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June 2013

**LAND OFF
BANGOR ROAD,
JOHNSTOWN,
WREXHAM**

**transport
assessment**

Client: Gladman Developments Ltd

ashleyhelme
a s s o c i a t e s



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TRANSPORT ASSESSMENT

LAND OFF BANGOR ROAD, JOHNSTOWN, WREXHAM

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Drg Nos 1232/02-11, 1232/13/A, 1232/16/A

1

introduction

1.1 Ashley Helme Associates Ltd (AHA) are appointed by Gladman Developments Ltd to prepare a Transport Assessment (TA) report, in support of the planning application for the proposed mixed-use development on land off Bangor Road, Johnstown, Wrexham (henceforth referred to as the Site). Figure 1 shows the location of the Site in the context of the local highway network.

1.2 The Site is characterised by two distinct areas: the southern area of the Site is generally vacant grassland whilst the northern Site area is occupied by a former brickworks. The proposed development comprises:

- Up to 300 residential dwellings,
- 465sm GFA B2/B8 industrial, storage and distribution units,
- 235sm A1 retail unit (assumed convenience store) with ATM,
- Play space.

In order to present a robust assessment of traffic impact, the TA analyses the impact of 300 dwellings; if there are lesser dwellings then there is a lesser traffic impact than presented herein.

1.3 A TA Scoping Study report (ref 1232/1) was submitted to the highway authority Wrexham County Borough Council (WCBC) in June 2010, and a dialogue ensued. WCBC also consulted with WAG. Arising from this, key parameters for the TA are **agreed** with WCBC and WAG, (WCBC 09.07.2010 email from Jonathan Plant).

1.4 The development proposals have evolved since the TA Scoping Study was agreed with WCBC and WAG. Notwithstanding, the scale of development remains broadly similar, and the methodology set out in the Scoping Study remains appropriate. Where necessary, amendments to the scope of the TA have been made to reflect the time that has elapsed since the original scope was agreed (eg, assessment years).

- 1.5 The transport policy context for the proposed development is outlined in Chapter 2. The principles of the access strategy are also discussed in Chapter 2, and this provides the means to achieve transport policy objectives. It is fundamental to the approach of the applicant, as represented in this TA, that a holistic view is taken of the consideration of access to the masterplan area by all modes of transport.
- 1.6 The issues addressed within the TA fall broadly into the following areas:
- Accessibility by non-car modes, and
 - The vehicular traffic impact on the operational performance of the local highway network, assessed quantitatively for the TA defined study network.
- 1.7 The local highway network is described in Chapter 3. The proposed access arrangements are outlined in Chapter 4.
- 1.8 The transport sustainability of the proposed development is a key issue, as set out in Chapter 8 of Planning Policy Wales. Accessibility issues are identified in Chapter 2, and an accessibility appraisal of the Site by non-car modes is presented in Chapters 5 (Walk & Cycle) and 6 (Public Transport), using an accessibility mapping methodology.
- 1.9 The planning application is supported by the Travel Plan (TP) report. Chapter 7 outlines the principles of the TP.
- 1.10 The estimation of the development generated traffic is presented in Chapter 8. Modelling of the impact of development traffic on the highway network is described in Chapter 9.
- 1.11 The conclusions of the TA are presented in Chapter 10.

2

policies & principles of access strategy

2.1 A holistic approach is adopted for the desired access strategy. Due cognisance is taken of a range of relevant policy/guidance documents and considerations that represent national/local policies and good practice. These include:

- Planning Policy Wales (Edition 5, November 2012)
- Technical Advice Notes 18 (Transport)
- Wales Spatial Plan 2004 (Updated 2008)
- Wales Transport Strategy
- Taith Regional Transport Plan (RTP)
- Wrexham UDP (2005)

2.2 A general thrust of current national and local policies is to promote and deliver sustainable transport objectives, and this is a key factor in defining the access strategy for the proposed development.

2.3 There are a range of documents that provide advice and guidance identifying that the historic approach of adopting rigid highway design standards and considering this in isolation is not appropriate or desirable in today's world. This includes, for example, the Urban Design Compendium (UDC), Manual for Streets (MfS) and the associated Manual for Streets 2 (MfS2.)

2.4 **PLANNING POLICY WALES (EDITION 5, NOVEMBER 2012)**

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes PPW, the TANS, circulars and policy clarification letters comprise national planning policy.

2.5 TECHNICAL ADVICE NOTE 18 (TRANSPORT)

2.5.1 The Welsh Assembly Government's commitment to sustainable development is emphasised in TAN18. The document sets out wide sustainable policy objectives:

- “• *promoting resource and travel efficient settlement patterns;*
- *ensuring new development is located where there is, or will be, good access by public transport, walking and cycling thereby minimising the need for travel and fostering social inclusion;*
- *managing parking provision;*
- *ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;*
- *encouraging the location of development near other related uses to encourage multi-purpose trips;*
- *promoting cycling and walking;*
- *supporting the provision of high quality, inclusive public transport;*
- *supporting provision of a reliable and efficient freight network;*
- *promoting the location of warehousing and manufacturing developments to facilitate the use of rail and sea transport for freight;*
- *encouraging good quality design of streets that provide a safe public realm and a distinct sense of place; and*
- *ensuring that transport infrastructure or service improvements necessary to serve new development allow existing transport networks to continue to perform their identified functions.”*

2.5.2 TAN 18 highlights specific policy objectives for walking cycling and public transport. These are as follows:

2.5.3 Walking:

- “• *ensure that new development encourages walking as a prime means for local journeys by giving careful consideration to location, access arrangements and design, including the siting of buildings close to the main footway, public transport stops and pedestrian desire lines;*

- ensure that pedestrian routes provide a safe and fully inclusive pedestrian environment, particularly for routes to primary schools;
- ensure the adoption of suitable measures, such as wide pavements, adequate lighting, pedestrian friendly desire lines and road crossings, and traffic calming;
- promote the reallocation of road space to pedestrians;
- consider the needs of all pedestrians in the design of town environmental improvement schemes, which may involve pedestrianisation and restricted access schemes;
- support the use of public rights of way for local journeys; and
- identify and protect existing and proposed routes suitable for the use of cyclists and walkers. These may include recreational or commuter routes alongside river banks, canal towpaths and disused railway lines."

2.5.4 Cycling

- “• identification of new cycle routes utilising existing highway (including public rights of way where appropriate), disused railway lines, space alongside rivers and canals, parks and open space;
- ensuring that new development encourages cycling by giving careful consideration to location, design, access arrangements, travel 'desire lines' through a development, and integration with existing and potential off-site links;
- securing provision of secure cycle parking and changing facilities in all major employment developments, including retail and leisure uses, town centres, transport interchanges, educational and health institutions;
- securing provision of cycle routes and priority measures in all major developments;
- adopting minimum cycle parking standards within their parking strategies - for commercial premises these standards should include cycle parking for both employees and visitors; and
- ensuring new residential developments provide storage for bicycles so they are easily available for everyday use while secure enough to be left unattended for long periods of time.”

2.5.5 Public Transport

- “• *indicate where buses will be given priority and the measures which will be taken to support this;*
- *consider the potential, and identify any proposals, for new routes, including the new opening and reuse of rail lines, or creation of additional stations on existing lines, light rail or guided bus routes;*
- *provide for interchange facilities with bus, rail and taxi services located close together;*
- *establish and apply design principles for transport infrastructure and associated links that will ensure all can access the facilities and feel safe;*
- *establish and apply design principles to ensure buildings are sited to provide convenient access to local public transport whether walking or cycling;*
- *consider the need for better or new public transport access to new development areas;*
- *consider the role of any waterways for public transport purposes; and*
- *consider the need for local community transport operations.”*

2.6 WALES SPATIAL PLAN (WSP) Updated 2008

The Wales Spatial Plan sets a strategic framework to guide future development and policy interventions. It integrates the spatial aspects of national strategies for social inclusion and economic development, health, transport and environment, translating the Welsh Government’s sustainable development duty into practice.

2.7 WALES TRANSPORT STRATEGY (WTS)

2.7.1 The WTS focuses on the role that transport can play in delivering the wider policy agenda of integrating transport with spatial planning, economic development, education, health, social services, environment and tourism, whilst meeting the strategic agenda set out in ‘Wales: A Better Country’ and the implementation framework of the Wales Spatial Plan.

2.7.2 The vision for WTS is:

“to provide a framework that connects national, regional and local policy to maximise the contribution that transport can make to achieving a sustainable future for Wales, where actions for social, economic and environmental improvement work together to create positive change.”

2.8 TAITH REGIONAL TRANSPORT PLAN (2009)

2.8.1 Regional Transport Plans (RTPs) replaced Local Transport Plans (LTPs) in 2008. The change reflects a need to plan transport improvements on a regional basis recognising that many transport issues across Wales raise cross-boundary issues for local authorities.

2.8.2 The Regional Transport Plan (RTP) is a strategy for delivering improvements to our transport system in North Wales over the next 5 years and is being developed by Taith. Taith is a transport partnership of the six Local Authorities in North Wales – Anglesey, Conwy, Denbighshire, Flintshire, Gwynedd and Wrexham.

2.8.3 The objectives of the Taith RTP are:

- *Provide, promote and improve sustainable forms of transport and infrastructure to minimise the negative impacts of transport on the local and global environment,*
- *Improve safety of all forms of transport,*
- *Enhance the efficiency and use of the transport network,*
- *Upgrade and maintain the transport infrastructure, providing significant new infrastructure where necessary”*

2.9 WREXHAM UNITARY DEVELOPMENT PLAN (UDP)

2.9.1 Local planning authorities in Wales must prepare a Local Development Plan (LDP) for its area. The LDP will be the development plan for each county or county borough council and each National Park, superseding the Unitary Development Plan (UDP) or any other existing development plan.

2.9.2 The Wrexham Unitary Development Plan (UDP) 1996-2011 was adopted in February 2005, and at present remains as the adopted planning policy for the borough.

2.9.3 Policy T8 sets out the context for requiring appropriate levels of development car parking to be provided.

2.9.4 Policy T9 sets out the requirement for development proposals to provide for non-car modes of transport. Policy T9 states:

“Development proposals will be required to provide walking and cycling routes, where feasible and appropriate, that link with existing or proposed walking and cycling routes, and integrate with the public transport system”.

2.10 **WREXHAM LOCAL DEVELOPMENT PLAN 2 (LDP2)**

The adopted UDP is due to be replaced by the Wrexham Local Development Plan 2 (LDP2), covering the period 2013 – 2028. Until the LDP2 is adopted, the UDP remains in place. The most recently available timetable for adoption is December 2016, depending upon the Planning Inspectorate.

2.11 **PRINCIPLES OF THE ACCESS STRATEGY**

2.11.1 The development access strategy provides the means to achieve the identified policy objectives by optimising the opportunity for access to/from the Site by non-car modes. This is in accordance with all local and national policies. Specifically, it is central to the philosophy of the development access strategy to provide well connected and permeable access arrangements for the benefit of those travelling on foot, cycle, public transport and to ensure that motor traffic is provided for in a way that does not have a material detriment.

2.11.2 The access strategy for the proposed development is cohesive, reflecting the need to appropriately consider and enable provision for the movement of people and goods. This includes considering, inter alia:

- Permeability of the Site from/connection to the surrounding locality, reflecting the principles and good practice set out in the national guidance in Manual for Streets (MfS & MfS2),
- Access/routing: for the external linkage to the Site. The corresponding internal access/routing details are to be addressed by reserved matters application(s),
- Internal access arrangements, all to be the subject of reserved matters application(s), should minimise distance travelled by all modes (where appropriate).

2.11.3 The access strategy for the development is illustrated on Figure 2. The proposed access arrangements and existing infrastructure are described as follows:

- Vehicles: Chapter 4,
- Pedestrian/cycle: Chapter 5,
- Public transport: Chapter 6.

2.12 **SUMMARY**

In summary, the development proposal respects and promotes the principles of transport sustainability, and is consistent with national and local transport policy objectives.

3

highway network

3.1 The location of the Site is indicated on Figure 1 in the context of the local highway network.

3.2 STUDY NETWORK

3.2.1 Traffic generated by the Site will pass through the following junctions that comprise the TA study network of junctions:

REF	JUNCTION	CONTROL
SJ2	Site Access/Bangor Road:	Roundabout,
SJ3	B5426 Bangor Road/B5605 High Street:	Traffic signals,
SJ4	B5605 High Street/B5426 Maelor Road:	Traffic signals,
SJ5	B5605 Wrexham Road/B5426 Smithy Lane:	Priority control,
SJ6	B5426 Bangor Road/Hafod Road/New Hall Road:	Priority control,
SJ7	A483/A539 Llangollen Road:	Double roundabout,
SJ8	A483/A5426 Bangor Road:	Priority control,
SJ9	A483/A5152 Wrexham Road:	Roundabout,
SJ10	A483/ A525 Ruthin Road:	Traffic signals,
SJ11	A483/A541 Mold Road:	Roundabout with partial traffic signal control,
SJ12	A483/A5156/A5152 Chester Road:	Roundabout with traffic signals.

The TA network of study junctions is presented on Figure 2 and is **agreed** with WCBC and WAG.

3.2.2 The local highway authority (WCBC) is responsible for SJ2-6 and the Welsh Assembly (WAG) is responsible for the study junctions on the A483 (ie SJ7-12).

3.2.3 The layout of the existing study network junctions is presented on the following drawings:

REF	JUNCTION	DRG NO
SJ3	B5426 Bangor Road/B5605 High Street:	1232/02
SJ4	B5605 High Street/B5426 Maelor Road:	1232/03
SJ5	B5605 Wrexham Road/B5426 Smithy Lane:	1232/04
SJ6	B5426 Bangor Road/Hafod Road/New Hall Road:	1232/05
SJ7	A483/A539 Llangollen Road:	1232/06
SJ8	A483/A5426 Bangor Road:	1232/07
SJ9	A483/A5152 Wrexham Road:	1232/08
SJ10	A483/ A525 Ruthin Road:	1232/09
SJ11	A483/A541 Mold Road:	1232/10
SJ12	A483/A5156/A5152 Chester Road:	1232/11.

- 3.2.4 The Site is bounded by Hafod Road to the east and the B5426 Bangor Road to the south.
- 3.2.5 Hafod Road is a single carriageway road circa 6.1-7.3m wide in the vicinity of the Site. It is subject to a derestricted speed limit. There is generally grass verge on both sides of the carriageway, but there is an absence of footway over the majority of its length. There are several existing Site access locations on Hafod Road. Hafod Road also provides vehicular access to the Key Gas site, Hafod House nursing home and a number of residential properties.
- 3.2.6 The B5426 Bangor Road is a single carriageway road, circa 5.5-7.3m wide in the vicinity of the Site frontage and subject to derestricted speed limit in this locale. There is footway on the north (Site) side of the carriageway, but there is no footway on the south side of the road in the vicinity of the Site.
- 3.2.7 Bangor Road passes under a railway bridge circa 130m west of the Site boundary and the footway narrows to circa 1.0m for a short distance in this location. The speed limit of Bangor Road changes from derestricted to a 30mph just before the bridge. Bangor Road forms a traffic signal controlled junction with the B5605 High Street (SJ3) circa 600m further west of the bridge.
- 3.2.8 South of Bangor Road, the SJ7 grade separated junction of the A438 and A539 Llangollen Road has 2no roundabouts on Llangollen Road that incorporate the A483 on- and off-slip roads. The 2no roundabouts form a dumbbell arrangement with a bridge link crossing of the A483 between the 2no roundabouts.

- 3.2.9 East of the Site, Bangor Road forms the grade separated junction with the A483 (SJ8). The A483 is a dual carriageway road which provides a strategic link between the A5 and the A55, and is the responsibility of the WAG. The A438 on-and off-slip road junctions with Bangor Road are priority (give-way) controlled, ie there is no traffic signal control at SJ8. Right turn lanes are provided on Bangor Road, for turning onto the A438 on-slip roads.
- 3.2.10 North of Bangor Road, SJ9 is the grade separated roundabout junction of the A483 and the A5152 Wrexham Road.
- 3.2.11 The grade separated SJ10 junction of the A483 and the A525 Ruthin Road incorporates a bridge crossing of the A483, that links 2no traffic signal controlled junctions on Ruthin Road. Each of the traffic signal junctions comprises Ruthin Road and A483 on- and off-slip road.
- 3.2.12 The SJ11 grade separated roundabout operates with partial traffic signal control. The traffic signals are provided on the A483 off-slip road entries to the roundabout, and also on the A541 Mold Road arm entry to the roundabout. The other 2no entry arms of the roundabout operate under priority (give-way control).
- 3.2.13 The SJ12 grade separated roundabout operates with partial traffic signal control. There are 7no entry arms of the roundabout, 4no of which operate under traffic signal control.

3.3 **ACCIDENT HISTORY**

- 3.3.1 The four year accident records for the TA study junctions were purchased from WCBC for the period 15.03.2010 to 14.03.2013.
- 3.3.2 There are no recorded accidents at TA study junction 5. A summary of the recorded accidents at the other study junctions comprises:

REF	YEAR	ACCIDENT INJURY CATEGORY
SJ2	2012	1 Serious
SJ3	2010	1 Slight
SJ4	2011	1 Slight

	2012	1 Slight, 1 Serious
SJ6	2010	1 Slight
	2011	1 Slight
SJ7	2010	1 Slight
	2012	1 Serious
SJ8	2011	1 Slight
SJ9	2010	4 Slight
	2011	2 Slight
	2012	2 Slight
SJ10	2010	3 Slight
	2011	3 Slight
	2012	1 Slight
	2013	1 Slight
SJ11	2010	2 Slight
	2011	3 Slight
	2012	4 Slight
	2013	1 Serious
SJ12	2010	1 Slight
	2011	2 Slight, 1 Serious
	2012	5 Slight
	2013	1 Slight

3.3.3 The accident record descriptions have been reviewed for all the above.

3.3.4 The WCBC junctions (SJ2 – SJ6) have no evidence of any recurring accident problem. Similarly, the WAG junctions SJ7 & SJ8 have no pattern of recurring accident type/features.

3.3.5 The WAG junctions SJ9 – SJ12 have a higher incidence of recorded accidents. A material factor in this may be the higher level of traffic flows on the WAG road network, and hence the higher exposure to likelihood of accidents. Review of the accident record information for the WAG junctions identifies:

- SJ9, SJ10 and SJ12: no pattern of material recurring accident type/features.

- SJ11: the only identified recurring accident 'type' is 8no rear end collisions. Generally, these are not at the same location in the same year. However, there is a recurrence of 3no recorded rear end shunt accidents, on the Mold Road (E) arm of the roundabout.

3.3.6 Notwithstanding the above, it is noted that there is some limited evidence of recurring rear end collisions on the SJ11 Mold Road (E) arm. Consequently, the estimated increase in traffic generated by the proposed development on the Mold Road (E) entry to the roundabout is assessed. This is presented on Figure D10, Appendix D, and comprises 5 vehicles in the AM peak hour and 14 vehicles in the PM peak hour. It is concluded that the increase in traffic generated on the northbound off-slip by the proposed development is **not material**.

3.3.7 Whilst all accidents are regrettable, the fact remains that more often than not an accident has unique isolated accident cause/characteristics, providing no basis for identifying or requiring accident remedial/mitigation works. That is the general situation for the recorded accidents at all of the TA study junctions.

4

proposed site access arrangements

4.1 As explained in Chapter 2, a holistic approach is at the core of the proposed Site access strategy and arrangements. Thus, there is a cohesive 'package' of development access arrangements for differing modes of travel, comprising, walk, cycle, bus and motor vehicles. Further information about walk and cycle modes is presented in Chapter 5, and about public transport in Chapter 6.

4.2 MASTERPLAN ACCESS STRATEGY

4.2.1 The illustrative masterplan prepared by the architect is presented in Appendix A. The development access strategy is indicated on Figure 3. Key elements of the identified masterplan access strategy include:

- 1no vehicle access location on the B5426 Bangor Road, which also accommodates pedestrians and cyclists,
- Complementary 6no additional access links to the surrounding area for pedestrians and cyclists,
- Good pedestrian/cycle routes and infrastructure through and within the masterplan area,
- Emergency access (if required by WCBC), on Hafod Road, that is available in any case for pedestrians/cyclists.

4.2.5 The above are outlined in more detail as follows:

- Vehicular Site Access: sections 4.4 & 4.5 below,
- Pedestrian & Cycle: Chapter 5,
- Bus: Chapter 6.

4.3 ILLUSTRATIVE MASTERPLAN LAYOUT

4.3.1 A key element of the masterplan strategy is the comprehensive approach to integration of land use and transport links. At the most basic level, this includes

ensuring that a range of amenities are accessible to the occupants of the proposed development by a choice of sustainable transport modes.

4.3.2 The proposed development comprises a mix of uses: residential, employment and amenities. This mixed use development provides a positive context and realistic opportunity for residents to travel to work and for other journey purposes by modes other than the private car, eg walk and cycle. This is in accordance with the UDP policy and the emerging LDF policy.

4.3.3 The architect's illustrative masterplan submitted with the planning application (refer Appendix A) shows mixed use development content comprising:

- Up to 300 residential dwellings,
- 465sm GFA B2/B8 industrial, storage and distribution units,
- 235sm A1 retail unit (assumed convenience store) with ATM,
- Play space.

4.4 **PROPOSED SJ2 SITE ACCESS ON BANGOR ROAD**

4.4.1 The proposed SJ2 Bangor Road/Site Access, that forms part of the planning application, is presented on AHA Drg No 1232/13/A. The detailed design of the Site Access junction is to be the subject of approval of WCBC, and to be pursued following the granting of planning consent.

