86%	1A, 5A, 6A, 7B	1.86%						7 Clywedog Rd N / Coad Aben Rd	left	ahead			
W02000093	350 Wrexham 016	Wrexham	Wales	Crabtree Green, Ruabon, Eytton, Marchwieli	18, 2A, 3A, 4A	3.71%								8					
W02000091	345 Wrexham 014	Wrexham	Wales	Bersham, Johnstonow, Ruabon lle Works	18, 2A, 3A, 4A	3.65%								9					
W02000092	340 Wrexham 015	Wrexham	Wales	Rhosdarewcruggog	18, 2A, 3A, 4B	3.46%													
W02000090	312 Wrexham 013	Wrexham	Wales	Pen-y-cau, Minera, New Brighton, Bwlchgwynn	18, 2A, 3A, 4B	2.65%	1A, 5A, 6A, 7B	1.65%											
W02000087	311 Wrexham 010	Wrexham	Wales	Caia Park, Queensway Sports Centre	18, 2A, 3A, 4B	3.29%													
W02000094	302 Wrexham 017	Wrexham	Wales	cefn Mawr, Froncysyllte, Trefor, Garth	18, 2A, 3A, 4A	3.20%													
W02000086	267 Wrexham 009	Wrexham	Wales	Acton	18, 2A, 3A, 4B	2.83%													
W02000077	240 Flintshire 028	Flintshire	Wales	Llanfynydd, cymau, Caerwile, Abermorddu, Caerwile	1A, 5A, 6A, 7B	2.54%													
W02000095	228 Wrexham 018	Wrexham	Wales	Horsemans Green, Overton, Hamner	18, 2A, 3A, 4A	2.41%													
W02000096	144 Wrexham 019	Wrexham	Wales	Chirk, Pontfadog, Glyn Ceiriog, Llywynmawr, Tregeirio	18, 2A, 3A, 4A	1.52%													
E02003810	121 Cheshire West and Chester 047	Cheshire West and Chester	North West	Fandon, Churton, Barton, Malpas, Malpas Castle Hill	1A, 5A, 6A, 7B	1.28%													
E02006023	111 Shropshire 003	Shropshire	West Midlands	Gobswon, Ifron Heath, Brongarth, Weston Rhyon	18, 2A, 3A, 4A	1.18%													
W02000075	105 Flintshire 016	Flintshire	Wales	Higher Kinnerston, Penysylfaidd	1A, 5A, 6A, 7B	1.11%													
W02000057	93 Denbighshire 016	Denbighshire	Wales	Llangollen, Llandrillo, Cynwyd, Glyndyfrdwy	18, 2A, 3A, 4A	0.98%													
W02000074	90 Flintshire 017	Flintshire	Wales	Drury, Buckley, Padeswood Cement Works	1A, 5A, 6A, 7B	0.95%													
W02000076	78 Flintshire 019	Flintshire	Wales	Gwernaffield, Gwernymynydd, Leeswood, Treuddyn	1A, 5A, 6A, 7B	0.83%													
W02000070	74 Flintshire 013	Flintshire	Wales	Ewloe, Hawarden, Hawarden Castle	1A, 5A, 6A, 7B	0.78%													
W02000071	73 Flintshire 014	Flintshire	Wales	Mynydd Isaf, Aargod High School	1A, 5A, 6A, 7B	0.77%													
W02000072	72 Flintshire 015	Flintshire	Wales	Broughton, Hawarden Airport, Bretton, Saltney Ferry	1A, 5A, 6A, 7B	0.76%													
W02000073	66 Flintshire 016	Flintshire	Wales	Mold	1A, 5A, 6A, 7B	0.70%													
E02006017	59 Shropshire 004	Shropshire	West Midlands	Ellesmere, Dudleyston Heath, Welshampton	18, 2A, 3A, 4A	0.62%													
W02000066	59 Flintshire 009	Flintshire	Wales	Shotton, Garden City	1A, 5A, 6A, 7B	0.62%													
E02003809	58 Cheshire West and Chester 046	Cheshire West and Chester	North West	Chester Business Park, Doodleston, Aldford, Tattenhall	1A, 5A, 6A, 7B	0.61%													
W02000063	47 Flintshire 006	Flintshire	Wales	Caerwys, Pentre Hallwyn, Rhosesmor	1A, 5A, 6A, 7B	0.50%													
W02000069	47 Flintshire 012	Flintshire	Wales	Northop, Sychdyn, Northop College	1A, 5A, 6A, 7B	0.50%													
W02000054	46 Denbighshire 013	Denbighshire	Wales	Llandymog, Llanbedr Dyffryn Chwyd	1A, 5A, 6A, 7B	0.49%													
E02000807	45 Cheshire West and Chester 043	Cheshire West and Chester	North West	Hough Green, Handbridge, Westminster Park	1A, 5A, 6A, 7B	0.48%													
W02000065	45 Flintshire 008	Flintshire	Wales	Connahs Quay Health Centre, Connahs Quay	1A, 5A, 6A, 7B	0.48%													