4.4.2 However, as illustrated on Drg No 1232/13/A, the key features of the proposed SJ2 include:

- Roundabout junction,
- 30m diameter,
- 7.3m Site access carriageway width,
- 2.0m footway on the north side of Bangor Road, and on both sides of the Site access,
- 160m forward visibility on the Bangor Road approaches to the roundabout.

4.4.3 As identified in para 3.2.6, a derestricted speed limit applies on Bangor Road along the Site frontage. A survey was undertaken in March 2012 to establish the actual

85%ile speed of vehicles travelling along Bangor Road in this locale. The speed survey results are presented in Appendix C. This establishes that the 85%ile wet weather journey speed (upon which the required forward visibility) is 85kph. Consequently, the required forward visibility distance on Bangor Road for the proposed SJ2 is 160m.

4.5 **EMERGENCY ACCESS**

As outlined above, the proposed development has a single vehicular access: the SJ2 priority controlled T-junction on Bangor Road. However, should WCBC require it, a complementary emergency access can be provided on Hafod Road. This would be achieved by suitable construction details (geometry etc) being specified for the proposed Site pedestrian/cycle access on Hafod Road, towards the northern boundary of the Site (refer Figure 3).

5

walk and cycle

5.1 WALK

5.1.1 It is established and acknowledged that walking is the most important mode of travel at the local level, and offers the greatest potential to replace short car trips, particularly under 2km.

5.1.2 The DfT identify that 78% of walk trips are less than 1km in length, (DfT Transport Statistics GB).

5.1.3 The CIHT provides guidance about journeys on foot. It does not provide a definitive view of distances, but does suggest a preferred maximum distance of 2000m for walk commuting trips.

5.1.4 The 'walkable neighbourhood' concept is set out in MfS1 and endorsed in MfS2. MfS1 explains that:

*"Walkable neighbourhoods are typically characterised by having a range of facilities within 10 minutes' (up to about 800 m) walking distance of residential areas which residents may access comfortably on foot. However, this is **not an upper limit** and PPG13 states that walking offers the greatest potential to replace short car trips, particularly those under 2 km."* (MfS1 para 4.4.1)

5.1.5 Figure 4 illustrates existing local amenities, most of which also offer employment opportunities.

5.1.6 A 400m distance corresponds to a walk time of 5 minutes, based on upon typical normal walking speed. Figure 5 presents the development 800m, 1000m and 2000m walk isochrones, (ie reflecting 10, 12 and 25 minute walk journeys), and taking account of the existing pedestrian infrastructure and the proposed pedestrian links between the Site and the surrounding area.

5.1.7 In preparing the Figure 5, account is taken of:

- Existing public rights of way (PROW),
- Complementary walk routes anecdotally observed to presently be used,
- Existing footway and highway,
- Development proposals for pedestrian infrastructure and links with the surrounding area (refer Figure 3).

5.1.8 Figure 6 illustrates existing PROW in the locale of the Site. This includes routes passing through the Site and complementary routes located outside the Site.

5.1.9 Existing PROW routes passing through the Site comprise:

- PROW 117: along the Site's western boundary,
- PROW 28: along the Site's northwestern boundary, 'following on' from PROW 117 and continuing northwards within the northern area of the Site, leading to Hafod Road,
- PROW 29: between Bangor Road and Hafod Road, within the southeastern area of the Site.

Thus, existing PROW located within the Site/along the Site boundary provide pedestrian/cycle link opportunities between Bangor Road and Hafod Road.

5.1.10 These in-Site PROW are complemented by further nearby PROW located outside the Site, as follows and indicated on Figure 6:

- PROW 24: providing a route in a north/northeastern direction from PROW 28 (on the Site's northwest boundary) across the railway line with an uncontrolled at-grade crossing,
- PROW 31: provides a route from Hafod Road to the east, across the A483,
- PROW 25 & 116: north-south along the eastern side of the railway line, intersecting with PROW 24,
- PROW 27: east-west route on the western side of the railway line, including along Glasfryn and incorporating a link to a tunnel route across the rail line.

- 5.1.11 Additional to the PROW illustrated on Figure 6, there is observed to be existing pedestrian use of a walk link route between PROW 24 and the tunnel crossing of the rail line; this is also indicated on Figure 6 and referenced as 'observed pedestrian activity link route'. It is recognised that this crosses third party land and is not designated as a PROW; nevertheless, in custom and practice this is observed to presently be used by pedestrians, and as such is included for the derivation of the Figure 5 walk isochrones.
- 5.1.12 To the west of the Site, the railway line provides some severance between the Site and Johnstown. In the locality of the Site there are pedestrian routes across the railway line as follows:
- To the north: the existing PROW 24 provides a pedestrian route to the rail line that includes an uncontrolled at-grade crossing of the rail line,
 - Still to the north of the Site: tunnel crossing of the rail line, between PROW 27 & 116,
 - To the south: Bangor Road is routed beneath the railway line, and has a footway alongside the carriageway.
- 5.1.13 As well as places of employment, there are existing amenities available in Johnstown, near to the Site, as shown on Figure 4. This includes, for example, closest to the Site, local shops (eg convenience store, hairdresser, postbox), schools, bowling green, as well as a greater range of amenities including shops, post office, churches, pharmacy, public houses and a restaurant/takeaway just beyond within a 1000m walk distance from the Site.
- 5.1.14 As can be seen from Figure 5, there is a substantial existing residential area within a walking commute distance of the Site, offering opportunities for existing local residents to walk to work at the proposed development's employment uses; (similarly there is opportunity for a much greater existing residential population to cycle to work at the development's employment locations, refer Section 5.2 below).

5.1.15 Review of the illustrative masterplan in Appendix A shows that, as well as the proposed housing, the proposed development also includes a mix of uses comprising:

- Industrial/storage/distribution (employment),
- Open space area,
- Green corridors, for leisure walking/cycling, and providing a link to the adjacent area,
- Proposed convenience store with ATM.

5.1.16 All of the above are complementary, and additional to, the existing employment opportunities and amenities that are available near to the Site (refer Figure 4).

5.1.17 **Proposed Pedestrian Links & Improvements**

5.1.17.1 The proposed development access strategy includes 7no pedestrian/cycle links with the surrounding area. These are indicated on Figure 3.

5.1.17.2 This pedestrian access strategy provides a good level of pedestrian linkage with the surrounding area and amenities, and also good pedestrian movement within and across/through the Site. In summary, the proposed development's pedestrian external links indicated on Figure 3 comprise:

- P1: Bangor Road/Site Access, that includes footway on both sides of the Site access road,
- P2: Bangor Road pedestrian/cycle access, towards eastern end of Site,
- P3: Hafod Road pedestrian/cycle access, opposite PROW 31,
- P4: Hafod Road pedestrian/cycle access at PROW 28. (This is capable of being constructed to a specification suitable to also provide emergency access, if required by WCBC),
- P5: Close to the intersection of PROW 24 & 28,
- P6: From northern end of PROW 117 westward across third party land, to land alongside the west side of the rail line (providing southward route to Bangor Road). The feasibility of this pedestrian link is dependent upon there being the right for unfettered pedestrian access to this route, and that remains to be established.

- P7: Bangor Road pedestrian/cycle access, towards the western end of the Site.

5.1.17.3 The above proposed pedestrian links between the Site and the surrounding area achieve excellent pedestrian connectivity for the proposed development.

5.1.17.4 As indicated on the illustrative masterplan layout in Appendix A, the masterplan on-Site access strategy includes pedestrian/cycle routes within an attractive landscaped green corridor setting that provides routes aligned north-south and east-west through the Site, and linking to the existing PROW network.

5.1.17.5 These are attractive pedestrian routes that fulfill the dual roles of:

- Functionality: enabling pedestrians to move around and through the masterplan area (connectivity and permeability) between homes and attractor destinations, eg shop, employment, and
- Leisure: attractive routes encouraging healthy lifestyle habit of walking.

5.1.17.6 Complementarily, the roads to be provided within the development include footways on both sides of the road, in accordance with good practice and the requirements of WCBC.

5.1.17.7 Complementary to the provision of pedestrian links between the Site and surrounding area outlined above, improvements for pedestrian infrastructure are proposed as part of the development. This comprises:

- Widen footway on the north side of Bangor Road to a minimum of 1.6m, at the railway bridge to the west of the Site, as shown on Drg 1232/16/A,
- Existing tunnel crossing of the rail line, ie between PROW 27 & 116: introduce lighting. Also consider introducing CCTV, subject to agreement with WCBC,
- Existing uncontrolled at-grade crossing of the rail line, ie along PROW 24: introduce signage, including electronic signage on both the east and west sides of the rail line, identifying time of next train,

- All development on-Site roads to include 2.0m wide footway on both sides of the road,
- Pedestrian/cycle routes within the Site (that do not also accommodate vehicles) to be minimum 3.0m wide, to a specification to be agreed with WCBC,
- Pedestrian signage, details of signs to be agreed with WCBC, identifying pedestrian routes, including to Johnstown and to leisure areas.

5.1.18 **Summary**

The masterplan pedestrian links and facilities provide a cohesive well-planned framework of pedestrian facilities that provides a favourable context for encouraging and achieving people choosing to walk for a range of everyday journeys.

5.2 **CYCLE**

5.2.1 It is recognised that cycling also has potential to substitute for short car trips, particularly those under 5km, and to form part of a longer journey by public transport.

5.2.2 The CIHT guidance 'Cycle Friendly Infrastructure' (2004) states that:

“Most journeys are short. Three quarters of journeys by all modes are less than five miles (8km) and half under two miles (3.2km) (DOT 1993, table 2a). These are distances that can be cycled comfortably by a reasonably fit person.”(para 2.3)

5.2.3 Figure 7 indicates the 2km and 5km cycle isochrones for the Site, reflecting typically 10 minute and 25 minute journeys. Review of Figure 7 highlights that all of Johnstown is within a 25 minute cycle journey and hence, a wide range of amenities are accessible by cycle. Indeed, beyond the environs of the built-up area of Johnstown itself, the roads and cycle route opportunities include a pleasant rural area that provides excellent opportunity for leisure cycling, with the attendant health benefits.

5.2.4 Figure 8 illustrates the cycle infrastructure/facilities in the vicinity of the Site, including linking to land to the west and south of the railway line.

- 5.2.5 The proposed development includes 7no pedestrian/cycle links between the Site and surrounding area, as outlined in para 5.1.15.2. The proposed cycle routes available within the masterplan area include along green corridors for pedestrians/cyclists only, as well as the road network also being available to cyclists.
- 5.2.6 In summary, the destination opportunities within a 5km cycle ride of the Site for residents of the development include a range of amenity and employment locations within Johnstown itself and beyond. This is complemented by the masterplan mix of land uses (refer para 5.1.14 & Indicative Masterplan).
- 5.2.7 Residents of the development will have opportunity to park cycles at their homes, and similarly for their visitors. The other development uses (refer para 1.2) will provide cycle parking in accordance with the Council's standards.

5.3 **SUMMARY**

Transport sustainability is a key principle underlying the masterplan development. Encouraging walk and cycle journeys is an important part of this. The location of the Site provides a reasonable context for journeys to be undertaken on foot and by cycle, and the masterplan access strategy enhances this with the provision of good permeability and connectivity for pedestrians and cyclists. This is complemented by the mixed use components of the masterplan (refer Appendix A).

6

public transport

6.1 The CIHT 'Guidelines for Planning for Public Transport in Developments' (March 1999) set out that, in considering public transport provision for development, three questions need to be addressed:

- “• What is the existing situation with respect to public transport provision in and around the development?*
- What transport provision is required to ensure that the proposed development meets national and local transport policy objectives?*
- Are the transport features of the development consistent with the transport policy objectives, and if not, can they be changed to enable the policy objectives to be achieved?” (para 4.18).*

6.2 The CIHT Guidelines conclude that a broad methodology which allows the issues to be identified and debated comprises the following general principles:

- Investigate existing public transport provision,
- Using this information, determine whether the Site is well served by public transport,
- Where the Site is not well served or existing services are fully loaded, suggest measures to rectify this situation,
- Define infrastructure for the proposed development which enables public transport to be operated effectively and make it attractive to potential passengers.

6.3 The proposed development affords opportunity for development generated public transport journeys to be made primarily by bus.

6.4 BUS

6.4.1 Figure 9 shows the location of bus stops within 800m of the Site. As shown on Figure 9, the bus stops are only marked with a 'flag and pole' on one side of the road, buses call in both directions at these stops. The closest bus stops to the Site are located on Heol Orsaf within circa 600m of the Site. The bus service No 6 calls at the stops shown on Figure 9. The Service 6 route is indicated on Figure 10, between Wrexham (to the north) and Ruabon (to the south), calling at Ruabon rail station. Service 6 provides an hourly service Monday to Saturday during the day.

6.4.2 Additionally, there are bus stops on High Street. Table 1 provides a summary of the services calling on High Street. In a typical weekday situation there are circa 11 buses per hour calling on High Street, or circa 22 buses per hour taking into account journeys in both directions along the road. This provides opportunity for bus travel to a range of destinations including Wrexham, Oswestry, Llangollen, Ruabon, Cefn Mawr, Acrefair, Chirk, Barmouth and Glyn Ceirog.

6.5 RAIL

6.5.1 The rail station closest to the Site is Ruabon, circa 3.6km to the south of the Site. This is on the Shrewsbury to Chester rail line.

6.5.2 There is 1 northbound train an hour to Wrexham General, that often continues on to Chester and Holyhead.

6.5.3 There is 1 southbound train an hour to Shrewsbury (circa 30 to 45 minute journey time). Alternate trains continue to Birmingham New Street (circa 1h 43 minutes journey time from Ruabon) or Cardiff Central (2h 35 minutes journey time) Providing a 120 minute frequency service to Birmingham, and a 120 minute frequency service to Cardiff.

6.5.4 Passengers with destinations even further afield have ample opportunity to make such journeys by rail, with a change of train. For example, Birmingham New Street offers access to the inter-city rail routes.

6.5.5 Bus service 6, which calls within 600m of the Site, provides bus service access from the Site to Ruabon rail station.

6.5.6 Cycles are permitted on all services calling at Ruabon station. This provides opportunity journeys to be undertaken by combination of cycle and rail.

6.6 **SUMMARY**

It is established that public transport journeys to/from the Site can be made to a range of destinations, including employment and amenity locations. This is in accordance with the aims and objectives of current national and local policies.

7

travel plan

- 7.1 The Travel Plan (TP) report is submitted in support of the planning application, and complementary to this TA report. A summary of the key points in the TP are set out below.
- 7.2 The form of the TP report is that of an Interim Framework Travel Plan (IFTP), which complies with current guidance (refer para 7.3 below). The primary reason for this is that the residential development at the Site may be undertaken by more than one developer (housebuilder(s)), and the requirements of the TP must relate to all dwellings constructed on the Site. Whilst there is employment and retail use included in the planning application, these are of modest scale, and are estimated to generate modest traffic flows (refer Table 3). Consequently, as a pragmatic matter of practicality, the development TP is a residential TP, with a residential TP target. Notwithstanding this, all of the TP measures and improvements for sustainable transport options are similarly available for employees based at the Site.
- 7.3 The TP for the proposed development is prepared in accordance with the DfT April 2009 'Good Practice Guidelines: Delivering Travel Plans through the Planning Process', complemented by the DfT 2005 'Making Residential Travel Plans Work: Good Practice Guidelines'. The DfT 2009 recommended outcomes approach is adopted.
- 7.4 The key objectives of the TP are to:
- Contribute to traffic reduction and other sustainable transport objectives set out in national, regional and local policies,
 - Improve accessibility of the Site by sustainable modes of transport and address traffic and parking issues,
 - Widen choice of travel mode for all those travelling to/from the Site.
- 7.5 Specific outcomes sought from the TP are to:
- Achieve the minimum number of additional single occupancy car traffic movements to/from the development,

- Address the access needs of site users, by supporting walking, cycling and public transport,
- Reduce the need for travel to/from the Site.

- 7.6 The TP explicitly considers accessibility by the sustainable travel modes of pedestrian, cycle, public transport and car share.
- 7.7 The TP target residential target is set as the **maximum AM peak hour 2-way vehicle trip rate of 0.548 vehicles/hour/dwelling**. The objective is for the TP target to be achieved within 5 years from first occupation, and subsequently to be maintained, or if possible improved upon.
- 7.8 It is proposed that the TP operates for a period of 5 years post-completion of the development.
- 7.9 The developer will appoint a Travel Plan Coordinator (TPC), to introduce, manage, operate and monitor the TP. As part of the ongoing management of the TP, the TPC will maintain a dialogue with the Council, and monitor emerging best practice information, to provide the most efficient platform for maximising the effectiveness of the TP.
- 7.10 Any and all TPs (ie if there is more than a single developer) operated at the Site must have an appointed TPC. It is an option for any/all of the developers to utilise a common shared area-wide TPC, and this is the preferred option. However, it is recognised that a/some developer(s) may elect to have their own individual TPC arrangements. If that situation arises, for the avoidance of doubt, the TP **must** be introduced and operated in accordance with this IFTP, or any successor document that has been agreed with the local authority.
- 7.11 The developer is required to finance the TP. A sufficient revenue budget will be identified to employ the TPC for a period of 5 years post-completion of the development, on a sufficient basis to introduce and manage the TP initiatives, and thereafter as required to:

- Manage the initiatives,
- Finance the measures identified in this and subsequent TP Monitoring and Review reports and as agreed with the Council, and
- Enable the TPC postholder to carry out the duties identified above.

7.12 The TP Action Plan is set out in Chapter 10 of the TP. The TP Table 3 summarises identified measures that are proposed, and indicates the timing for the measures and funding information. This illustrates the holistic approach adopted for the TP, aimed at encouraging from the outset a positive sustainable transport awareness and culture for the development. The TP measures will be reviewed and amended as appropriate, in consultation with and requiring the agreement of the local authority, as part of the ongoing dynamic monitoring and review process for the TP.

traffic flows

8.1 STUDY NETWORK

The TA study network of junctions comprises:

REF	JUNCTION	CONTROL
SJ2	Site Access/Bangor Road:	Roundabout,
SJ3	B5426 Bangor Road/B5605 High Street:	Traffic signals,
SJ4	B5605 High Street/B5426 Maelor Road:	Traffic signals,
SJ5	B5605 Wrexham Road/B5426 Smithy Lane:	Priority control,
SJ6	B5426 Bangor Road/Hafod Road/New Hall Road:	Priority control,
SJ7	A483/A539 Llangollen Road:	Double roundabout,
SJ8	A483/A5426 Bangor Road:	Priority control,
SJ9	A483/A5152 Wrexham Road:	Roundabout,
SJ10	A483/ A525 Ruthin Road:	Traffic signals,
SJ11	A483/A541 Mold Road:	Traffic signals,
SJ12	A483/A5156/A5152 Chester Road:	Traffic signals.

8.2 PEAK PERIODS

The times when the combination is greatest, of traffic generated by the proposed development uses (residential and employment) and the existing highway network traffic, are the weekday AM & PM peak hours. The TA includes quantitative analysis of the traffic impact of the masterplan development for these periods, and this is **agreed** with WCBC and WAG.

8.3 TRAFFIC COUNTS

8.3.1 Traffic count surveys were undertaken at the TA Study Junctions on 14 May 2013.

8.3.2 Analysis of the count data identified that the peak hours for traffic flows are:

- AM 0800-0900,
- PM 1630-1730.

8.3.3 The 2013 AM & PM peak hour traffic count data are converted to the equivalent passenger car units (pcu). These are presented on Figure D1, Appendix D.

8.4 ASSESSMENT YEARS

8.4.1 The DfT Guidelines on Transport Assessment (GTA) recommends that TA modelling of network performance is undertaken for:

- Year of development opening: defined for this purpose as the year in which the proposed development is fully completed and occupied, and
- If future year modelling is required for the local network, a period *"of no less than five years after the date of registration of a planning application"* (para 4.4).

8.4.2 It is **agreed** with WCBC that junction modelling is undertaken for the following years:

- Year of opening: **2019** (Note: in 2010 this was agreed as 2016, and has been re-based to 2019, to reflect the 3 years' gap),
- Future design year: **2023**, to reflect 10 years after registration of the planning application, as required by WAG for the strategic road network (SRN) junctions.

8.4.2 The DfT NTM factors are applied to the traffic count data to estimate the 'growthed' year 2019 peak hour traffic flows at all of the TA study junctions. The 2019 factored traffic counts are presented on Figure D2, Appendix D.

8.4.3 The DfT NTM factors are applied to the traffic count data to estimate the 'growthed' future design year peak hour traffic flows at the strategic network junctions, ie SJ 7 – 12), ie those that fall within the control of WAG. The 2023 factored traffic counts at SJ 7 – 12 are presented on Figure D3, Appendix D.

8.5 COMMITTED DEVELOPMENTS

AHA is not aware of any committed developments for which generated traffic should be included in this TA report.

8.6 PROPOSED DEVELOPMENT

8.6.1 As set out in para 1.2, the mixed use development comprises:

- Up to 300 residential dwellings,
- 465sm GFA B2/B8 industrial, storage and distribution units,
- 235sm A1 retail unit (assumed convenience store) with ATM,
- Play space.

8.6.2 Of the above, it is the residential and employment uses that generate traffic at the TA study network of junctions. The traffic generated by this assumed development (300 houses + 465sm employment units) is estimated and adopted for the TA analysis and modelling undertaken and reported herein.

8.6.3 The other uses (convenience store with ATM, and play space) indicated in para 1.2 are ancillary uses provided to primarily serve the needs of the development's residents and employees. As such, the short distance trips to/from these ancillary land uses will be predominantly on foot or by cycle, and not as driver of a car. Hence, the exclusion of car traffic generated by such ancillary uses in the AM & PM peak hour masterplan generated traffic estimates is concluded to be appropriate.

8.6.4 However, it is recognised that the Bangor Road roadside location of the proposed convenience store (refer Appendix A), may result in some customer patronage of 'pass-by' traffic along Bangor Road, traveling between Johnstown and the A483. The TA traffic estimates take account of this, as outlined in Section 8.10 below.

8.7 GENERATED TRAFFIC: RESIDENTIAL

8.7.1 Residential AM & PM peak hour trip rates are included in the TA Scoping Study report (ref 1232/1 submitted to WCBC and WAG), and these are **agreed**. For convenience, these are reproduced in Table 2 herein.

8.7.2 Thus, the estimated AM & PM peak hour traffic generated by the proposed 300 houses is presented in Table 3.

8.8 GENERATED TRAFFIC: INDUSTRIAL

- 8.8.1 Similarly and consistently, industrial use AM & PM peak hour trip rates are **agreed** with WCBC and WAG, and these are reproduced in Table 2 herein.
- 8.8.2 Table 3 includes the consequent estimate of AM and PM peak hour traffic generated by the proposed development 465sm GFA industrial use development.

8.9 GENERATED TRAFFIC: CONVENIENCE STORE

- 8.9.1 The TA Scoping Study report ref 1232/1 does not include trip rates for a convenience store. This is simply because, at that time in 2010, a convenience store was not proposed.
- 8.10.2 Interrogation of the TRICS database is undertaken to establish suitable convenience store trip generation rates for the proposed 235sm convenience store. The identified trip rates are included in Table 2.
- 8.10.3 As explained in para 8.6.3, the convenience store patronage will comprise:
- Residents and employees of the proposed development: these will not generate any traffic on the highway network, as these people move within the Site to/from the convenience store,
 - Pass-by traffic on Bangor Road passing the Site. The only traffic implication is that they turn into and out of the Site to make a visit to the convenience store. Hence their traffic impact is restricted to the SJ" Bangor Road/Site Access junction,
 - 'New' traffic that makes a journey from Johnstown that is not presently being made.
- 8.10.4 The assumptions adopted for the TA estimate of the traffic generated by the development's convenience store on the highway network is that this comprises:
- Residents/employees of development: 25%,
 - Pass-by traffic: 60%,

- 'New' traffic, from Johnstown: 15%
- TOTAL 100%.

8.10.5 The consequent estimate of AM & PM peak hour traffic generated by the proposed convenience store is presented in Table 4.

8.11 DISTRIBUTION OF SITE GENERATED TRAFFIC

8.11.1 It is necessary to estimate the % directional distribution on the TA study network of the traffic generated by the elements of the proposed development, to enable quantative analysis of traffic impact at the TA study junctions.

8.11.2 The methodology **agreed** with WCBC and WAG is set out in the TA Scoping Study report ref 1232/1. Thus uses Journey to Work data from the 2001 Census as the basis for estimating the % distribution of development generated traffic on the study network junctions. The resultant % distribution **agreed** with WCBC and WAG for the residential, office and industrial uses is presented on Figure D4, Appendix D.

8.11.3 Additionally, it is necessary to estimate a % distribution of the convenience store 'pass-by' and 'new' traffic. This is presented as follows in Appendix D:

- Figure D5: pass-by traffic,
- Figure D6: 'new' traffic (ie from Johnstown).

8.12 GENERATED TRAFFIC ON HIGHWAY NETWORK

The estimated additional traffic movements generated at the TA study junctions by the proposed development are presented in Appendix D as follows:

- Figure D7: Residential + Industrial,
- Figure D8: Convenience store 'pass-by,
- Figure D9: Convenience store 'new'
- Figure D10: Total Generated, ie D7 + D8 + D9.

8.13 WITH DEVELOPMENT

The estimated AM and PM peak hour With Development traffic flows at the TA study junctions are presented in Appendix D as follows:

- Figure D11: 2019, all TA study junctions,
- Figure D12: 2023, WAG SRN junctions, SJ 7 -12.

8.14 TRAFFIC IMPACT

8.14.1 The March 2007 GTA sets out that:

"For the avoidance of doubt, the 1994 Guidance regarding the assessment thresholds of 10 percent and 5 percent levels of development traffic relative to background traffic is no longer an acceptable mechanism....".

8.14.2 However, GTA does suggest that a threshold of 30 two-way trips may be appropriate for identifying the level of impact below which the need for a formal assessment may not be needed. Indeed, it is generally the HA's approach to apply the 30 two-way trips threshold as that below which operational assessments are not required for the trunk road network. It is concluded that, in the specific case of this TA, and the absence of any other guidance, the '30 two-way trip threshold' should be adopted as the basis of a materiality test of traffic impact for all the TA study junctions. This approach is widely used and is adopted herein.

8.14.3 The total peak hour traffic flows generated at the TA study junctions by the proposed development content is presented on Figure D10, Appendix D.

8.14.4 The total Phase 2 generated traffic increase (ie sum of all of the generated traffic entering the junction) is summarised below for each of the study network junctions:

REF	JUNCTION	TRAFFIC INCREASE (pcu)	
		AM	PM
SJ2	Site Access/Bangor Road:	210	230
SJ3	B5426 Bangor Road/B5605 High Street:	20	20
SJ4	B5605 High Street/B5426 Maelor Road:	16	18
SJ5	B5605 Wrexham Road/B5426 Smithy Lane:	7	8
SJ6	B5426 Bangor Road/Hafod Road/New Hall Road:	176	196

SJ7	A483/A539 Llangollen Road:	17	19
SJ8	A483/A5426 Bangor Road:	176	196
SJ9	A483/A5152 Wrexham Road:	35	38
SJ10	A483/ A525 Ruthin Road:	8	10
SJ11	A483/A541 Mold Road:	39	43
SJ12	A483/A5156/A5152 Chester Road:	12	14.

8.14.5 Review of the information presented on Figure D10, Appendix D and summarised above, shows that the proposed development is estimated to generate an increase in traffic of more than 30 vehicles (2-way) at the TA study junctions ref SJ2, SJ6, SJ8, SJ9 & SJ11.

8.14.6 It is consequently concluded that modelling of the traffic impact of the proposed development is required at these 5no TA study junctions. The results of this TA junction modelling are reported in Chapter 9.

9

operational performance of highway network

9.1 The DfT computer program PICADY is used to model the performance of a priority (give-way) control junction. PICADY predicts the ratio of flow to capacity (RFC) and associated queue for the minor (give-way) entry to the junction and for the major road. PICADY is used to model the operational performance of SJ 6 & 8.

9.2 The DfT computer program ARCADY is used to model the performance of a roundabout junction. ARCADY predicts the ratio of flow to capacity (RFC) and associated queue for each entry to the roundabout. ARCADY is used to model the operational performance of SJ 2 & 9.

9.3 The DfT computer program TRANSYT is used to model the performance of a linked network of traffic signals. TRANSYT predicts the performance of each link of the TRANSYT network, in terms of:

- DS: degree of saturation, expressed as a percentage, eg 95 represents 95% saturation,
- Q: mean maximum queue, in units of pcu (passenger car unit).

TRANSYT modelling is the methodology adopted for modelling the signalised roundabout arrangement of SJ 11.

9.4 **SJ2**

Table 5 presents the 2019 AM & PM peak hour ARCADY modelling results for the proposed SJ2 Bangor Road/Site Access. Review of Table 5 shows that SJ2 is predicted to accommodate the proposed development and operate with high levels of spare capacity, with negligible queues and delays.

9.5 SJ6

Table 5 presents the 2019 AM & PM peak hour PICADY modelling results for the SJ6, for the Base and With Development situations. Review of Table 6 shows that SJ6 is predicted to operate with high levels of spare capacity in the 2019 Base AM & PM peak hour situations. Similarly, SJ6 is predicted to continue to operate with high spare capacity and negligible queues and delays in the 2019 With Development AM & PM peak hours.

9.6 SJ8

9.6.1 The PICADY modelling results for SJ8 are summarised in Tables 7 & 8, as follows:

- Table 7: Bangor Road/A483 northbound off-slip,
- Table 8: Bangor Road/A483 southbound off-slip.

9.6.2 Review of Table 7 shows that the SJ8 Bangor Road/A483 northbound off-slip junction is predicted to operate with significant spare capacity, and negligible queues and delays in the 2019 and 2023 AM & PM peak hours, in both the Base and With Development scenarios.

9.6.3 Similarly, review of Table 8 shows that the SJ8 Bangor Road/A483 southbound off-slip junction is predicted to operate with significant spare capacity, and negligible queues and delays in the 2019 and 2023 AM & PM peak hours, in both the Base and With Development scenarios.

9.7 SJ9

The ARCADY modelling results for SJ9 are summarised in Table 9. Review of Table 9 shows that the SJ9 is predicted to operate with significant spare capacity, and negligible queues and delays in the 2019 and 2023 AM & PM peak hours, in both the Base and With Development scenarios.

9.8 **SJ11**

9.8.1 SJ11 is a roundabout that has partial signalisation. Hence, a TRANSYT model is constructed for SJ11. ARCADY modelling is undertaken to establish appropriate slope and intercept values to input to the TRANSYT model for the priority control entry arms of SJ11.

9.8.2 The TRANSYT modelling results for the SJ11 are presented in Tables 10-13, as follows:

- Table 10 2019 AM
- Table 11 2019 PM
- Table 12 2023 AM
- Table 13 2023 PM.

9.8.3 The SJ11 TRANSYT Network Diagram is presented on Figure 11.

9.8.4 Review of Tables 10-13 shows that SJ11 is predicted to operate in an acceptable manner with spare capacity in the 2019 and 2023 AM & PM peak hours, in both the Base and With Development scenarios.

10

summary and conclusions

10.1 Planning consent is sought for masterplan development comprising:

- Up to 300 residential dwellings,
- 465sm GFA B2/B8 industrial, storage and distribution units,
- 235sm A1 retail unit (assumed convenience store) with ATM,
- Play space.

An illustrative masterplan layout is provided, and this shows the development use components that are proposed.

10.2 Transport sustainability is a key principle underlying the masterplan development. The location of the Site provides a reasonable context for journeys to be undertaken on foot and by cycle, and the masterplan access strategy exploits this with the provision of permeability and connectivity for pedestrians and cyclists. This is further enhanced by the mixed use components of the masterplan.

10.3 It is established that a range of destinations are accessible from the Site by public transport, including amenity and employment locations. This is in accordance with the aims and objectives of current national and local policies.

10.4 A Travel Plan forms part of the development. This is set out in the complementary Travel Plan report, and key elements are summarised in Chapter 7 herein.

10.5 The TA study network of junctions is **agreed** with WCBC and WAG, and comprises:

REF	JUNCTION	CONTROL
SJ2	Site Access/Bangor Road:	Roundabout,
SJ3	B5426 Bangor Road/B5605 High Street:	Traffic signals,
SJ4	B5605 High Street/B5426 Maelor Road:	Traffic signals,
SJ5	B5605 Wrexham Road/B5426 Smithy Lane:	Priority control,
SJ6	B5426 Bangor Road/Hafod Road/New Hall Road:	Priority control,
SJ7	A483/A539 Llangollen Road:	Double roundabout,

SJ8	A483/A5426 Bangor Road:	Priority control,
SJ9	A483/A5152 Wrexham Road:	Roundabout,
SJ10	A483/ A525 Ruthin Road:	Traffic signals,
SJ11	A483/A541 Mold Road:	Traffic signals,
SJ12	A483/A5156/A5152 Chester Road:	Traffic signals.

- 10.6 Comprehensive junction analysis and modelling has been undertaken for the TA study network of 11 junctions, for the development year of opening 2019 AM & PM peak hours. Additionally, to meet the information requirements of WAG, AM & PM comprehensive junction analysis is undertaken for the future design year 2023, for the SRN study junctions SJ7-12. The junction analysis and modelling demonstrates that the traffic impact of the proposed development can be accommodated in an acceptable manner by the highway network, and that the proposed development has **no material** traffic impact.
- 10.7 It is demonstrated that the proposed Bangor Road/Site Access junction provides a suitable all movement vehicular access for the proposed development. This additionally accommodates pedestrians and cyclists.
- 10.8 It is concluded that the proposed development is in accordance with national and local transport policies, and that there are no transport/highways reasons for refusal of planning permission.

figures

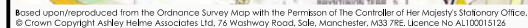


FIGURE 1

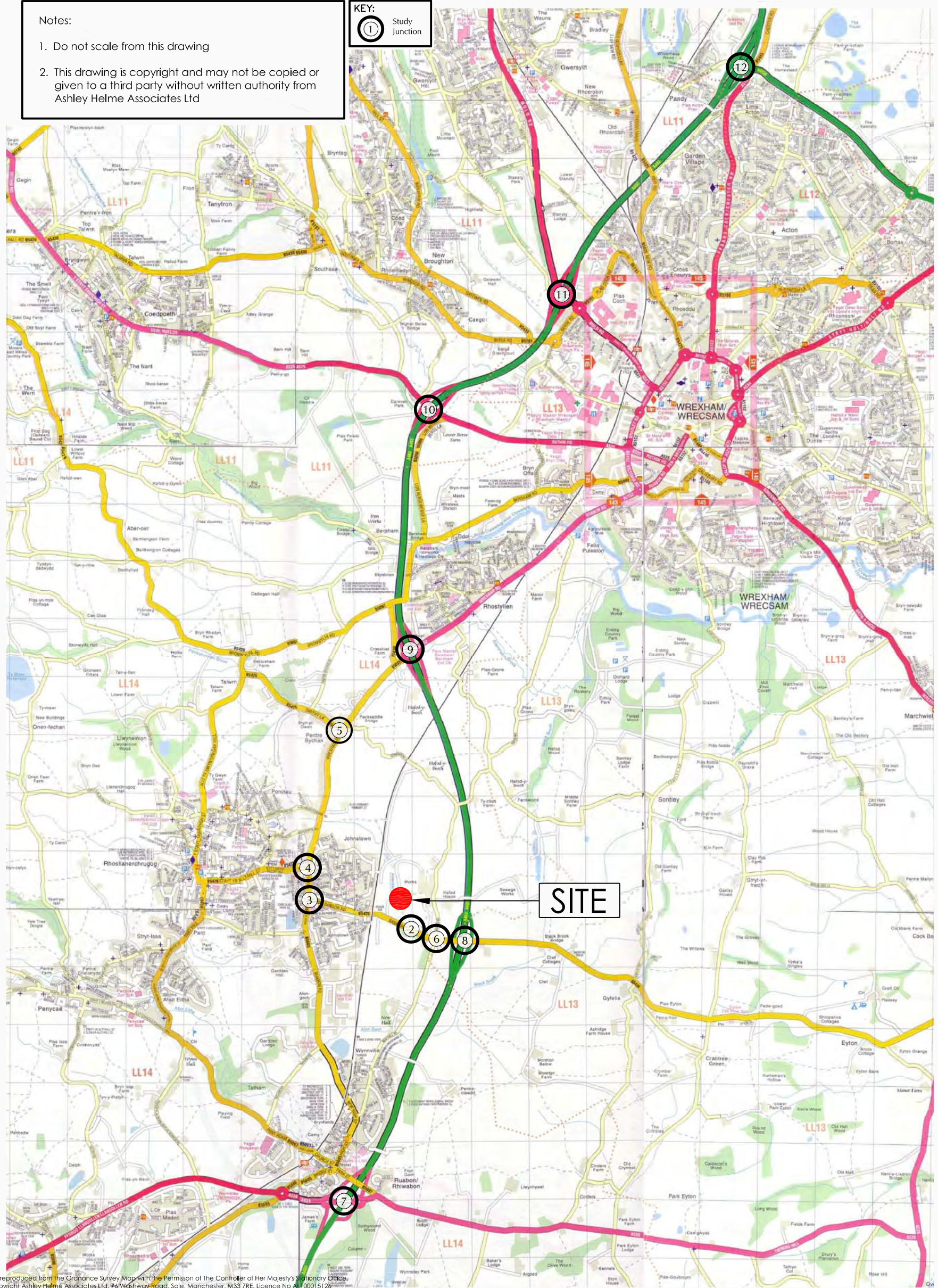
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① Study Junction



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STUDY JUNCTIONS

FIGURE 2

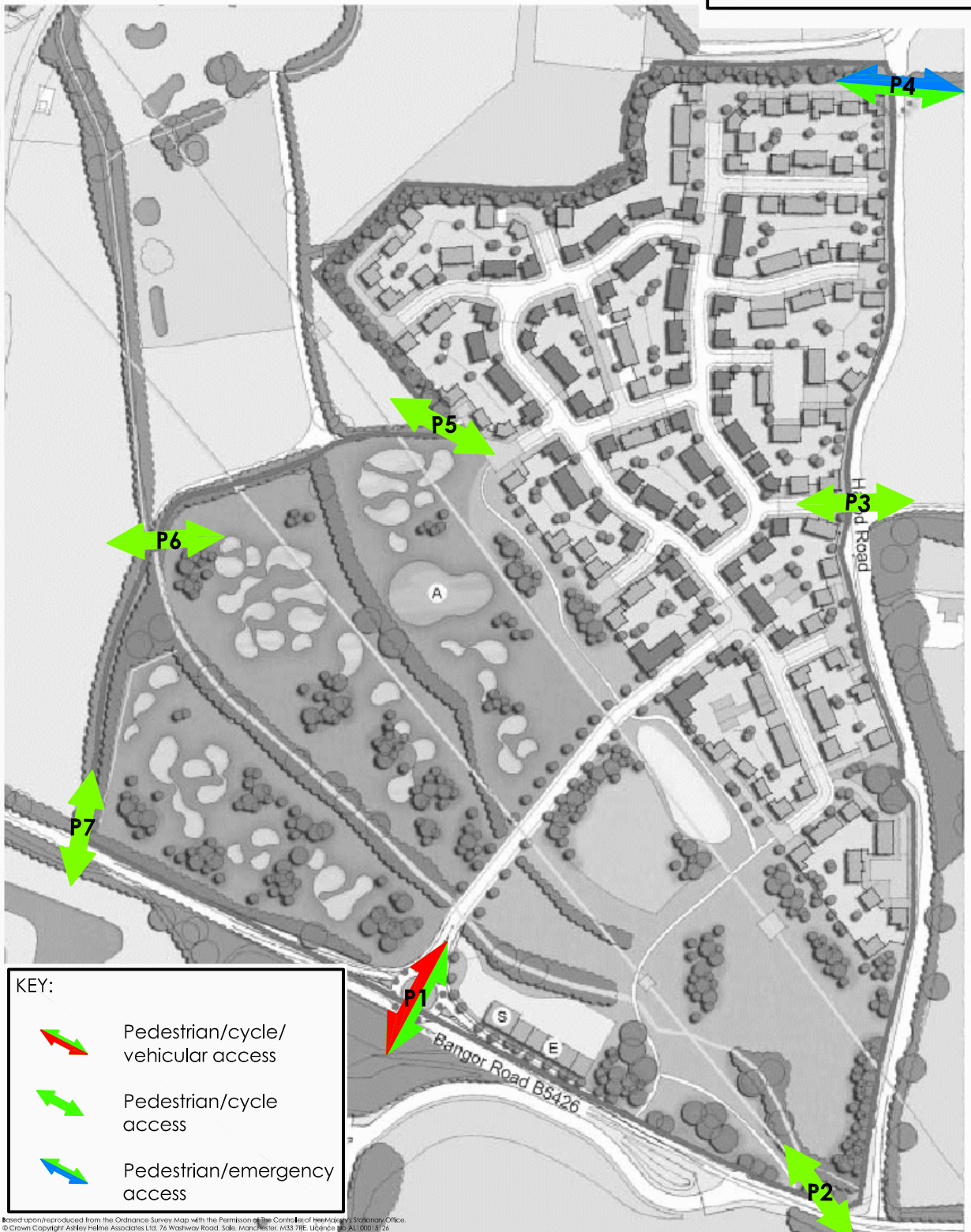
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a s s o c i a t e s

76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553



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KEY:



Pedestrian/cycle/
vehicular access



Pedestrian/cycle
access



Pedestrian/emergency
access

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ACCESS STRATEGY

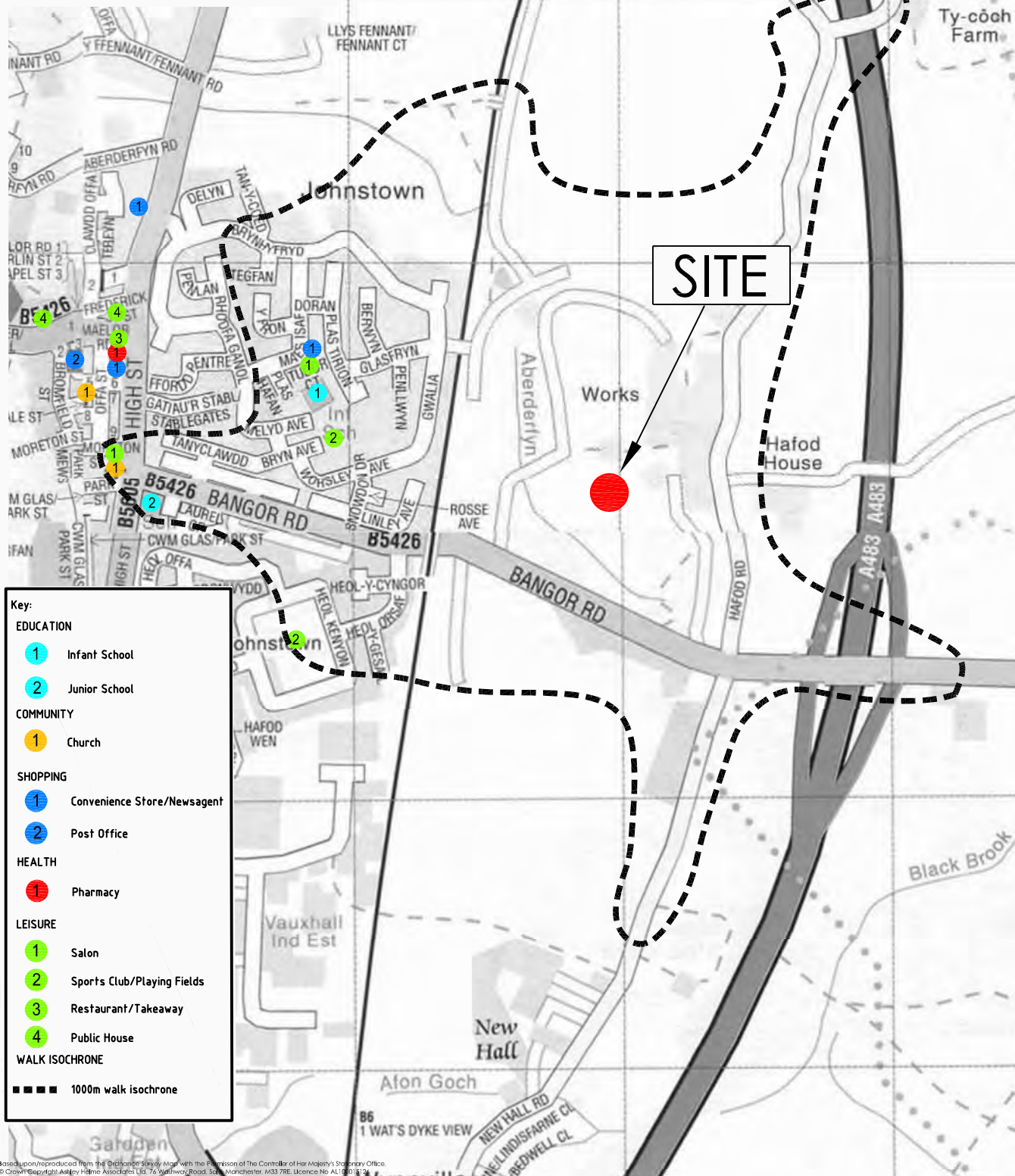
FIGURE 3

ashleyhelme
associates

76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553

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LOCAL AMENITIES

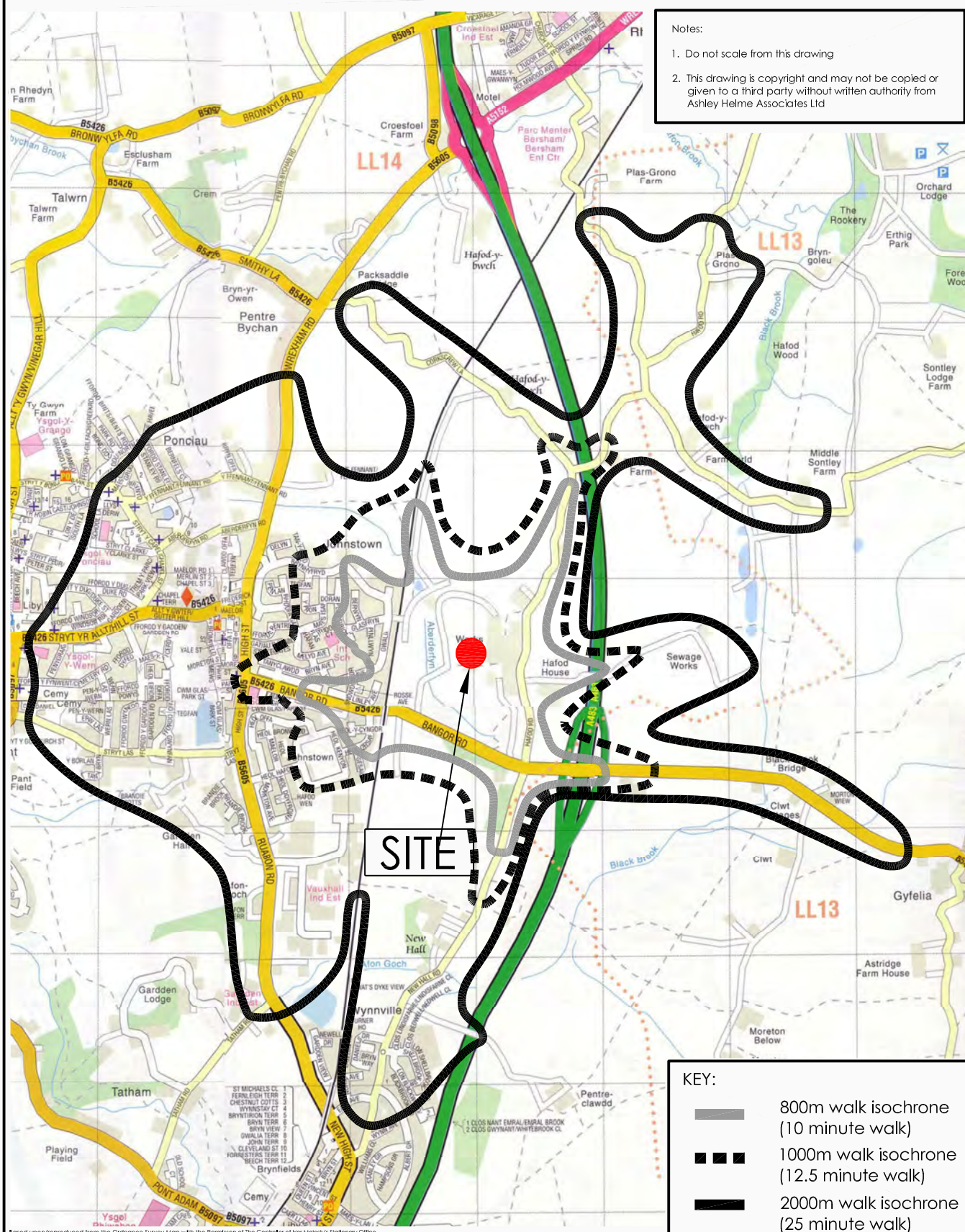
FIGURE 4

ashleyhelme
associates

76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553

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WALK ISOCHRONES

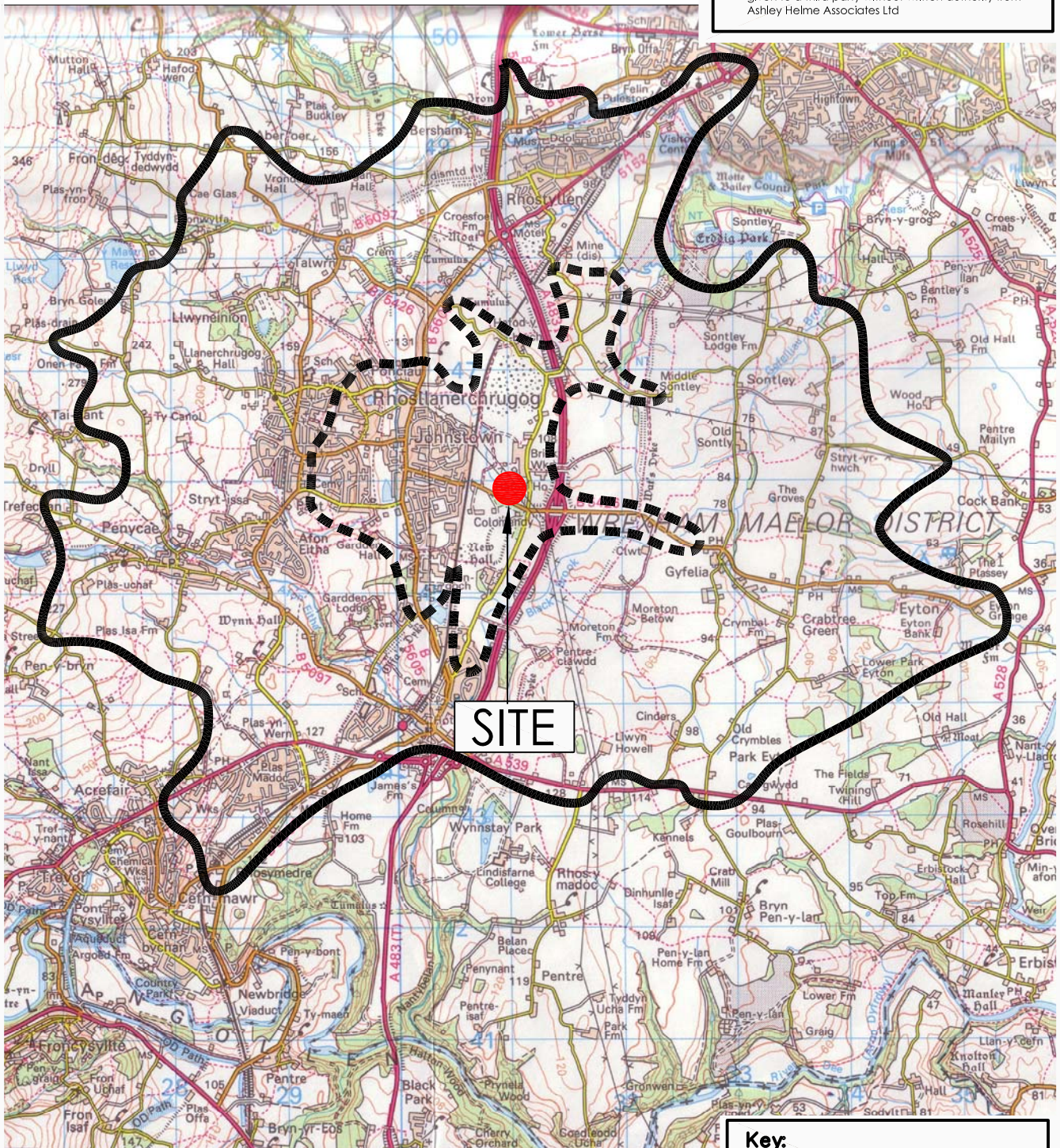
FIGURE 5

ashleyhelme
associates

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Key:

- 2000m cycle isochrone (10 minute cycle isochrone)
- 4000m cycle isochrone (20 minute cycle isochrone)
- 6000m cycle isochrone (30 minute cycle isochrone)

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CYCLE ISOCHRONES

FIGURE 7

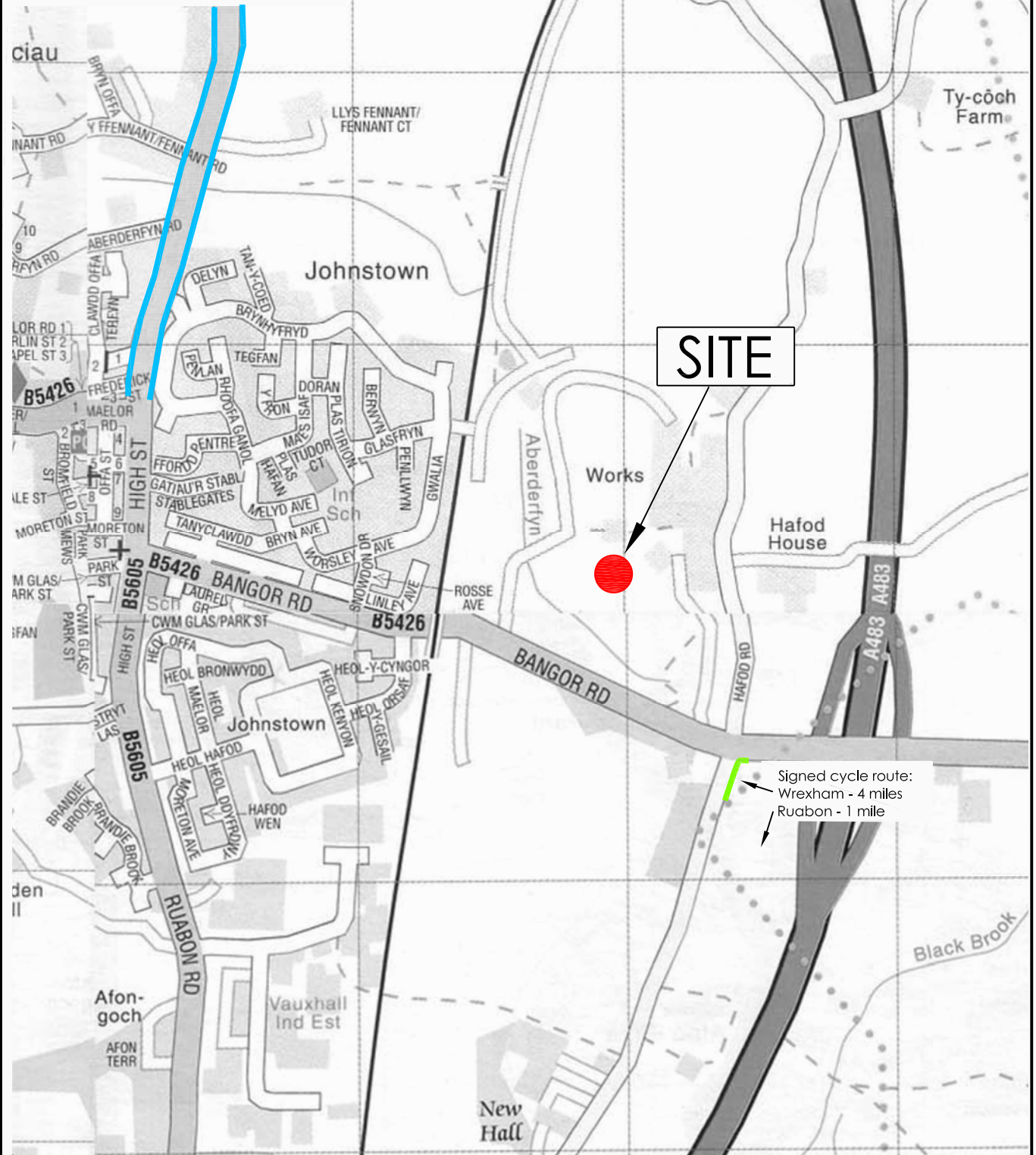
ashleyhelme
associates
76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553

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Key:

- On-road cycle lane
- Off-road cycle lane



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EXISTING CYCLE ROUTES

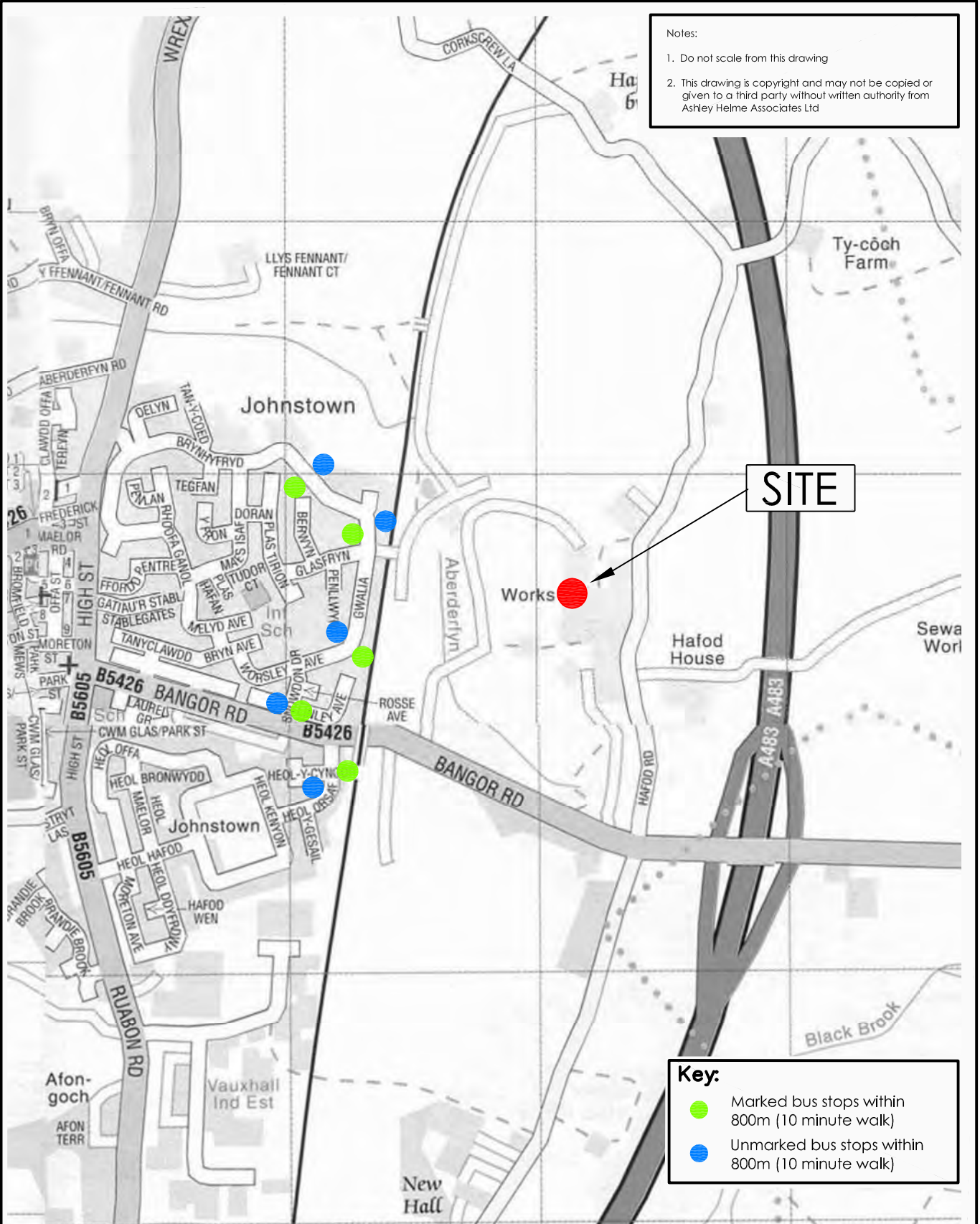
FIGURE 8

ashleyhelme
associates

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Key:

- Marked bus stops within 800m (10 minute walk)
- Unmarked bus stops within 800m (10 minute walk)

BUS STOPS

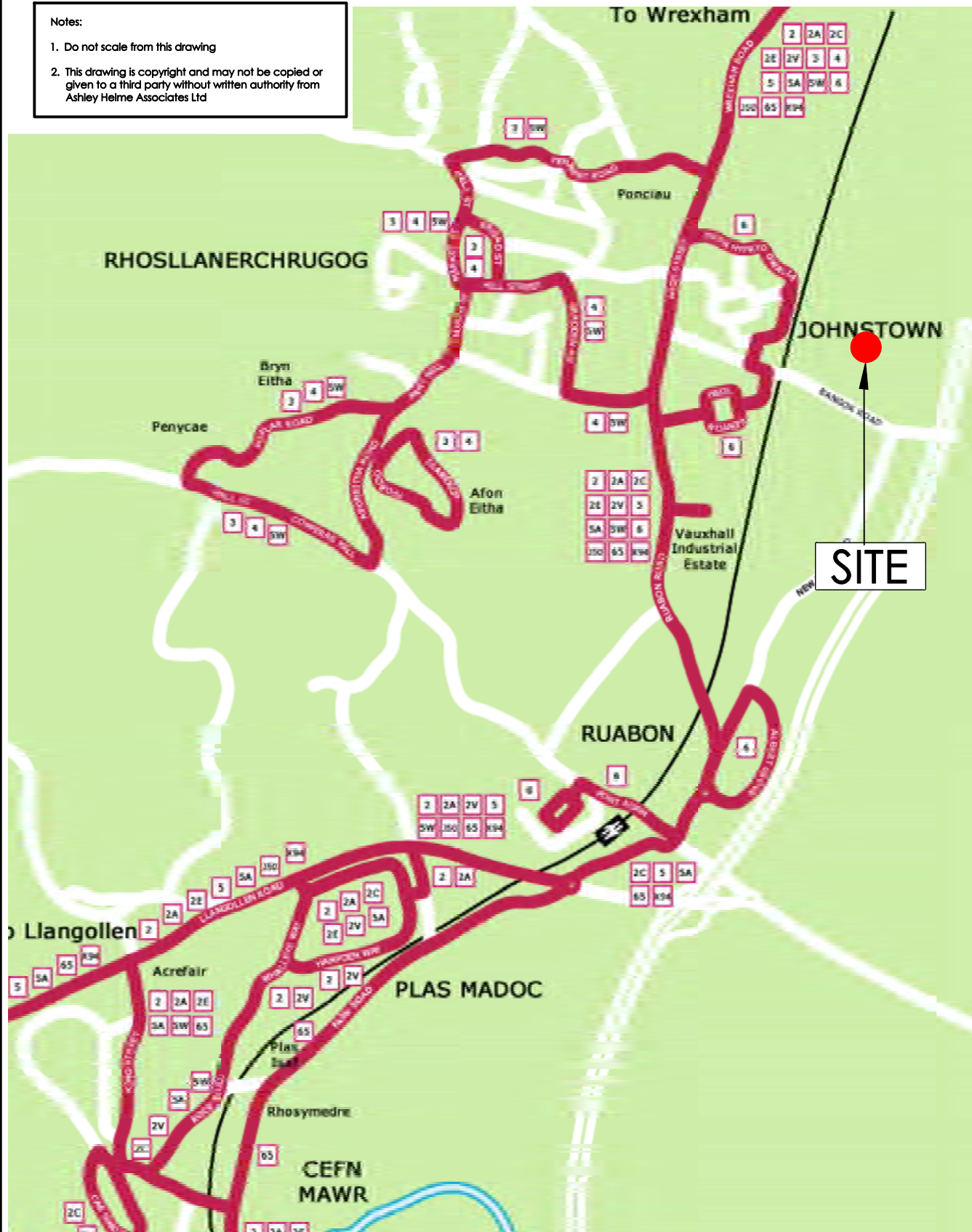
FIGURE 9

ashleyhelme
associates

76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553

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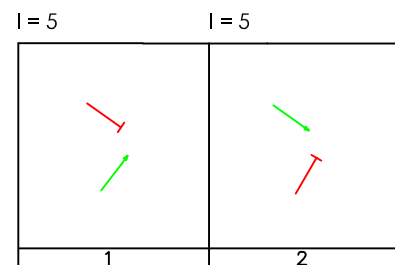
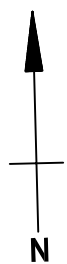
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Source: www.wrexham.gov.uk