W02000067	44 Flintshire 010	Flintshire	Wales	Northop Hall, Aston	1A, 5A, 6A, 7B	0.47%													
E02006024	43 Shropshire 006	Shropshire	West Midlands	Mike Oak Industrial Estate, Oswestry Cattle Market, Oswestry Minor Injuries Unit	18, 2A, 3A, 4A	0.46%													
W02000068	41 Flintshire 011	Flintshire	Wales	Sandycroft, Queensferry, Mancot, Queensferry Industrial Estate	1A, 5A, 6A, 7B	0.43%													
W02000060	40 Flintshire 003	Flintshire	Wales	Bagliff, Holywell, Walwen, Greenfield Business Park	1A, 5A, 6A, 7B	0.42%													
E02006025	39 Shropshire 007	Shropshire	West Midlands	Oswestry	18, 2A, 3A, 4A	0.41%													
W02000059	36 Flintshire 002	Flintshire	Wales	Rhewl-Mostyn, Mostyn Dock	1A, 5A, 6A, 7B	0.38%													
E02006015	35 Shropshire 001	Shropshire	West Midlands	Whitchurch, Whitchurch Community Hospital	18, 2A, 3A, 4A	0.37%													
W02000064	35 Flintshire 007	Flintshire	Wales	Connahs Quay, Sealand Rifle Range, Deeside Power Station	1A, 5A, 6A, 7B	0.37%													
E02003803	33 Cheshire West and Chester 034	Cheshire West and Chester	North West	Chester, Greyhound Retail Park, Sealand Industrial Estate	1A, 5A, 6A, 7B	0.35%													
W02000062	33 Flintshire 005	Flintshire	Wales	Flint Mountain, Aber Park Industrial Centre, Aber Park Industrial Estate	1A, 5A, 6A, 7B	0.35%													
E02003797	30 Cheshire West and Chester 028	Cheshire West and Chester	North West	North Chester	1A, 5A, 6A, 7B	0.32%													
E02003801	30 Cheshire West and Chester 032	Cheshire West and Chester	North West	Vicars Cross, East Chester	1A, 5A, 6A, 7B	0.32%													
E02003805	29 Cheshire West and Chester 039	Cheshire West and Chester	North West	Waverton, Christleton, Brown Heath, Guilden Sutton	1A, 5A, 6A, 7B	0.31%													
E02003804	28 Cheshire West and Chester 036	Cheshire West and Chester	North West	East Chester	1A, 5A, 6A, 7B	0.30%													
E02003794	27 Cheshire West and Chester 022	Cheshire West and Chester	North West	Dunham on the Hill, Eton, Great Barrow	1A, 5A, 6A, 7B	0.29%													
E02003802	27 Cheshire West and Chester 033	Cheshire West and Chester	North West	Newtown, Northgate Village, Chester Train Station	1A, 5A, 6A, 7B	0.29%													
E02003800	25 Cheshire West and Chester 030	Cheshire West and Chester	North West	Tarvin, Oxcroft, Kelsall, Ashton Hayes	1A, 5A, 6A, 7B	0.26%													
E02003806	25 Cheshire West and Chester 041	Cheshire West and Chester	North West	Boughton Heath, Huntington, Caidy Valley	1A, 5A, 6A, 7B	0.26%													
W02000056	25 Denbighshire 015	Denbighshire	Wales	Kingsley, Helsby, Rannere	1A, 5A, 6A, 7B	0.26%													
W02000061	25 Flintshire 004	Flintshire	Wales	Flint, Oakenholt Paper Mill, Ashmound Industrial Centre	1A, 5A, 6A, 7B	0.26%													
E02003808	24 Cheshire West and Chester 044	Cheshire West and Chester	North West	Lache	1A, 5A, 6A, 7B	0.25%													
E02006026	23 Shropshire 011	Shropshire	West Midlands	Ruyton-Xi-Towns, Rednal Industrial Estate, Whittington, West Felton	18, 2A, 3A, 4A	0.24%													
E02006027	22 Shropshire 012	Shropshire	West Midlands	Maesbury, Trefonen, Llanyblodwel	18, 2A, 3A, 4A	0.23%													
E02003796	20 Cheshire West and Chester 027	Cheshire West and Chester	North West	Upton Grange, Upton-by-Chester High School	1A, 5A, 6A, 7B	0.21%													
	9444					83.85%		16.15%		0.00%		0.00%							
						100.00%													

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APPENDIX J

MODEL CAPACITY OUTPUTS

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Junctions 9	
PICADY 9 - Priority Intersection Module	
Version: 9.5.0.6896 © Copyright TRL Limited, 2018	
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Filename: 1-Bryn-Oak.j9

Path: N:\Projects 2019\P19014 - The Oakes, Wrexham Industrial Estate\6.Technical\Models

Report generation date: 21/05/2019 15:05:19

- »1 Observed 2019 , AM
- »1 Observed 2019, PM
- »2 Without Development 2034, AM
- »2 Without Development 2034, PM
- »3 With Development 2034, AM
- »3 With Development 2034, PM

File summary

File Description

Title	Bryn Lane/Oak Road
Location	Wrexham
Site number	1
Date	17/05/2019
Version	
Status	Final
Identifier	
Client	Cefn Park Development Ltd
Jobnumber	P19014
Enumerator	GHClb.gaze
Description	Checked by D. Stoddart

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2019	AM	ONE HOUR	07:15	08:45	15	✓
D2	1 Observed 2019	PM	ONE HOUR	16:00	17:30	15	✓
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

1 Observed 2019 , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		5.51	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Oak Road (Western Arm)		Major
B	Bryn Lane		Minor
C	Oak Road (Eastern Arm)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Oak Road (Eastern Arm)	7.00		✓	3.50	150.0	✓	8.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Bryn Lane	One lane plus flare	10.00	9.60	5.80	3.60	3.20	✓	2.00	40	16

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	552	0.096	0.243	0.153	0.347
1	B-C	693	0.102	0.257	-	-
1	C-B	754	0.280	0.280	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2019	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	102	100.000
B - Bryn Lane		ONE HOUR	✓	225	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	94	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
	From			
	A - Oak Road (Western Arm)	0	76	26
	B - Bryn Lane	140	0	85
	C - Oak Road (Eastern Arm)	62	32	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
	From			
	A - Oak Road (Western Arm)	0	13	0
	B - Bryn Lane	7	0	12
	C - Oak Road (Eastern Arm)	13	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.15	7.63	0.2	A	78	117
B-A	0.30	10.69	0.5	B	128	193
C-AB	0.05	5.40	0.1	A	29	44
C-A					57	85
A-B					70	105
A-C					24	36

1 Observed 2019, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		3.10	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	1 Observed 2019	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	302	100.000
B - Bryn Lane		ONE HOUR	✓	127	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	128	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
	From			
	A - Oak Road (Western Arm)	0	247	55
	B - Bryn Lane	78	0	49
	C - Oak Road (Eastern Arm)	40	88	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
	From			
	A - Oak Road (Western Arm)	0	3	4
	B - Bryn Lane	15	0	11
	C - Oak Road (Eastern Arm)	3	4	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.09	7.07	0.1	A	45	67
B-A	0.18	10.23	0.2	B	72	107
C-AB	0.15	6.60	0.2	A	81	121
C-A					37	55
A-B					227	340
A-C					50	76

2 Without Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		5.74	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	112	100.000
B - Bryn Lane		ONE HOUR	✓	247	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	102	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	83	29
	B - Bryn Lane	154	0	93
	C - Oak Road (Eastern Arm)	67	35	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	12	0
	B - Bryn Lane	6	0	11
	C - Oak Road (Eastern Arm)	12	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.17	7.83	0.2	A	85	128
B-A	0.33	11.22	0.5	B	141	212
C-AB	0.05	5.44	0.1	A	32	48
C-A					61	92
A-B					76	114
A-C					27	40

2 Without Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		3.16	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	334	100.000
B - Bryn Lane		ONE HOUR	✓	138	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	141	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	273	61
	B - Bryn Lane	85	0	53
	C - Oak Road (Eastern Arm)	44	97	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	3	3
	B - Bryn Lane	13	0	10
	C - Oak Road (Eastern Arm)	2	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.10	7.16	0.1	A	49	73
B-A	0.19	10.54	0.3	B	78	117
C-AB	0.16	6.82	0.2	A	89	134
C-A					40	61
A-B					251	376
A-C					56	84

3 With Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		7.33	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	149	100.000
B - Bryn Lane		ONE HOUR	✓	308	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	102	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	120	29
	B - Bryn Lane	215	0	93
	C - Oak Road (Eastern Arm)	67	35	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	19	0
	B - Bryn Lane	9	0	11
	C - Oak Road (Eastern Arm)	12	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.18	8.72	0.2	A	85	128
B-A	0.46	14.38	0.9	B	197	296
C-AB	0.05	5.53	0.1	A	32	48
C-A					61	92
A-B					110	165
A-C					27	40