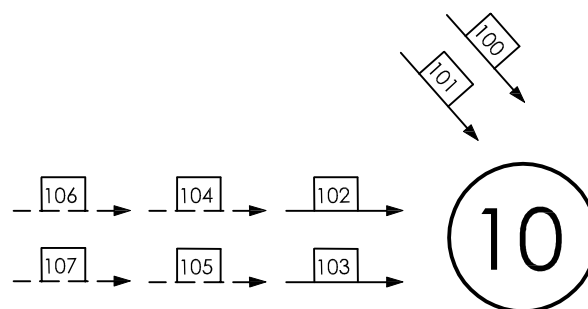
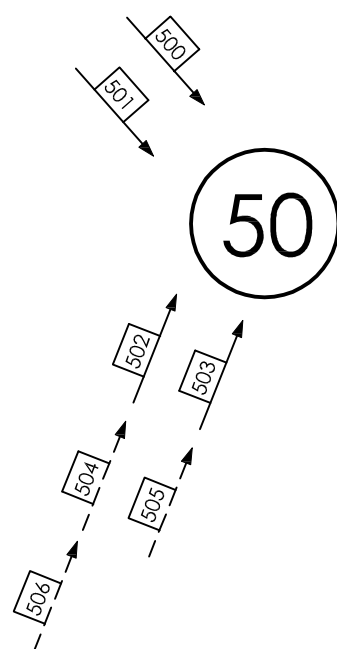
EXISTING BUS ROUTES

FIGURE 10

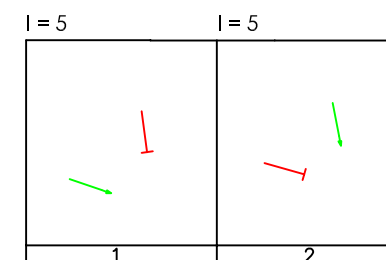
ashleyhelme
associates
76 washway road, sale, manchester, m33 7re
e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553



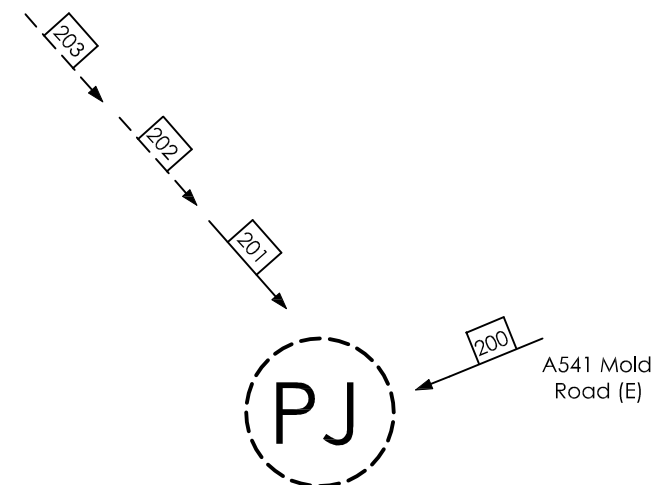
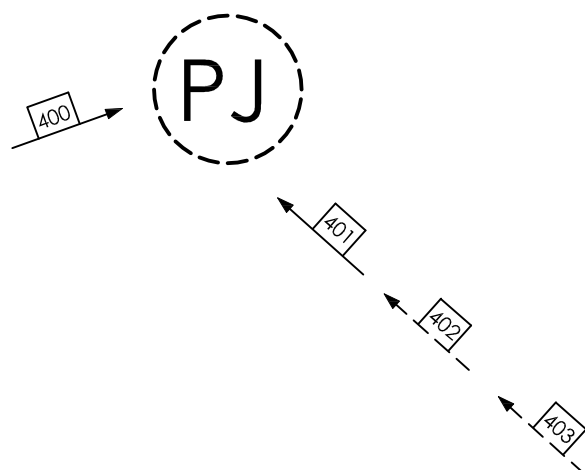
A541 Mold Road (W)



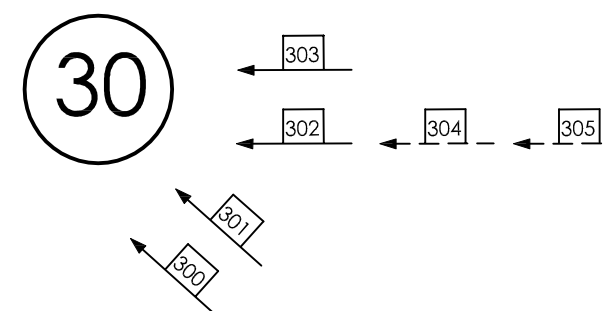
A483
SB Off-Slip



Summerhill Road



A541 Mold Road (E)



A483 NB
Off-Slip

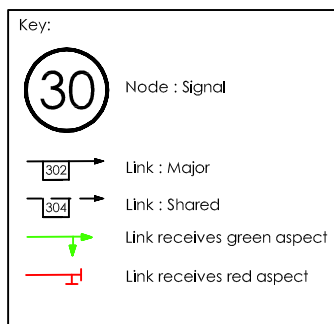
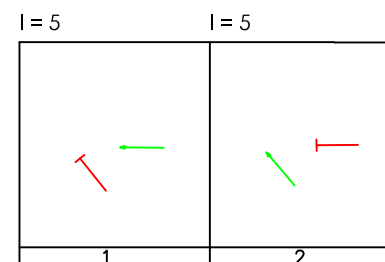


FIGURE 11

TRANSYT NETWORK DIAGRAM

tables

BUS No	Route	FREQUENCY			OPERATOR
		Mon- Sat		Sun	
		Day	Eve		
Services calling within a 10 minute walk					
6	Wrexham – Johnstown – Ruabon	60 mins	-	-	GHA
Services calling on High Street					
2	Wrexham – Oswestry ⁽¹⁾	60 mins	-	-	ARR
2A	Wrexham – Oswestry	60 mins	-	-	ARR
2C	Wrexham – Cefn Mawr	30 mins	-	-	ARR
2E	Wrexham – Chirk (eve)	-	120 mins	-	GHA
2V	Wrexham – Cefn Mawr	30 mins	-	-	V
5	Wrexham Llangollen	15 mins	60 mins	-	BM/GHA
5A	Wrexham - Llangollen	-	-	60 mins	GHA
5W	Acrefair – Wrexham	1 trip	-	-	GHA
6	Wrexham – Ruabon	60 mins	-	-	GHA
J50	Wrexham – Acrefair	4 trips ⁽²⁾	2 trips ⁽²⁾	-	DJ
65	Wrexham – Glyn Ceirog	4 trips	-	-	GHA
X94	Wrexham – Barmouth	120 mins	120 mins	4 trips	ARR/GHA

Source: www.wrexham.gov.uk

Key:

BM Bryn Melyn
ARR Arriva
GHA GHA Coaches
V Vale
DJ D Jones & Son

Notes:

1. Continues on to Gobowen.
2. Operates during peak times only.

TABLE 1 BUS SERVICES AND FREQUENCIES

USE	AM ⁽⁴⁾			PM ⁽⁵⁾		
	ARR	DEP	2-WAY	ARR	DEP	2-WAY
Residential ⁽¹⁾	0.152	0.457	0.609	0.439	0.249	0.688
Industrial ⁽²⁾	0.833	0.257	1.090	0.086	0.832	0.918
Convenience store ⁽³⁾	10.130	10.275	20.405	9.183	9.687	18.870

Notes:

1. Units = veh/hour/residential unit,
2. Units = veh/hour/100sm GFA,
3. Source: TRICS 2011 (a),
4. AM peak hour trip rates are for 0800-0900,
5. PM peak hour trip rates are for 1700-1800.

TABLE 2 **TRIP GENERATION RATES**
PROPOSED DEVELOPMENT
AM & PM PEAK HOURS

USE	AM			PM		
	ARR	DEP	2-WAY	ARR	DEP	2-WAY
Residential ⁽¹⁾	46	137	183	132	74	206
Industrial ⁽²⁾	4	1	5	0	4	4
TOTAL	50	138	188	132	78	210

Notes:

1. Residential element assumed to comprise 300 dwellings,
2. Industrial element assumed to comprise 465sm GFA,
3. NB: Convenience store in Table 4.

TABLE 3 **GENERATED TRAFFIC**
PROPOSED RESIDENTIAL & INDUSTRIAL
AM & PM PEAK HOURS

	AM			PM		
	ARR	DEP	TWO-WAY	ARR	DEP	TWO-WAY
60% Pass-by	14	14	28	13	14	27
25% from proposed residential element of the development (ie internal site movement)	6	6	12	5	6	11
15% New traffic on highway network	4	4	8	3	3	6
Total	24	24	48	21	23	44

Notes:

1. Trip rates as Table 2,
2. Assumes 235sm GFA convenience store.

TABLE 4 **GENERATED TRAFFIC
PROPOSED CONVENIENCE STORE**

PEAK HOUR	SITE ACCESS			B5426 BANGOR ROAD (E)			B5426 BANGOR ROAD (W)		
	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)
AM	0.182	0.22	4.655	0.152	0.18	3.497	0.318	0.47	4.302
PM	0.100	0.11	3.829	0.401	0.67	4.935	0.177	0.21	3.704

Notes:

1. Refer Figure D11, Appendix D for traffic flows,
2. Q = Queue (pcu).

**TABLE 5 ARCADY ANALYSIS RESULTS: SJ2
AM & PM PEAK HOURS
2019 WITH DEVELOPMENT**

PEAK HOUR	DEVT	NEW HALL ROAD						HAFOD ROAD			B5426 BANGOR ROAD (W)			B5426 BANGOR ROAD (E)		
		RIGHT			LEFT											
		RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)
AM	Base	0.406	0.68	0.22	0.060	0.06	0.17	0.062	0.07	0.12	0.024	0.03	0.08	0.064	0.10	0.09
	With	0.438	0.77	0.25	0.064	0.07	0.18	0.068	0.07	0.14	0.026	0.03	0.07	0.070	0.12	0.09
PM	Base	0.195	0.24	0.17	0.032	0.03	0.15	0.087	0.09	0.12	0.026	0.03	0.10	0.052	0.08	0.07
	With	0.217	0.28	0.20	0.034	0.04	0.16	0.092	0.10	0.13	0.029	0.04	0.09	0.060	0.10	0.07

Notes:

1. Refer Figure D2, Appendix D for traffic flows,
2. Refer Figure D11, Appendix D for traffic flows,
3. Q= Queue (pcu).

TABLE 6 **PICADY ANALYSIS RESULTS: SJ6**
AM & PM PEAK HOURS
2019 BASE & WITH DEVELOPMENT

PEAK HOUR	YEAR	DEVT	A483 N/B OFF-SLIP						B5426 BANGOR ROAD		
			RIGHT			LEFT					
			RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)
AM	2019	Base ⁽¹⁾	0.236	0.31	0.19	0.065	0.07	0.12	0.196	0.24	0.11
		With ⁽²⁾	0.247	0.32	0.21	0.081	0.09	0.12	0.211	0.27	0.13
	2023	Base ⁽³⁾	0.248	0.33	0.20	0.068	0.07	0.12	0.207	0.26	0.12
		With ⁽⁴⁾	0.259	0.35	0.21	0.084	0.09	0.12	0.222	0.28	0.13
PM	2019	Base ⁽¹⁾	0.136	0.16	0.18	0.095	0.11	0.12	0.142	0.16	0.10
		With ⁽²⁾	0.148	0.17	0.20	0.143	0.17	0.14	0.147	0.17	0.10
	2023	Base ⁽³⁾	0.144	0.17	0.18	0.103	0.11	0.13	0.149	0.17	0.10
		With ⁽⁴⁾	0.157	0.18	0.20	0.151	0.18	0.14	0.154	0.18	0.10

Notes:

1. Refer Figure D2, Appendix D for traffic flows.
2. Refer Figure D11, Appendix D for traffic flows.
3. Refer Figure D3, Appendix D for traffic flows.
4. Refer Figure D12, Appendix D for traffic flows.
5. Q = Queue (pcu)

**TABLE 7 PICADY ANALYSIS RESULTS: SJ8A
AM & PM PEAK HOURS
2019 & 2023 BASE & WITH DEVELOPMENT**

PEAK HOUR	YEAR	DEVT	A483 S/B OFF-SLIP						B5426 BANGOR ROAD		
			LEFT			RIGHT					
			RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)
AM	2019	Base ⁽¹⁾	0.119	0.13	0.13	0.301	0.43	0.21	0.095	0.10	0.09
		With ⁽²⁾	0.122	0.14	0.13	0.393	0.64	0.24	0.126	0.14	0.10
	2023	Base ⁽³⁾	0.125	0.14	0.13	0.313	0.45	0.21	0.100	0.11	0.09
		With ⁽⁴⁾	0.130	0.15	0.13	0.411	0.69	0.26	0.131	0.15	0.10
PM	2019	Base ⁽¹⁾	0.202	0.25	0.14	0.480	0.91	0.26	0.074	0.08	0.09
		With ⁽²⁾	0.218	0.28	0.15	0.701	2.24	0.46	0.093	0.10	0.10
	2023	Base ⁽³⁾	0.214	0.27	0.14	0.507	1.01	0.28	0.080	0.09	0.10
		With ⁽⁴⁾	0.231	0.30	0.16	0.731	2.56	0.51	0.098	0.11	0.10

Notes:

1. Refer Figure D2, Appendix D for traffic flows,
2. Refer Figure D11, Appendix D for traffic flows,
3. Refer Figure D3, Appendix D for traffic flows,
4. Refer Figure D12, Appendix D for traffic flows,
5. Q = Queue (pcu).

TABLE 8 **PICADY ANALYSIS RESULTS: SJ8B**
AM & PM PEAK HOURS
2019 & 2023 BASE & WITH DEVELOPMENT

PEAK HOUR	YEAR	DEVT	A5152 WREXHAM ROAD			A483 NB OFF-SLIP			B5605			A483 SB OFF-SLIP		
			RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)	RFC	Q	DELAY (min)
AM	2019	Base ⁽¹⁾	0.280	0.4	0.036	0.272	0.4	0.045	0.558	1.3	0.068	0.316	0.5	0.044
		With ⁽²⁾	0.285	0.4	0.036	0.287	0.4	0.046	0.568	1.3	0.071	0.321	0.5	0.045
	2023	Base ⁽³⁾	0.295	0.4	0.037	0.290	0.4	0.047	0.593	1.4	0.075	0.336	0.5	0.046
		With ⁽⁴⁾	0.302	0.4	0.038	0.306	0.4	0.048	0.601	1.5	0.077	0.341	0.5	0.047
PM	2019	Base ⁽¹⁾	0.513	1.0	0.062	0.183	0.2	0.052	0.418	0.7	0.048	0.393	0.6	0.043
		With ⁽²⁾	0.527	1.1	0.064	0.193	0.2	0.053	0.421	0.7	0.049	0.396	0.7	0.044
	2023	Base ⁽³⁾	0.546	1.2	0.068	0.197	0.2	0.055	0.442	0.8	0.051	0.416	0.7	0.045
		With ⁽⁴⁾	0.621	1.6	0.091	0.193	0.2	0.051	0.502	1.0	0.065	0.466	0.9	0.056

Notes:

1. Refer Figure D2, Appendix D for traffic flows.
2. Refer Figure D11, Appendix D for traffic flows.
3. Refer Figure D3 Appendix D for traffic flows.
4. Refer Figure D12, Appendix D for traffic flows.
5. Q = Queue (pcu).

**TABLE 9 ARCADY ANALYSIS RESULTS: SJ9
AM & PM PEAK HOUR
2019 & 2023 BASE & WITH DEVELOPMENT**

LINK	BASE ⁽¹⁾			WITH DEVELOPMENT ⁽²⁾		
	DS	Q	DELAY (sec)	DS	Q	DELAY (sec)
100	82	10	33.5	82	10	33.5
101	65	7	24.5	65	7	24.5
102	69	9	7.2	70	9	7.5
103	73	10	6.2	74	10	6.5
200	27	0	0.7	27	0	0.7
300	56	7	15.4	55	7	14.6
301	47	6	13.8	47	6	13.1
302	50	6	18.7	53	6	20.0
303	52	6	19.0	54	6	20.3
400	18	1	2.7	18	1	3.0
500	67	7	25.5	67	7	25.5
501	82	11	32.1	82	11	32.7
502	72	8	15.4	73	8	15.5
503	24	4	10.0	25	4	9.9

Notes:

1. Refer Figure D2, Appendix D for traffic flows.
2. Refer Figure D11, Appendix D for traffic flows.
3. Refer Drg No 1232/10 for existing geometry.
4. Q=Queue (pcu).

TABLE 10 **TRANSYT ANALYSIS RESULTS: SJ11**
AM PEAK HOUR
2019 BASE & WITH DEVELOPMENT

LINK	BASE ⁽¹⁾			WITH DEVELOPMENT ⁽²⁾		
	DS	Q	DELAY (sec)	DS	Q	DELAY (sec)
100	52	6	21.2	55	5	22.6
101	60	6	22.5	63	7	24.1
102	44	5	5.2	43	5	5.0
103	61	5	7.4	61	5	7.2
200	61	1	1.4	62	1	1.4
300	79	8	35.3	80	9	36.3
301	64	6	27.3	65	6	27.8
302	79	11	15.8	79	11	15.9
303	51	6	10.5	51	6	10.5
400	17	0	2.9	17	0	2.9
500	42	4	22.0	42	4	22.0
501	78	9	31.8	80	9	33.1
502	79	10	16.4	80	10	16.6
503	17	1	7.8	17	1	7.8

Notes:

1. Refer Figure D2, Appendix D for traffic flows.
2. Refer Figure D11, Appendix D for traffic flows.
3. Refer Drg No 1232/10 for existing geometry.
4. Q=Queue (pcu).

TABLE 11 **TRANSYT ANALYSIS RESULTS: SJ11**
PM PEAK HOUR
2019 BASE & WITH DEVELOPMENT

LINK	BASE ⁽¹⁾			WITH DEVELOPMENT ⁽²⁾		
	DS	Q	DELAY (sec)	DS	Q	DELAY (sec)
100	86	11	37.5	86	11	37.5
101	68	7	25.4	68	7	25.4
102	72	10	8.0	73	9	10.1
103	76	7	6.7	77	12	10.3
200	29	0	0.7	29	0	0.7
300	56	7	14.8	60	7	16.1
301	47	6	13.2	51	6	14.3
302	55	6	20.5	53	6	19.1
303	57	6	20.7	54	6	19.4
400	19	1	2.9	20	1	3.1
500	70	8	26.5	67	7	24.3
501	85	12	35.6	82	11	31.2
502	76	8	16.3	79	9	18.2
503	25	4	10.0	27	4	10.5

Notes:

1. Refer Figure D3, Appendix D for traffic flows.
2. Refer Figure D12, Appendix D for traffic flows.
3. Refer Drg No 1232/10 for existing geometry.
4. Q=Queue (pcu).

TABLE 12 **TRANSYT ANALYSIS RESULTS: SJ11**
AM PEAK HOUR
2023 BASE & WITH DEVELOPMENT

LINK	BASE ⁽¹⁾			WITH DEVELOPMENT ⁽²⁾		
	DS	Q	DELAY (sec)	DS	Q	DELAY (sec)
100	55	5	21.6	55	5	21.6
101	63	7	23.1	63	7	23.1
102	46	5	5.9	46	5	5.0
103	64	6	9.0	66	5	8.1
200	65	1	1.6	66	1	1.6
300	83	9	38.4	84	9	39.8
301	67	7	28.3	68	7	28.8
302	82	12	17.7	83	12	17.8
303	53	7	10.8	53	7	10.8
400	18	0	3.2	18	0	3.1
500	44	4	22.3	47	4	23.7
501	81	10	34.1	88	12	43.7
502	83	10	17.9	81	10	16.3
503	18	2	7.8	18	1	7.3

Notes:

1. Refer Figure D3, Appendix D for traffic flows.
2. Refer Figure D12, Appendix D for traffic flows.
3. Refer Drg No 1232/10 for existing geometry.
4. Q=Queue (pcu).

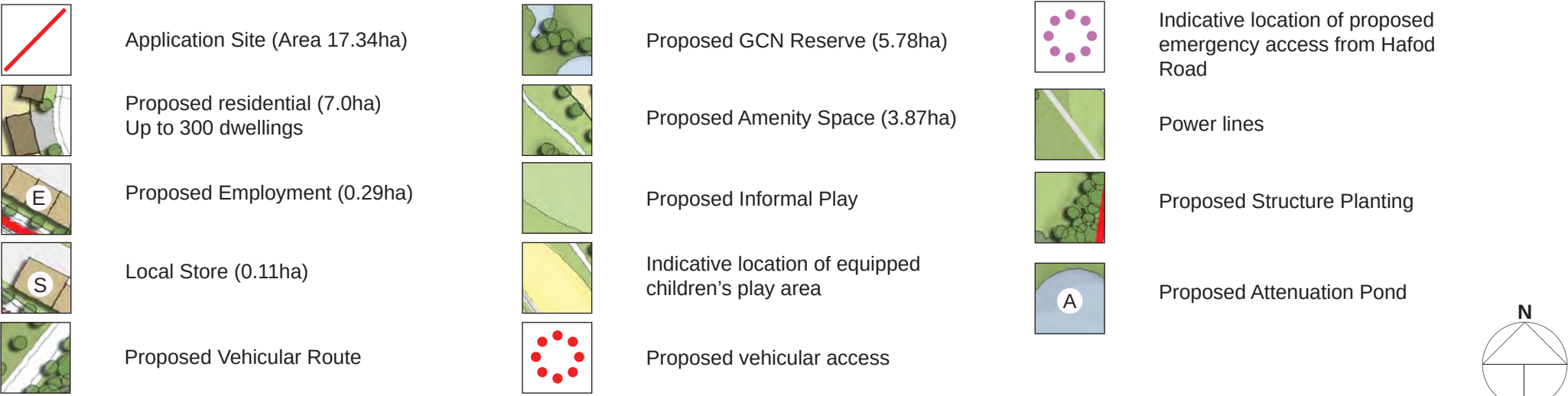
TABLE 13

TRANSYT ANALYSIS RESULTS: SJ11
PM PEAK HOUR
2023 BASE & WITH DEVELOPMENT



illustrative masterplan



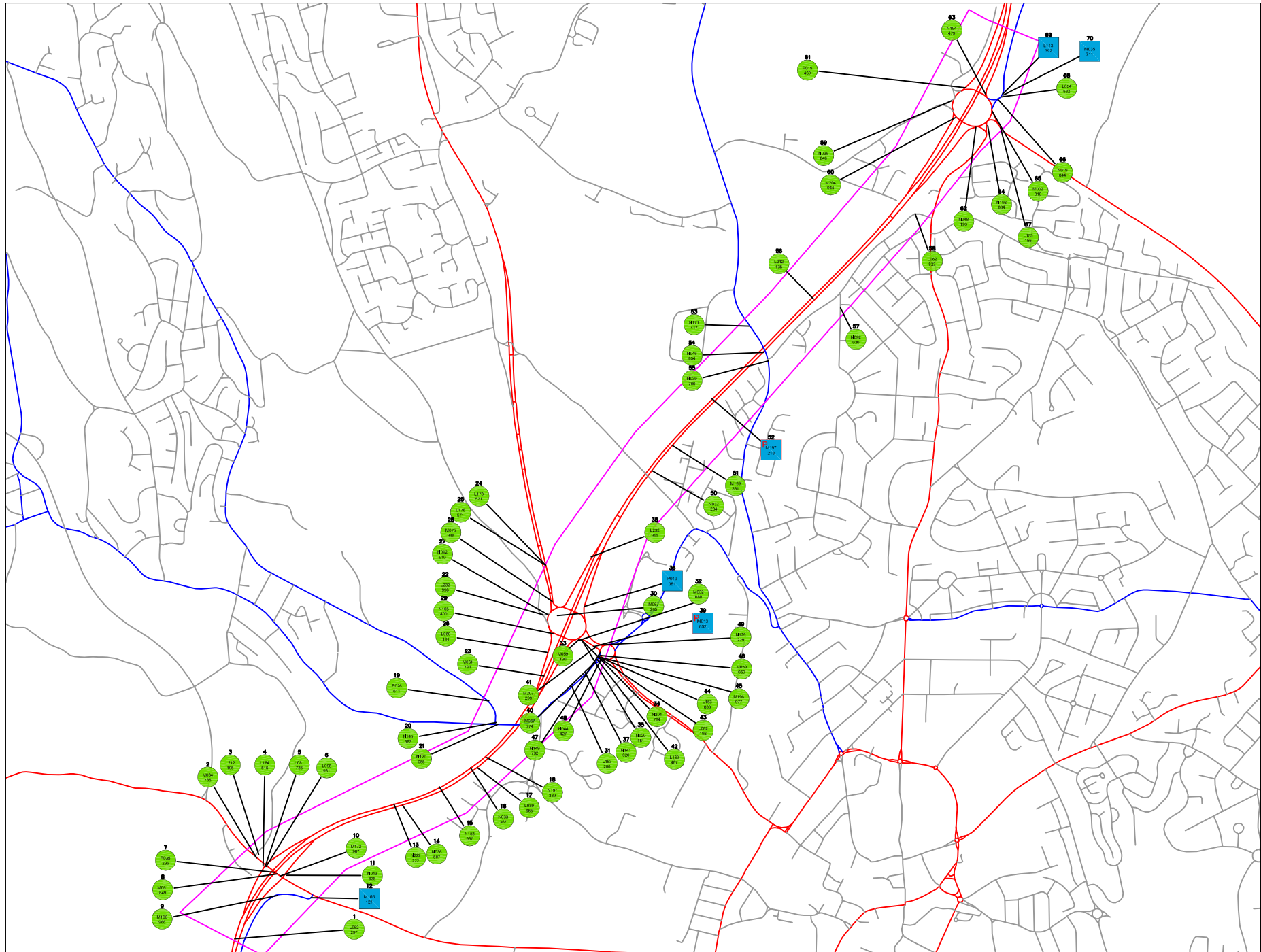


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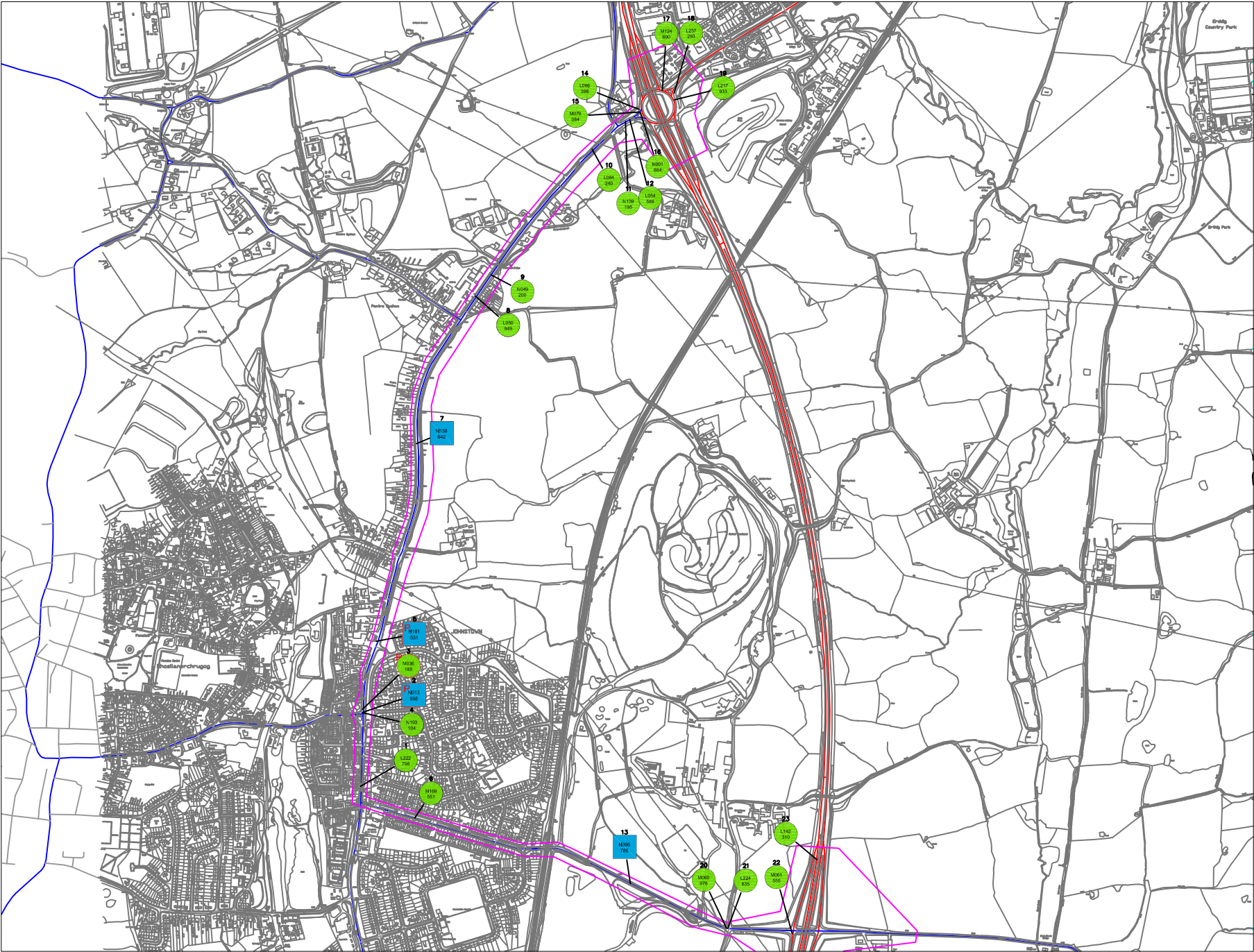
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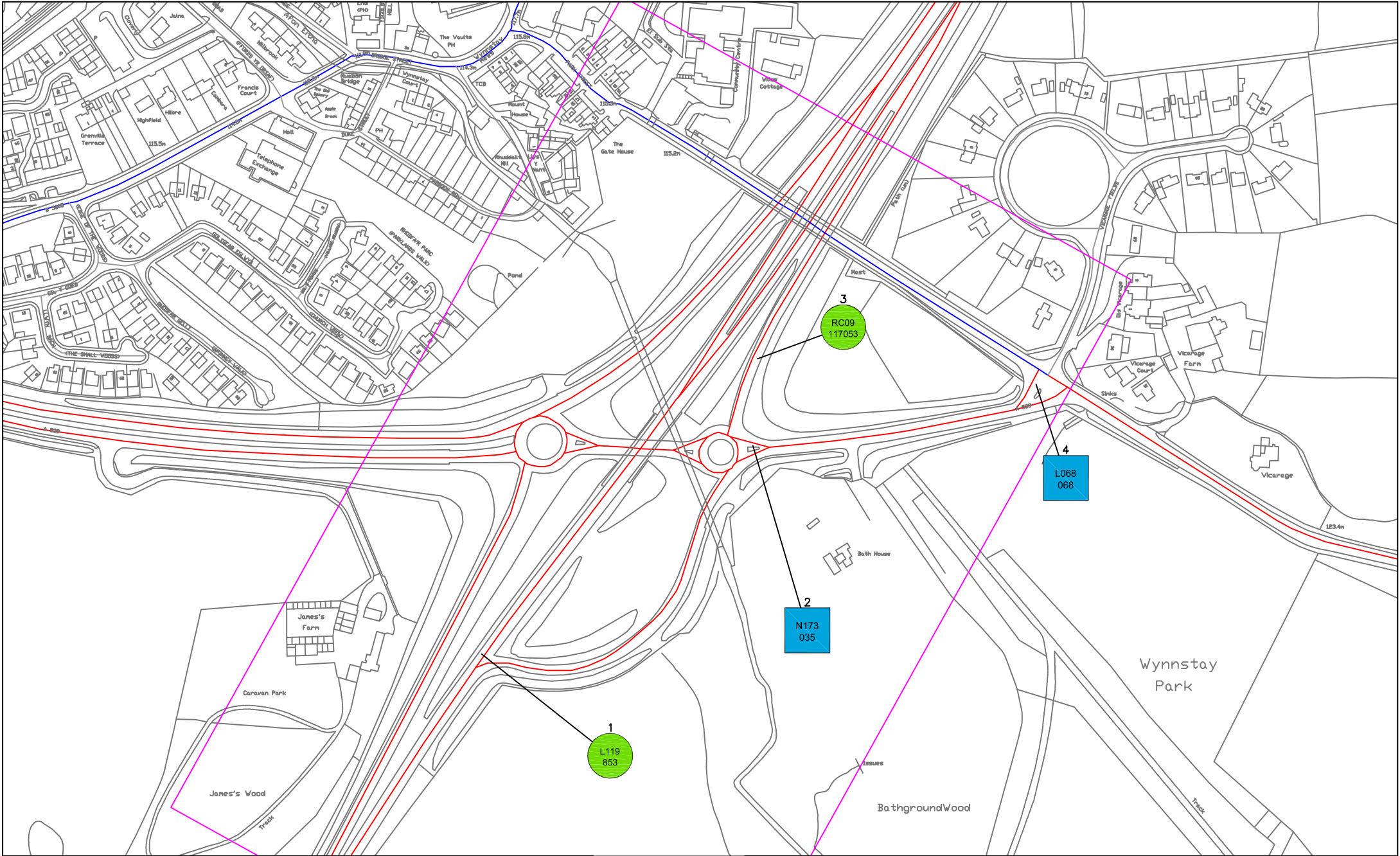
accidents

Site 1 : Accident Summary 15.03.10 – 14.03.13



Accident Summary 15.03.10- 14.03.13
Site 2





DRAWING NUMBER:	 WREXHAM COUNTY BOROUGH COUNCIL ABBAY ROAD DEPOT, ABBAY ROAD SOUTH WREXHAM INDUSTRIAL ESTATE LL13 9PW. JOHN BRADBURY HAD OF ENVIRONMENT		JOB NUMBER:	SCALES:	AMENDMENTS:	DATE:	SCHEME TITLE: Accident Summary : 15.03.10 - 14.03.13 Site 3	
			DACDV GROUP:	Not to Scale				DRAWING TITLE:
			DRAWN BY:	NATIONAL GRID REF:				
			CHECKED BY:	STATUS:	Accident Summary			

C

speed survey

Johnstown ATC 1, Bangor Road

Channel 1 - Eastbound

	16/03/2012 Friday	17/03/2012 Saturday	18/03/2012 Sunday	19/03/2012 Monday	20/03/2012 Tuesday	21/03/2012 Wednesday	22/03/2012 Thursday	5-DAY MEAN	7-DAY MEAN
0000-2400 Vehicle Flow	1815	1231	1220	1859	2363	2665	2239	2188	1913
Mean Speed	41.9	42.4	42.5	42.3	42.1	41.5	41.8	41.9	42.1
85%ile Speed	48.6	48.9	48.6	48.2	48.1	48.3	48.1	48.3	48.4
No. Vehicles > 60 MPH Limit	14	9	6	14	16	15	16	15	13
% Vehicles > 60 MPH Limit	0.8	0.7	0.5	0.8	0.7	0.6	0.7	0.7	0.7
No. Vehicles > 75 MPH	2	0	1	2	2	2	2	2	2
% Vehicles > 75 MPH	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Channel 2 - Westbound

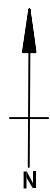
	16/03/2012 Friday	17/03/2012 Saturday	18/03/2012 Sunday	19/03/2012 Monday	20/03/2012 Tuesday	21/03/2012 Wednesday	22/03/2012 Thursday	5-DAY MEAN	7-DAY MEAN
0000-2400 Vehicle Flow	1786	1332	1317	1928	2424	2608	1992	2148	1912
Mean Speed	41.5	42.2	42.3	41.5	41.1	40.8	41.7	41.3	41.6
85%ile Speed	48.9	48.2	48.9	48.8	48.4	48.3	48.6	48.6	48.6
No. Vehicles > 60 MPH Limit	17	9	13	10	14	20	12	15	14
% Vehicles > 60 MPH Limit	1.0	0.7	1.0	0.5	0.6	0.8	0.6	0.7	0.7
No. Vehicles > 75 MPH	0	0	1	1	0	0	0	0	0
% Vehicles > 75 MPH	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0

Channels 1+2 - Eastbound & Westbound

	16/03/2012 Friday	17/03/2012 Saturday	18/03/2012 Sunday	19/03/2012 Monday	20/03/2012 Tuesday	21/03/2012 Wednesday	22/03/2012 Thursday	5-DAY MEAN	7-DAY MEAN
0000-2400 Vehicle Flow	3601	2563	2537	3787	4787	5273	4231	4336	3826
Mean Speed	41.7	42.3	42.4	41.9	41.6	41.2	41.8	41.6	41.8
85%ile Speed	48.8	48.6	48.8	48.5	48.3	48.3	48.3	48.4	48.5
No. Vehicles > 60 MPH Limit	31	18	19	24	30	35	28	30	26
% Vehicles > 60 MPH Limit	0.9	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7
No. Vehicles > 75 MPH	2	0	2	3	2	2	2	2	2
% Vehicles > 75 MPH	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0

D

traffic flows



KEY:

3

 Study Junction

Notes:
1. AHA Surveys, SJ2: March 2012,
SJ3-12: 14th May 2013.

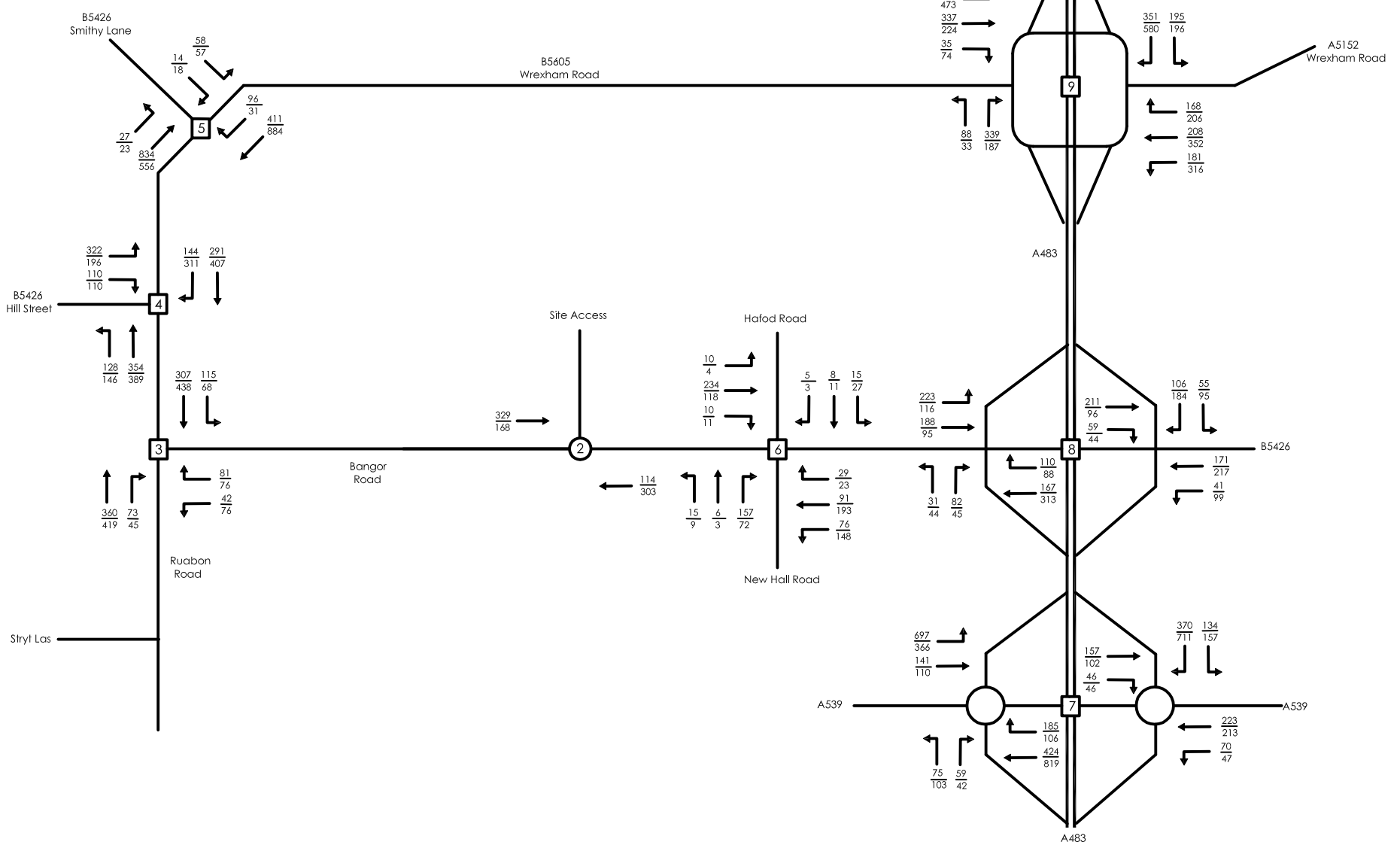
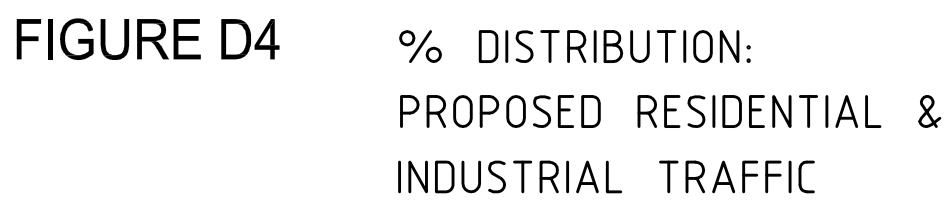


FIGURE D1 TRAFFIC COUNT: 2013

Key:
AM = 0800-0900 pcu
PM = 1630-1730

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a s s o c i a t e s
76 washway road, sale, manchester, m33 7re
email: aha@ashleyhelme.co.uk tel: 0161 972 0552 fax: 0161 972 0553