3 With Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bryn Lane/Oak Road	T-Junction	Two-way		3.70	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Western Arm)		ONE HOUR	✓	380	100.000
B - Bryn Lane		ONE HOUR	✓	168	100.000
C - Oak Road (Eastern Arm)		ONE HOUR	✓	141	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	319	61
	B - Bryn Lane	115	0	53
	C - Oak Road (Eastern Arm)	44	97	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Western Arm)	B - Bryn Lane	C - Oak Road (Eastern Arm)
From	A - Oak Road (Western Arm)	0	4	3
	B - Bryn Lane	19	0	10
	C - Oak Road (Eastern Arm)	2	3	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.10	7.54	0.1	A	49	73
B-A	0.28	12.79	0.4	B	106	158
C-AB	0.17	7.00	0.2	A	89	134
C-A					40	61
A-B					293	439
A-C					56	84

Junctions 9	
ARCADY 9 - Roundabout Module	
Version: 9.5.0.6896 © Copyright TRL Limited, 2018	
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Filename: 2-Bryn-Ash-Aben-Ind Est.j9

Path: N:\Projects 2019\P19014 - The Oakes, Wrexham Industrial Estate\6.Technical\Models

Report generation date: 21/05/2019 15:06:20

- »1 Observed 2019 , AM
- »1 Observed 2019, PM
- »2 Without Development 2034, AM
- »2 Without Development 2034, PM
- »3 With Development 2034, AM
- »3 With Development 2034, PM

File summary

File Description

Title	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way
Location	Wrexham
Site number	2
Date	17/05/2019
Version	
Status	Final
Identifier	
Client	Cefn Park Development Ltd
Jobnumber	P19014
Enumerator	GHClb.gaze
Description	Checked by D. Stoddart

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2019	AM	ONE HOUR	07:15	08:45	15	✓
D2	1 Observed 2019	PM	ONE HOUR	16:00	17:30	15	✓
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

1 Observed 2019 , AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	4.78	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Bryn Lane	
2	Ash Road North	
3	Abenbury Road	
4	Industrial Estate Road	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1 - Bryn Lane	3.59	7.19	18.1	41.4	60.0	35.8	
2 - Ash Road North	3.59	7.54	20.6	37.3	60.0	34.9	
3 - Abenbury Road	3.65	8.25	20.8	62.7	60.0	34.6	
4 - Industrial Estate Road	8.57	9.91	8.3	37.1	60.0	34.7	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Bryn Lane	0.569	1763
2 - Ash Road North	0.583	1840
3 - Abenbury Road	0.606	1954
4 - Industrial Estate Road	0.764	2883

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2019	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	176	100.000
2 - Ash Road North		ONE HOUR	✓	140	100.000
3 - Abenbury Road		ONE HOUR	✓	239	100.000
4 - Industrial Estate Road		ONE HOUR	✓	1868	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
From	1 - Bryn Lane	0	45	61	70
	2 - Ash Road North	10	0	3	127
	3 - Abenbury Road	14	21	0	204
	4 - Industrial Estate Road	163	911	794	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
From	1 - Bryn Lane	0	7	5	23
	2 - Ash Road North	43	0	0	32
	3 - Abenbury Road	56	17	0	22
	4 - Industrial Estate Road	13	2	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.28	8.28	0.4	A	162	242
2 - Ash Road North	0.12	4.35	0.2	A	128	193
3 - Abenbury Road	0.14	2.85	0.2	A	219	329
4 - Industrial Estate Road	0.72	4.73	2.7	A	1714	2571

1 Observed 2019, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	5.20	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	1 Observed 2019	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	413	100.000
2 - Ash Road North		ONE HOUR	✓	859	100.000
3 - Abenbury Road		ONE HOUR	✓	520	100.000
4 - Industrial Estate Road		ONE HOUR	✓	436	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	7	37	369
	2 - Ash Road North	2	0	6	851
	3 - Abenbury Road	13	5	0	502
	4 - Industrial Estate Road	122	154	160	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	17	6	3
	2 - Ash Road North	100	0	50	2
	3 - Abenbury Road	8	25	0	5
	4 - Industrial Estate Road	16	13	21	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.29	3.35	0.4	A	379	568
2 - Ash Road North	0.64	6.94	1.8	A	788	1182
3 - Abenbury Road	0.50	6.65	1.0	A	477	716
4 - Industrial Estate Road	0.17	1.76	0.2	A	400	600