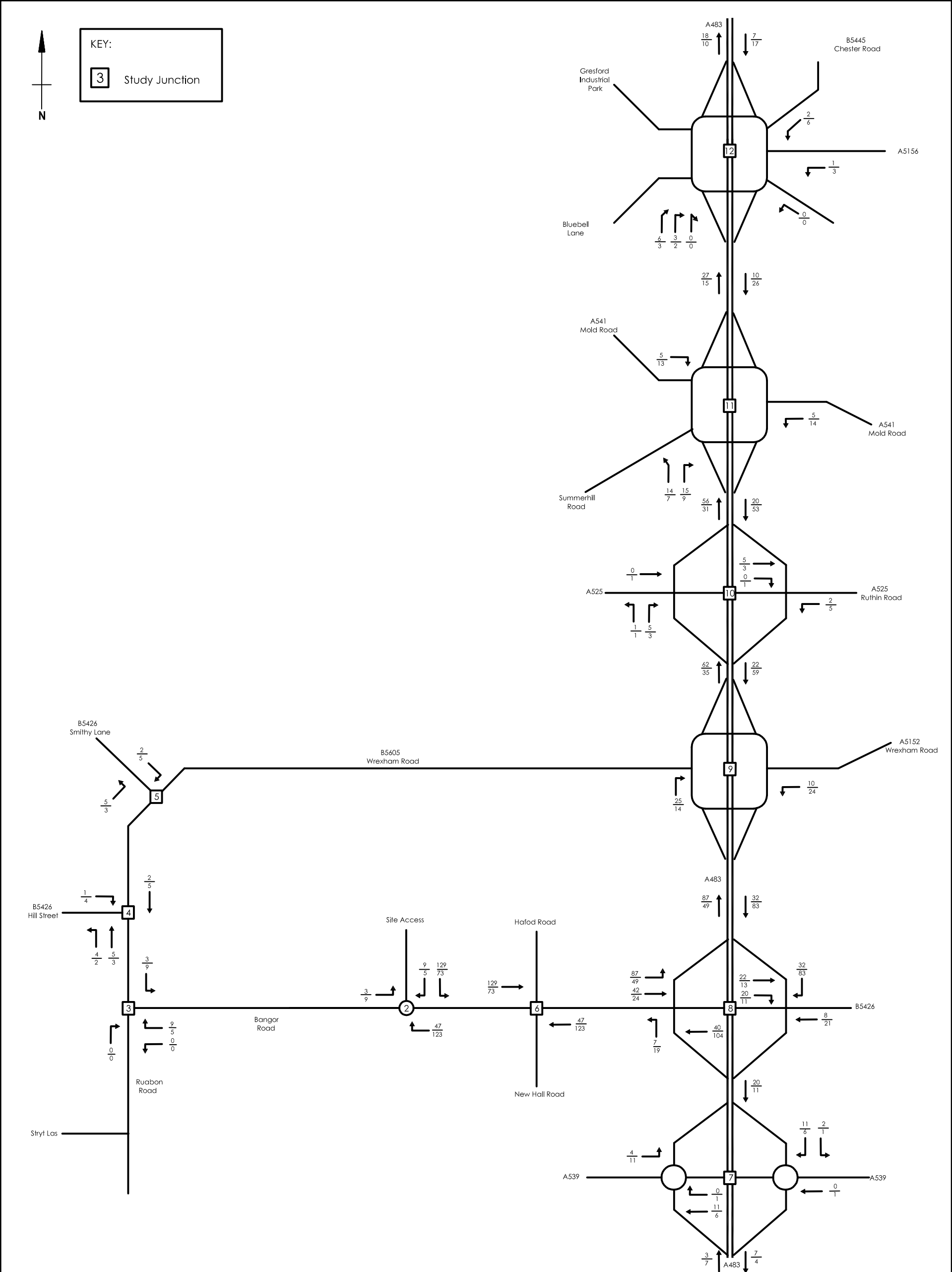


FIGURE D7

GENERATED TRAFFIC:
RESIDENTIAL & INDUSTRIAL

Key:
AM = 0800-0900 pcu
PM = 1630-1730

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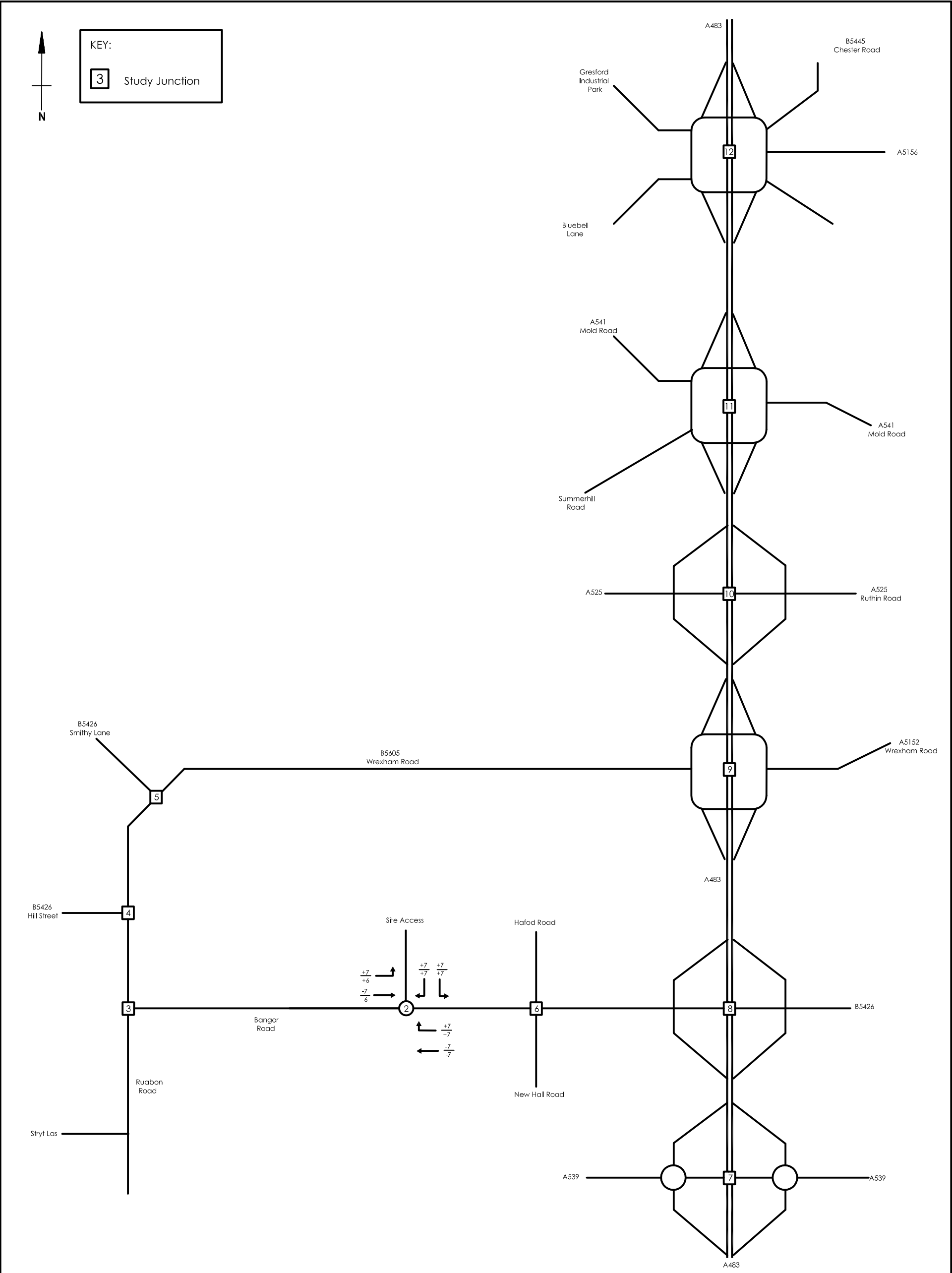


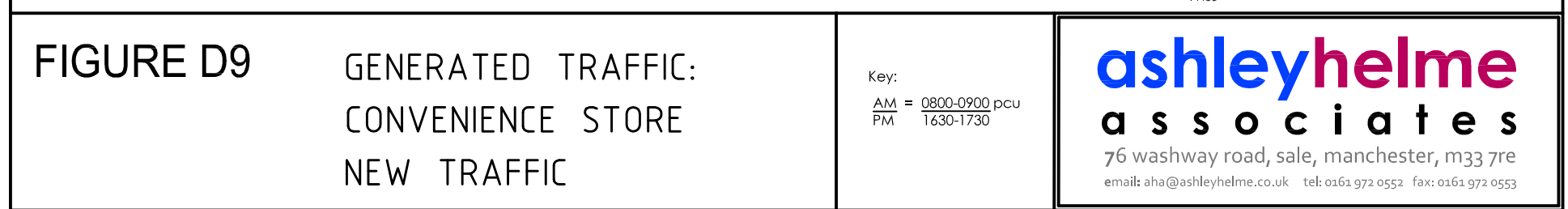
FIGURE D8
GENERATED TRAFFIC:
CONVENIENCE STORE
PASS-BY

Key:
AM = 0800-0900 pcu
PM = 1630-1730

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associates

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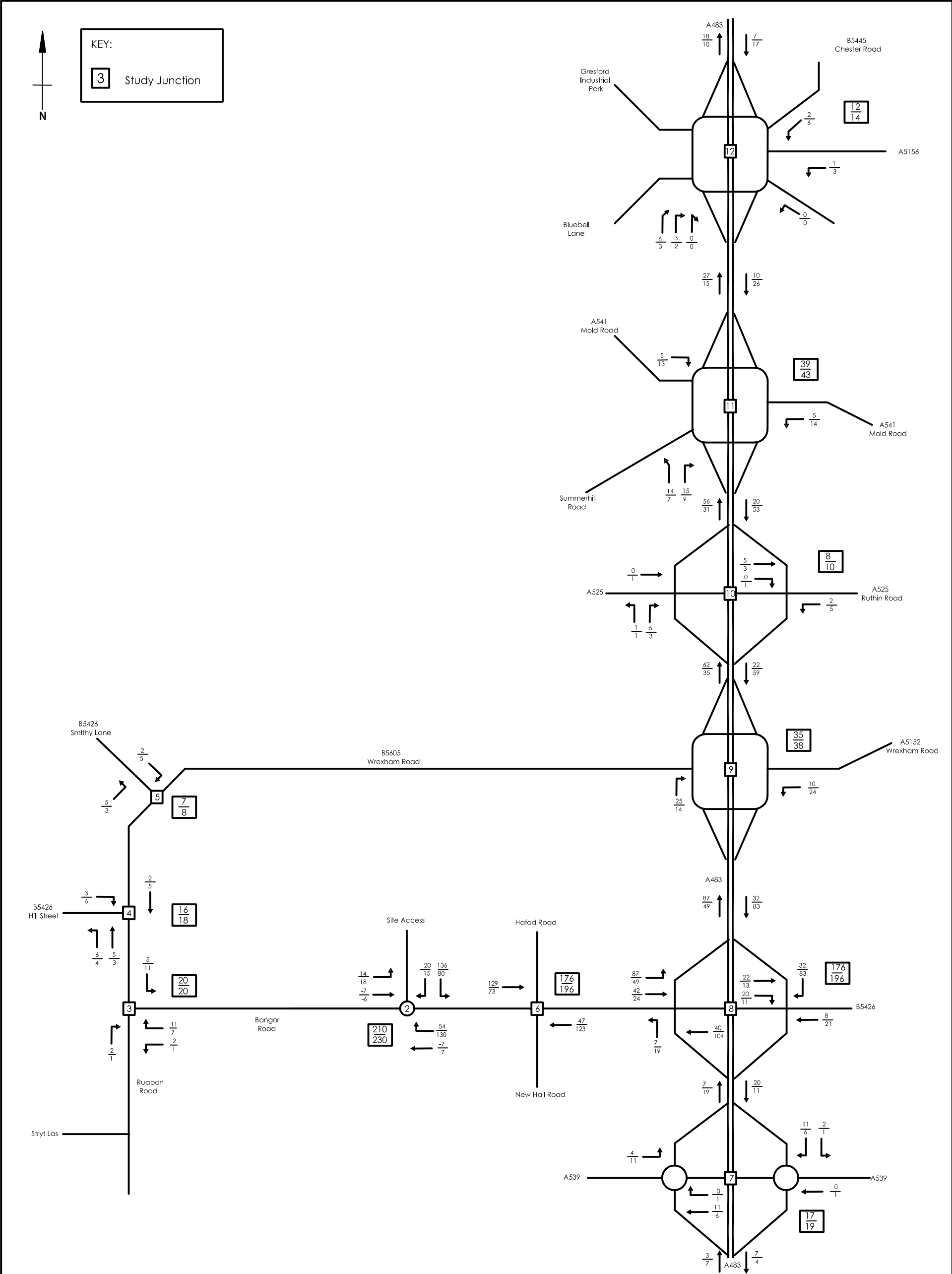


FIGURE D10

GENERATED TRAFFIC:
TOTAL TRAFFIC
=D7+D8+D9

Key:
AM = 0800-0900 pcu
PM 1630-1730

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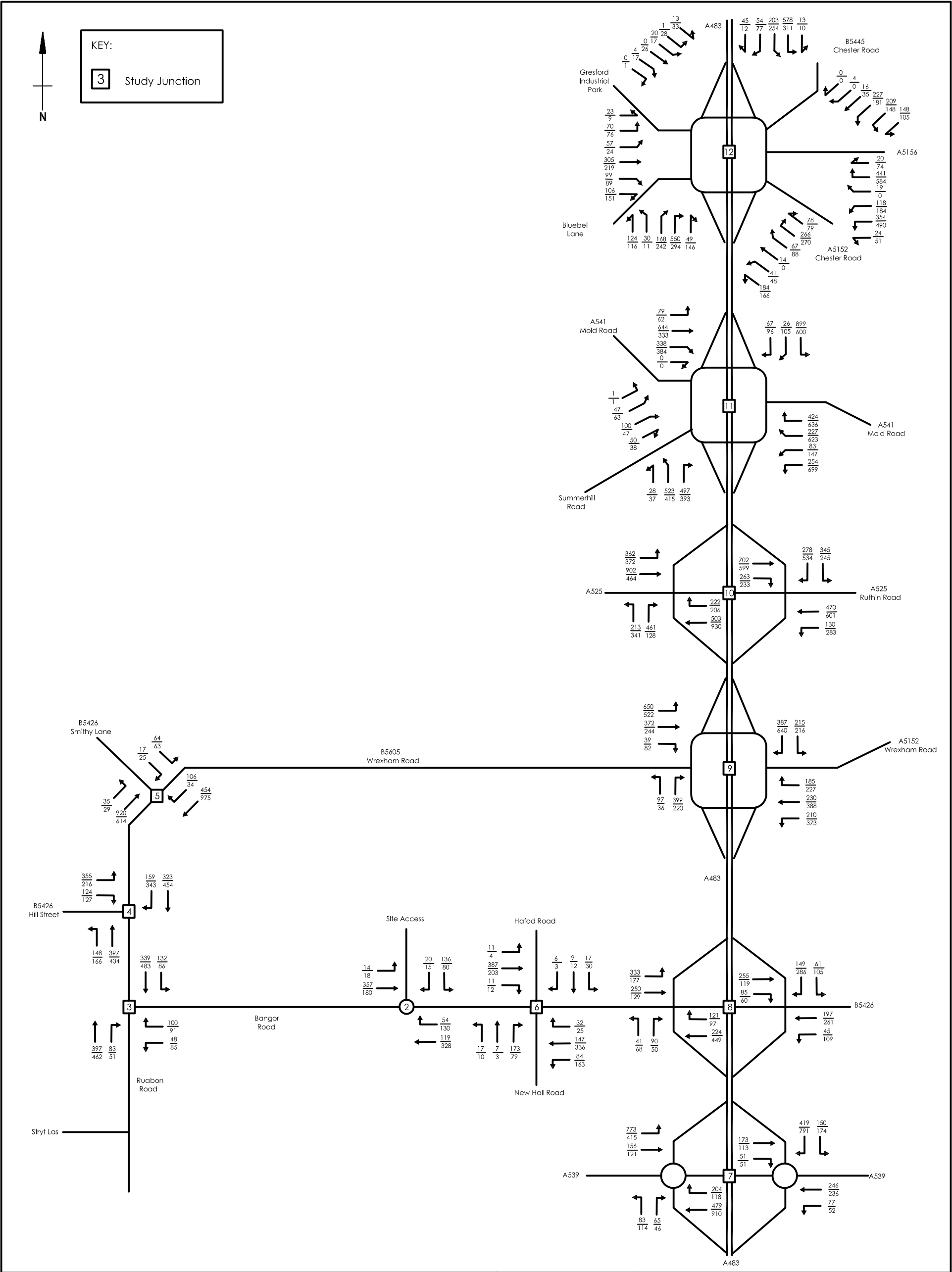
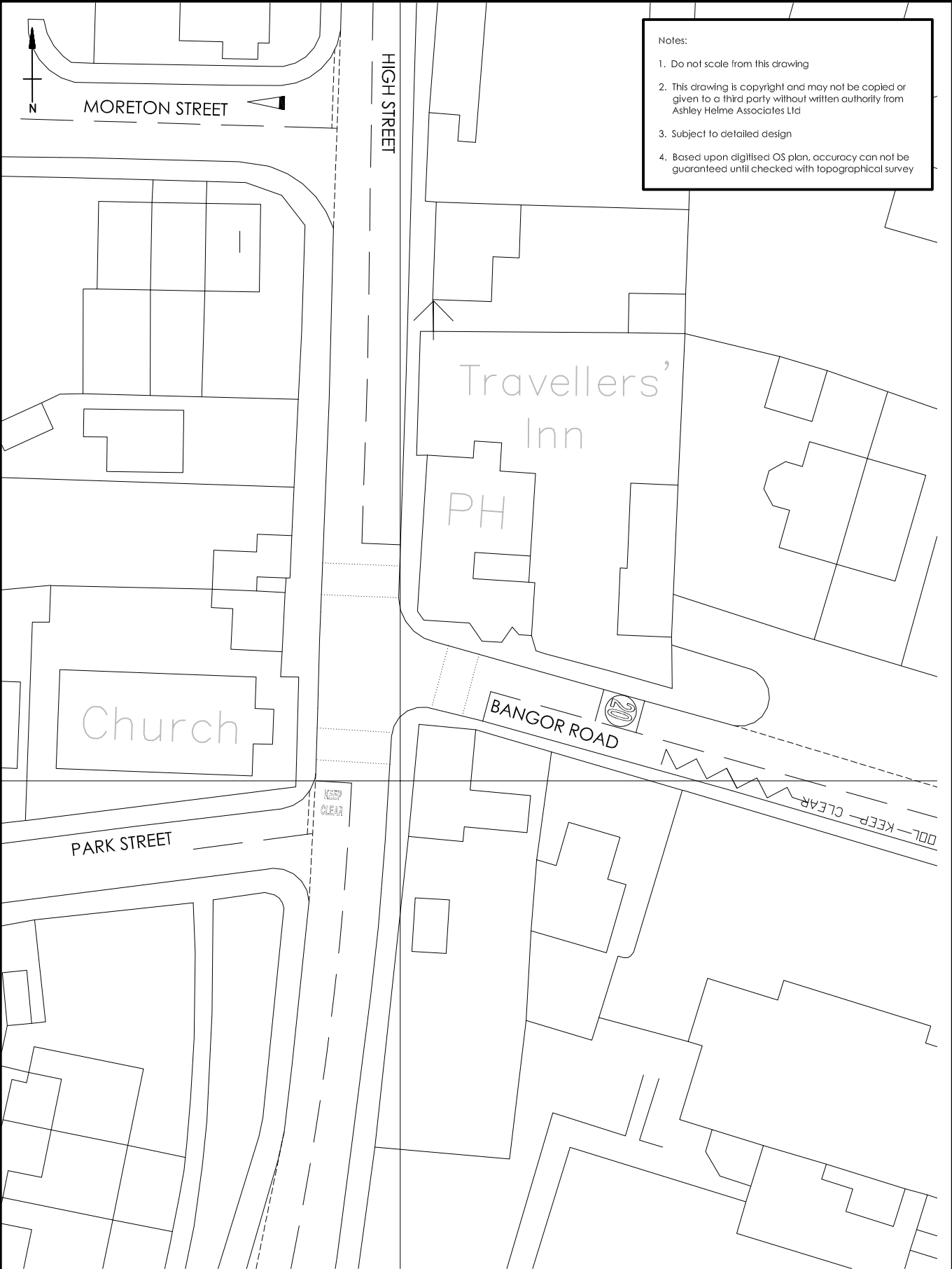