2 Without Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	6.78	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	191	100.000
2 - Ash Road North		ONE HOUR	✓	147	100.000
3 - Abenbury Road		ONE HOUR	✓	278	100.000
4 - Industrial Estate Road		ONE HOUR	✓	2098	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	49	67	75
	2 - Ash Road North	10	0	3	134
	3 - Abenbury Road	14	23	0	241
	4 - Industrial Estate Road	177	1009	912	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	7	5	21
	2 - Ash Road North	43	0	0	30
	3 - Abenbury Road	56	15	0	21
	4 - Industrial Estate Road	12	2	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.39	11.96	0.7	B	175	263
2 - Ash Road North	0.14	4.67	0.2	A	135	202
3 - Abenbury Road	0.17	2.92	0.2	A	255	383
4 - Industrial Estate Road	0.81	6.97	4.4	A	1925	2888

2 Without Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	6.90	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	457	100.000
2 - Ash Road North		ONE HOUR	✓	950	100.000
3 - Abenbury Road		ONE HOUR	✓	598	100.000
4 - Industrial Estate Road		ONE HOUR	✓	482	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	8	41	408
	2 - Ash Road North	2	0	6	942
	3 - Abenbury Road	14	5	0	579
	4 - Industrial Estate Road	132	167	183	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	14	5	3
	2 - Ash Road North	100	0	50	2
	3 - Abenbury Road	8	25	0	4
	4 - Industrial Estate Road	15	12	18	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.33	3.57	0.5	A	419	629
2 - Ash Road North	0.73	9.46	2.7	A	872	1308
3 - Abenbury Road	0.63	9.53	1.7	A	549	823
4 - Industrial Estate Road	0.19	1.77	0.3	A	442	663

3 With Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	7.82	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	228	100.000
2 - Ash Road North		ONE HOUR	✓	147	100.000
3 - Abenbury Road		ONE HOUR	✓	278	100.000
4 - Industrial Estate Road		ONE HOUR	✓	2159	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	49	67	112
	2 - Ash Road North	10	0	3	134
	3 - Abenbury Road	14	23	0	241
	4 - Industrial Estate Road	238	1009	912	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
From	1 - Bryn Lane	0	7	5	26
	2 - Ash Road North	43	0	0	30
	3 - Abenbury Road	56	15	0	21
	4 - Industrial Estate Road	13	2	4	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.46	14.03	1.0	B	209	314
2 - Ash Road North	0.14	4.79	0.2	A	135	202
3 - Abenbury Road	0.17	2.97	0.3	A	255	383
4 - Industrial Estate Road	0.84	7.99	5.2	A	1981	2972

3 With Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	Industrial Estate Road/Bryn Lane/Ash Road North/Abenbury Way	Standard Roundabout		1, 2, 3, 4	7.31	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Bryn Lane		ONE HOUR	✓	503	100.000
2 - Ash Road North		ONE HOUR	✓	950	100.000
3 - Abenbury Road		ONE HOUR	✓	598	100.000
4 - Industrial Estate Road		ONE HOUR	✓	512	100.000

Origin-Destination Data

Demand (PCU/hr)

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	8	41	454
	2 - Ash Road North	2	0	6	942
	3 - Abenbury Road	14	5	0	579
	4 - Industrial Estate Road	162	167	183	0

Vehicle Mix

Heavy Vehicle Percentages

	To				
From		1 - Bryn Lane	2 - Ash Road North	3 - Abenbury Road	4 - Industrial Estate Road
	1 - Bryn Lane	0	14	5	3
	2 - Ash Road North	100	0	50	2
	3 - Abenbury Road	8	25	0	4
	4 - Industrial Estate Road	18	12	18	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
1 - Bryn Lane	0.36	3.78	0.6	A	462	692
2 - Ash Road North	0.74	10.23	2.9	B	872	1308
3 - Abenbury Road	0.64	10.33	1.9	B	549	823
4 - Industrial Estate Road	0.20	1.81	0.3	A	470	705

Junctions 9	
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Filename: 3a-Bridge N-Redwither.j9

Path: N:\Projects 2019\P19014 - The Oakes, Wrexham Industrial Estate\6.Technical\Models

Report generation date: 21/05/2019 15:06:47

- »1 Observed 2018, AM
- »1 Observed 2018, PM
- »2 Without Development 2034, AM
- »2 Without Development 2034, PM
- »3 With Development 2034, AM
- »3 With Development 2034, PM

File summary

File Description

Title	Bridge Road North/Redwither Road
Location	Wrexham
Site number	3a
Date	17/05/2019
Version	
Status	Final
Identifier	
Client	Cefn Park Development Ltd
Jobnumber	P19014
Enumerator	GHClb.gaze
Description	Checked by D. Stoddart

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2018	AM	ONE HOUR	07:15	08:45	15	✓
D2	1 Observed 2018	PM	ONE HOUR	16:00	17:30	15	✓
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

1 Observed 2018, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		1.47	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Redwither Road (Western Arm)		Major
B	Bridge Road North		Minor
C	Redwither Road (Eastern Arm)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Redwither Road (Eastern Arm)	6.80			90.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Bridge Road North	One lane plus flare	10.00	5.70	4.40	3.20	3.20	✓	1.00	25	80

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	580	0.102	0.258	0.162	0.368
1	B-C	613	0.091	0.229	-	-
1	C-B	626	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2018	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwith Road (Western Arm)		ONE HOUR	✓	368	100.000
B - Bridge Road North		ONE HOUR	✓	78	100.000
C - Redwith Road (Eastern Arm)		ONE HOUR	✓	173	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwith Road (Western Arm)	B - Bridge Road North	C - Redwith Road (Eastern Arm)
	From			
	A - Redwith Road (Western Arm)	0	207	161
	B - Bridge Road North	68	0	10
	C - Redwith Road (Eastern Arm)	161	12	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwith Road (Western Arm)	B - Bridge Road North	C - Redwith Road (Eastern Arm)
	From			
	A - Redwith Road (Western Arm)	0	5	12
	B - Bridge Road North	15	0	43
	C - Redwith Road (Eastern Arm)	18	20	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.02	9.97	0.0	A	9	14
B-A	0.16	10.32	0.2	B	62	94
C-AB	0.03	6.80	0.0	A	14	22
C-A					144	217
A-B					190	285
A-C					148	222

1 Observed 2018, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		5.93	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	1 Observed 2018	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road (Western Arm)		ONE HOUR	✓	310	100.000
B - Bridge Road North		ONE HOUR	✓	256	100.000
C - Redwither Road (Eastern Arm)		ONE HOUR	✓	178	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	94	216
	B - Bridge Road North	241	0	15
	C - Redwither Road (Eastern Arm)	172	6	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	22	15
	B - Bridge Road North	3	0	7
	C - Redwither Road (Eastern Arm)	13	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.04	10.53	0.0	B	14	21
B-A	0.56	17.47	1.3	C	221	332
C-AB	0.01	5.65	0.0	A	7	11
C-A					156	234
A-B					86	129
A-C					198	297

2 Without Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		1.48	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road (Western Arm)		ONE HOUR	✓	407	100.000
B - Bridge Road North		ONE HOUR	✓	84	100.000
C - Redwither Road (Eastern Arm)		ONE HOUR	✓	187	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	230	177
	B - Bridge Road North	74	0	10
	C - Redwither Road (Eastern Arm)	174	13	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	5	11
	B - Bridge Road North	14	0	43
	C - Redwither Road (Eastern Arm)	17	18	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.02	10.19	0.0	B	9	14
B-A	0.17	10.61	0.2	B	68	102
C-AB	0.03	6.71	0.0	A	16	24
C-A					156	233
A-B					211	317
A-C					162	244

2 Without Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		7.40	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road (Western Arm)		ONE HOUR	✓	337	100.000
B - Bridge Road North		ONE HOUR	✓	286	100.000
C - Redwither Road (Eastern Arm)		ONE HOUR	✓	195	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	101	236
	B - Bridge Road North	269	0	17
	C - Redwither Road (Eastern Arm)	188	7	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	20	13
	B - Bridge Road North	3	0	6
	C - Redwither Road (Eastern Arm)	12	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.06	12.24	0.1	B	16	23
B-A	0.63	21.52	1.7	C	247	370
C-AB	0.02	5.62	0.0	A	9	13
C-A					170	255
A-B					93	139
A-C					217	325

3 With Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		1.34	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road (Western Arm)		ONE HOUR	✓	490	100.000
B - Bridge Road North		ONE HOUR	✓	84	100.000
C - Redwither Road (Eastern Arm)		ONE HOUR	✓	239	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	230	260
	B - Bridge Road North	74	0	10
	C - Redwither Road (Eastern Arm)	226	13	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	5	13
	B - Bridge Road North	14	0	43
	C - Redwither Road (Eastern Arm)	21	18	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.02	10.66	0.0	B	9	14
B-A	0.19	11.60	0.3	B	68	102
C-AB	0.03	6.63	0.1	A	18	26
C-A					202	303
A-B					211	317
A-C					239	358

3 With Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road North/Redwither Road	T-Junction	Two-way		7.54	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road (Western Arm)		ONE HOUR	✓	377	100.000
B - Bridge Road North		ONE HOUR	✓	286	100.000
C - Redwither Road (Eastern Arm)		ONE HOUR	✓	257	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	101	276
	B - Bridge Road North	269	0	17
	C - Redwither Road (Eastern Arm)	250	7	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road (Western Arm)	B - Bridge Road North	C - Redwither Road (Eastern Arm)
From	A - Redwither Road (Western Arm)	0	20	16
	B - Bridge Road North	3	0	6
	C - Redwither Road (Eastern Arm)	12	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.06	13.48	0.1	B	16	23
B-A	0.67	24.73	2.0	C	247	370
C-AB	0.02	5.45	0.0	A	10	14
C-A					226	339
A-B					93	139
A-C					253	380

Junctions 9	
PICADY 9 - Priority Intersection Module	
Version: 9.5.0.6896 © Copyright TRL Limited, 2018	
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Filename: 3b-Bridge-Redwither-Coed Aben.j9

Path: N:\Projects 2019\P19014 - The Oakes, Wrexham Industrial Estate\6.Technical\Models

Report generation date: 21/05/2019 15:07:52

- »1 Observed 2018, AM
- »1 Observed 2018, PM
- »2 Without Development 2034, AM
- »2 Without Development 2034, PM
- »3 With Development 2034, AM
- »3 With Development 2034, PM

File summary

File Description

Title	Bridge Road/Redwither Road/Coed Aben Road
Location	Wrexham
Site number	3b
Date	17/05/2019
Version	
Status	Final
Identifier	
Client	Cefn Park Development Ltd
Jobnumber	P19014
Enumerator	GHCLb.gaze
Description	Checked by D. Stoddart

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2018	AM	ONE HOUR	07:15	08:45	15	✓
D2	1 Observed 2018	PM	ONE HOUR	16:00	17:30	15	✓
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

1 Observed 2018, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		13.67	B

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Redwither Road		Major
B	Bridge Road		Minor
C	Coed Aben Road		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Width for right turn (m)	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Coed Aben Road	6.80		✓	3.50	120.0	✓	7.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Bridge Road	One lane plus flare	10.00	10.00	7.50	6.00	4.50	✓	3.00	66	60

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	622	0.109	0.276	0.174	0.395
1	B-C	651	0.096	0.243	-	-
1	C-B	734	0.275	0.275	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 Observed 2018	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	229	100.000
B - Bridge Road		ONE HOUR	✓	367	100.000
C - Coed Aben Road		ONE HOUR	✓	279	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	154	75
	B - Bridge Road	310	0	57
	C - Coed Aben Road	58	221	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	15	23
	B - Bridge Road	8	0	33
	C - Coed Aben Road	9	9	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.16	14.96	0.3	B	52	78
B-A	0.72	29.21	2.7	D	284	427
C-AB	0.37	9.29	0.6	A	203	304
C-A					53	80
A-B					141	212
A-C					69	103

1 Observed 2018, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		5.53	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	1 Observed 2018	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	413	100.000
B - Bridge Road		ONE HOUR	✓	348	100.000
C - Coed Aben Road		ONE HOUR	✓	198	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	360	53
	B - Bridge Road	201	0	147
	C - Coed Aben Road	109	89	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	5	23
	B - Bridge Road	11	0	4
	C - Coed Aben Road	30	14	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.29	9.47	0.4	A	135	202
B-A	0.47	15.89	1.0	C	184	277
C-AB	0.16	8.03	0.2	A	82	123
C-A					100	150
A-B					330	496
A-C					49	73

2 Without Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		20.15	C

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2 Without Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	248	100.000
B - Bridge Road		ONE HOUR	✓	404	100.000
C - Coed Aben Road		ONE HOUR	✓	308	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	168	80
	B - Bridge Road	343	0	61
	C - Coed Aben Road	64	244	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	14	21
	B - Bridge Road	7	0	30
	C - Coed Aben Road	8	8	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.25	23.04	0.4	C	56	84
B-A	0.83	45.23	4.4	E	315	472
C-AB	0.41	9.94	0.7	A	224	336
C-A					59	88
A-B					154	231
A-C					73	110

2 Without Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		6.19	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2 Without Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	457	100.000
B - Bridge Road		ONE HOUR	✓	385	100.000
C - Coed Aben Road		ONE HOUR	✓	213	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	400	57
	B - Bridge Road	221	0	164
	C - Coed Aben Road	116	97	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	4	21
	B - Bridge Road	10	0	3
	C - Coed Aben Road	27	13	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.34	10.48	0.5	B	150	226
B-A	0.53	18.15	1.2	C	203	304
C-AB	0.18	8.29	0.2	A	89	134
C-A					106	160
A-B					367	551
A-C					52	78

3 With Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		81.45	F

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	3 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	300	100.000
B - Bridge Road		ONE HOUR	✓	487	100.000
C - Coed Aben Road		ONE HOUR	✓	308	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	220	80
	B - Bridge Road	426	0	61
	C - Coed Aben Road	64	244	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	18	21
	B - Bridge Road	9	0	30
	C - Coed Aben Road	8	8	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	1.05	306.47	5.5	F	56	84
B-A	1.04	159.54	20.9	F	391	586
C-AB	0.42	10.35	0.8	B	224	336
C-A					59	88
A-B					202	303
A-C					73	110

3 With Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Bridge Road/Redwither Road/Coed Aben Road	T-Junction	Two-way		7.76	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	3 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Redwither Road		ONE HOUR	✓	519	100.000
B - Bridge Road		ONE HOUR	✓	425	100.000
C - Coed Aben Road		ONE HOUR	✓	213	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	462	57
	B - Bridge Road	261	0	164
	C - Coed Aben Road	116	97	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Redwither Road	B - Bridge Road	C - Coed Aben Road
From	A - Redwither Road	0	5	21
	B - Bridge Road	13	0	3
	C - Coed Aben Road	27	13	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-C	0.37	12.14	0.6	B	150	226
B-A	0.63	23.58	1.8	C	239	359
C-AB	0.18	8.62	0.3	A	89	134
C-A					106	160
A-B					424	636
A-C					52	78

Junctions 9	
PICADY 9 - Priority Intersection Module	
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Filename: 4-SA-Oak.j9

Path: N:\Projects 2019\P19014 - The Oakes, Wrexham Industrial Estate\6.Technical\Models

Report generation date: 21/05/2019 15:04:22

»1 With Development 2034, AM

»1 With Development 2034, PM

File summary

File Description

Title	Site Access/Oak Road
Location	Wrexham
Site number	4
Date	17/05/2019
Version	
Status	Final
Identifier	
Client	Cefn Park Development Ltd
Jobnumber	P19014
Enumerator	GHC\b.gaze
Description	Checked by D. Stoddart

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓
D2	1 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

1 With Development 2034, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Site Access/Oak Road	T-Junction	Two-way		2.91	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	Oak Road (Eastern Arm)		Major
B	Site Access		Minor
C	Oak Road (Western Arm)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - Oak Road (Western Arm)	7.00			100.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B - Site Access	One lane	3.60	20	22

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (PCU/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	525	0.091	0.231	0.145	0.330
1	B-C	676	0.099	0.251	-	-
1	C-B	632	0.234	0.234	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	1 With Development 2034	AM	ONE HOUR	07:15	08:45	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Eastern Arm)		ONE HOUR	✓	304	100.000
B - Site Access		ONE HOUR	✓	89	100.000
C - Oak Road (Western Arm)		ONE HOUR	✓	270	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Eastern Arm)	B - Site Access	C - Oak Road (Western Arm)
From				
	A - Oak Road (Eastern Arm)	0	61	243
	B - Site Access	37	0	52
	C - Oak Road (Western Arm)	187	83	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Eastern Arm)	B - Site Access	C - Oak Road (Western Arm)
From				
	A - Oak Road (Eastern Arm)	0	17	13
	B - Site Access	37	0	37
	C - Oak Road (Western Arm)	12	17	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-AC	0.20	12.41	0.3	B	82	123
C-AB	0.19	7.35	0.4	A	103	154
C-A					145	217
A-B					56	84
A-C					223	334

1 With Development 2034, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Site Access/Oak Road	T-Junction	Two-way		2.52	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	1 With Development 2034	PM	ONE HOUR	16:00	17:30	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
A - Oak Road (Eastern Arm)		ONE HOUR	✓	177	100.000
B - Site Access		ONE HOUR	✓	108	100.000
C - Oak Road (Western Arm)		ONE HOUR	✓	293	100.000

Origin-Destination Data

Demand (PCU/hr)

	To			
		A - Oak Road (Eastern Arm)	B - Site Access	C - Oak Road (Western Arm)
From	A - Oak Road (Eastern Arm)	0	30	147
	B - Site Access	46	0	62
	C - Oak Road (Western Arm)	253	40	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A - Oak Road (Eastern Arm)	B - Site Access	C - Oak Road (Western Arm)
From	A - Oak Road (Eastern Arm)	0	36	16
	B - Site Access	12	0	11
	C - Oak Road (Western Arm)	13	33	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS	Average Demand (PCU/hr)	Total Junction Arrivals (PCU)
B-AC	0.23	9.84	0.3	A	99	149
C-AB	0.09	6.67	0.2	A	54	81
C-A					215	322
A-B					28	41
A-C					135	202