FIGURE D12 WITH DEVELOPMENT: 2023

Key:
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PM 1630-1730

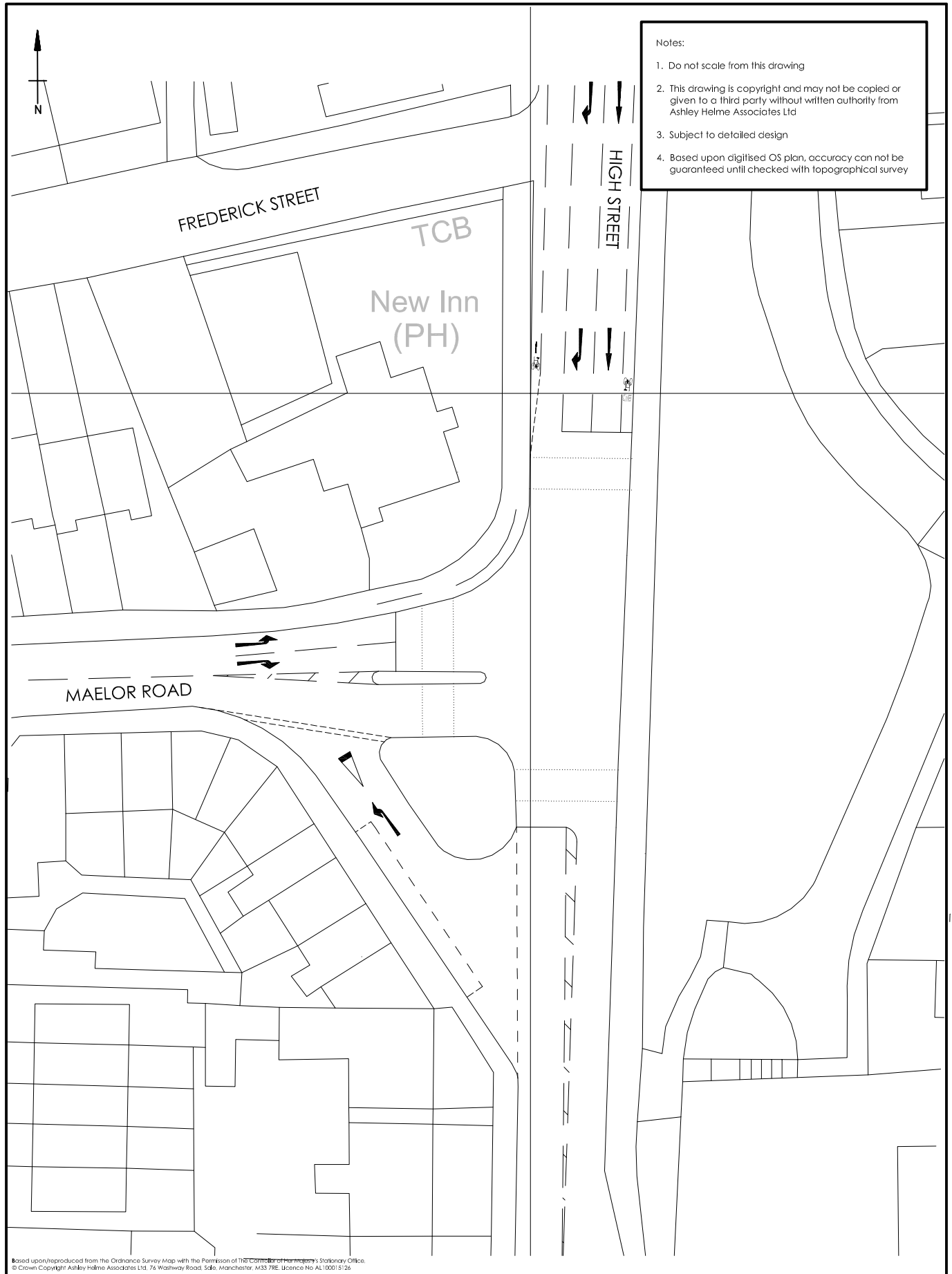
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associates
76 washway road, sale, manchester, m33 7re
email: aha@ashleyhelme.co.uk tel: 0161 972 0552 fax: 0161 972 0553

drawings



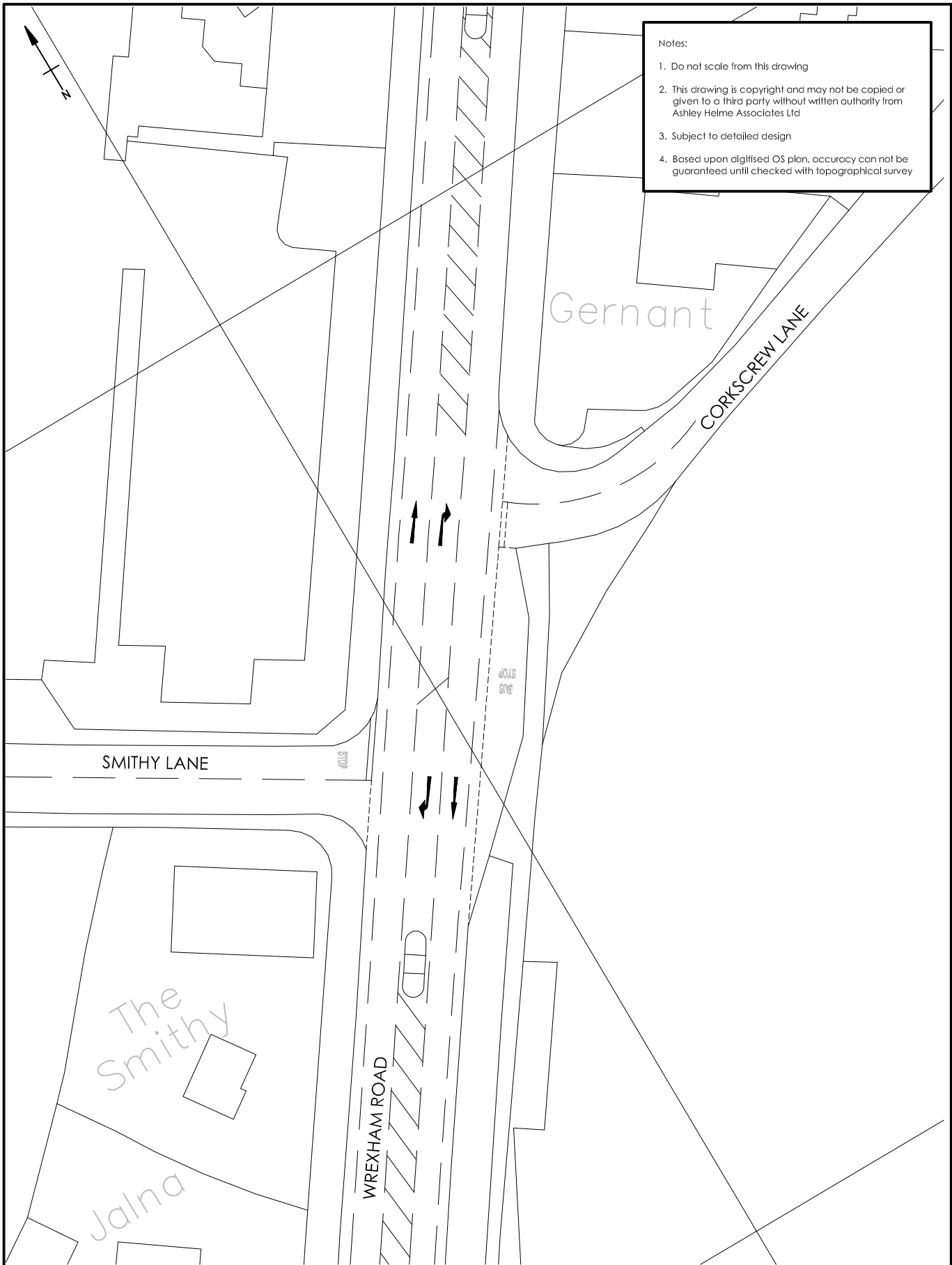
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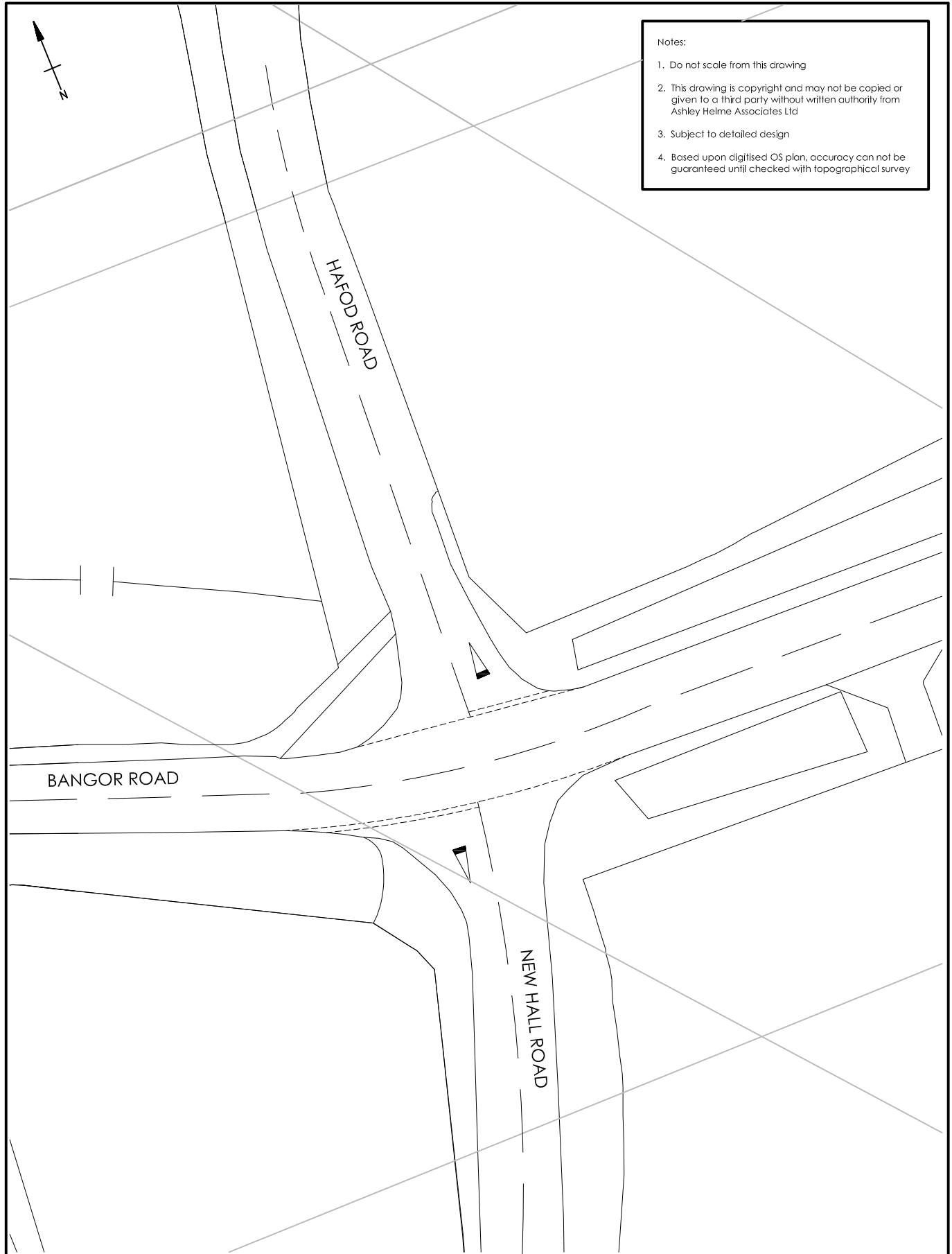
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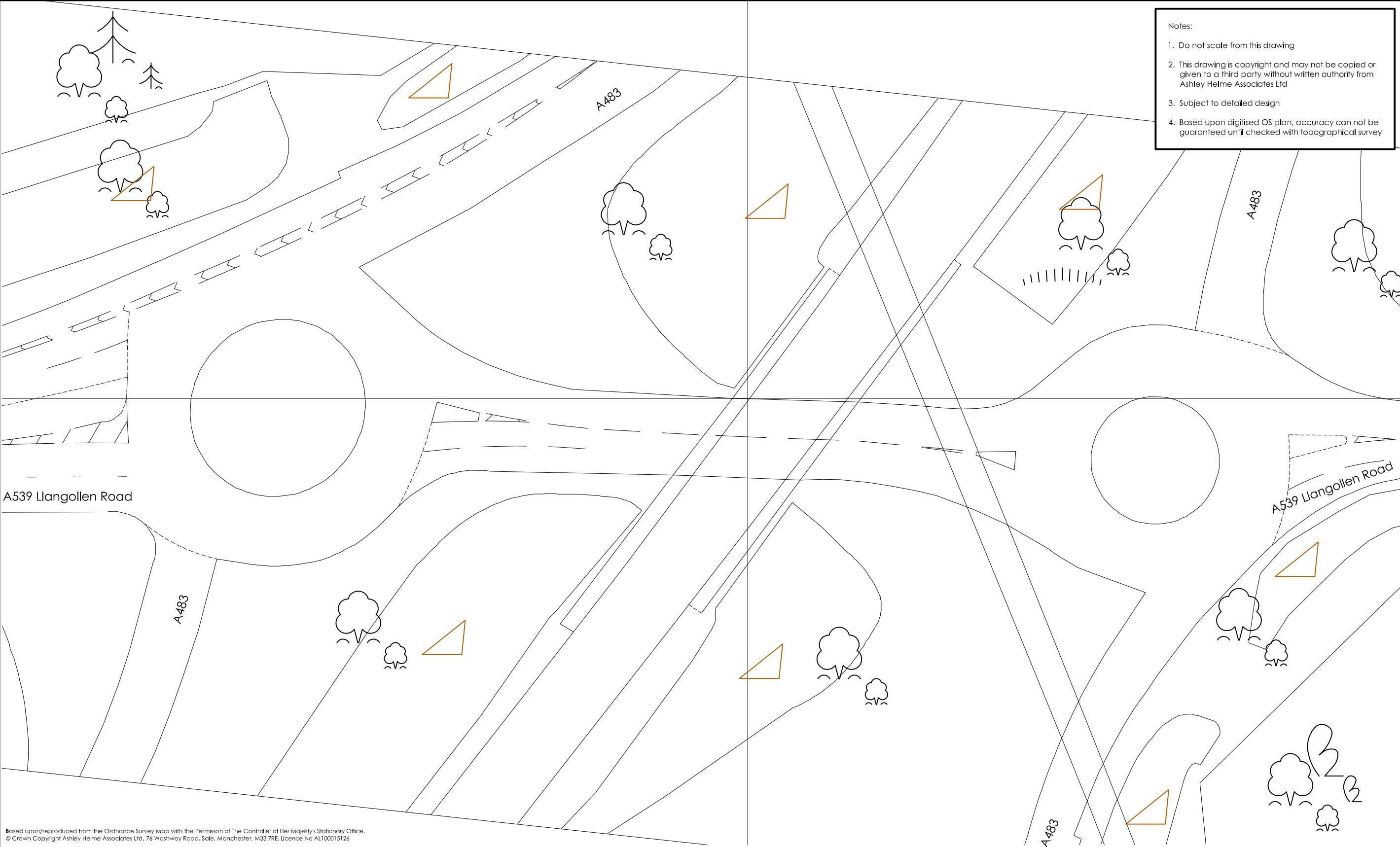
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	Title	EXISTING JUNCTION ARRANGEMENTS: STUDY JUNCTION 5			Date	MAY 2013	Scale	1:500@A4



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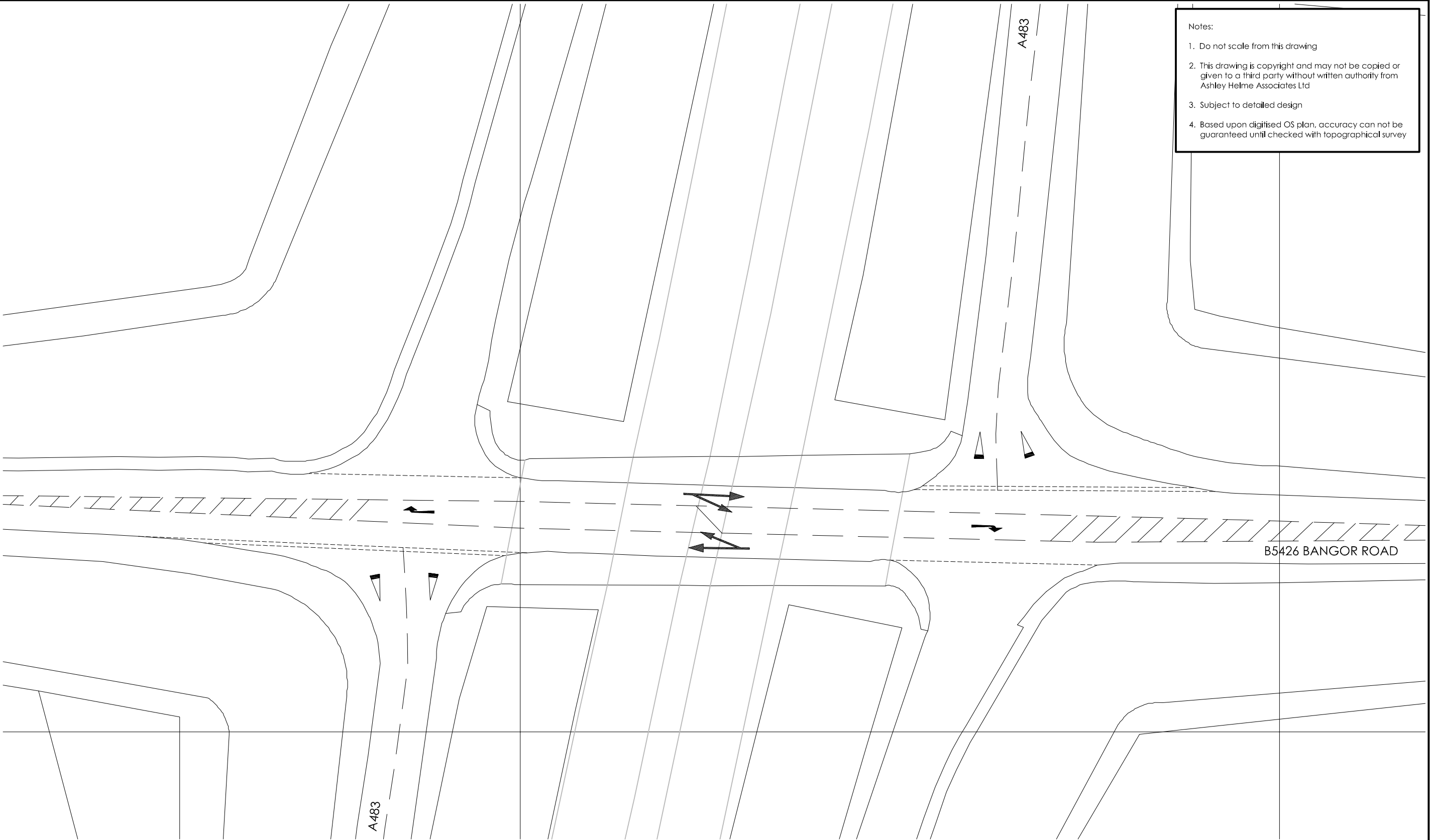
ashleyhelme associates 76 washway road, sale, manchester, m33 7re e: aha@ashleyhelme.co.uk t: 0161 972 0552 f: 0161 972 0553	Project	JOHNSTOWN, WREXHAM	Client	GLADMAN DEVELOPMENTS	Drawing No	1232/05	Rev	
	Title	EXISTING JUNCTION ARRANGEMENTS: STUDY JUNCTION 6			Date	MAY 2013	Scale	1:500@A4



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Client	GLADMAN DEVELOPMENTS			Date	MAY 2013	Scale	

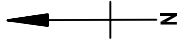


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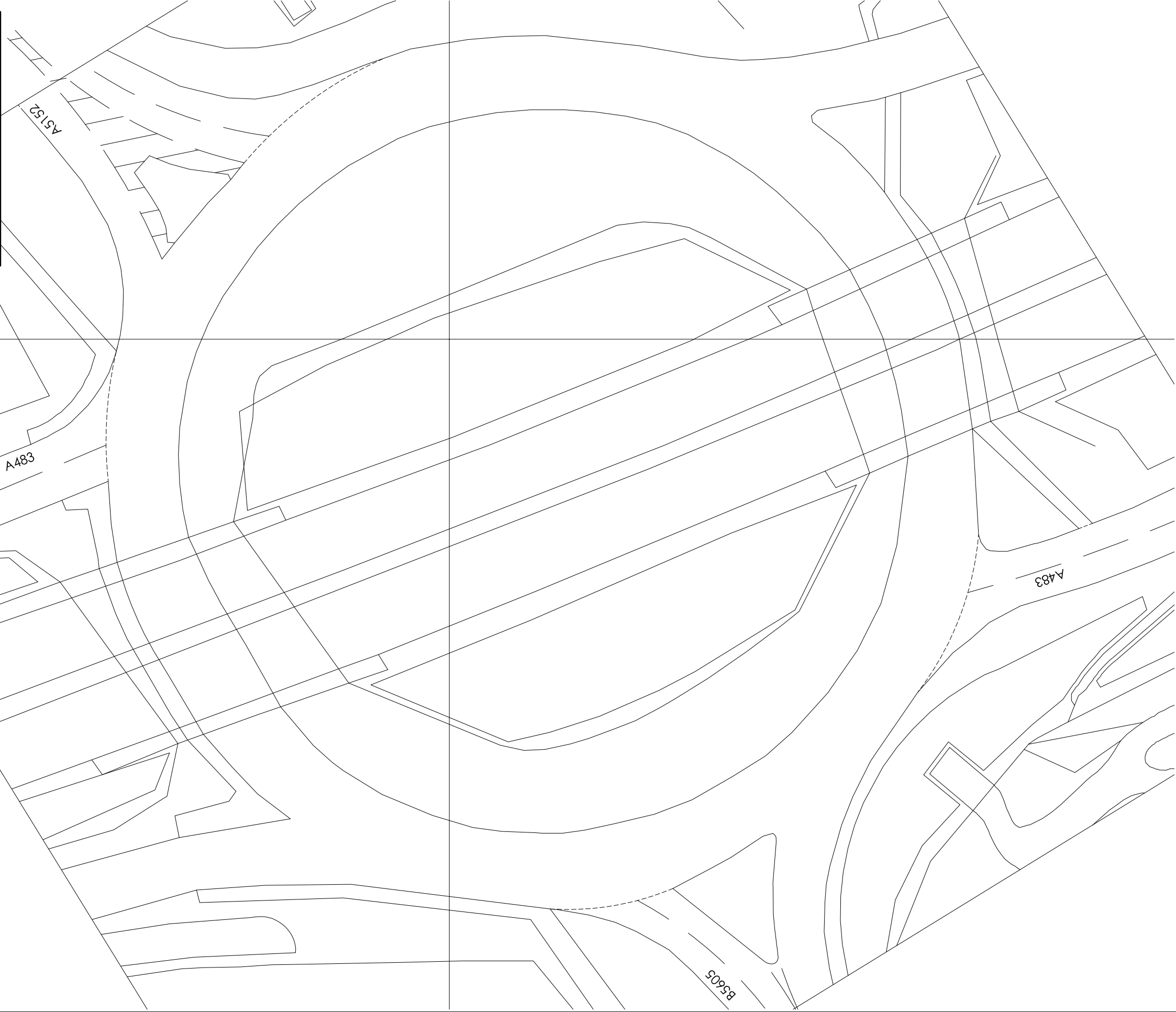
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Client	GLADMAN DEVELOPMENTS			Date	MAY 2013	Scale	1:500@A3



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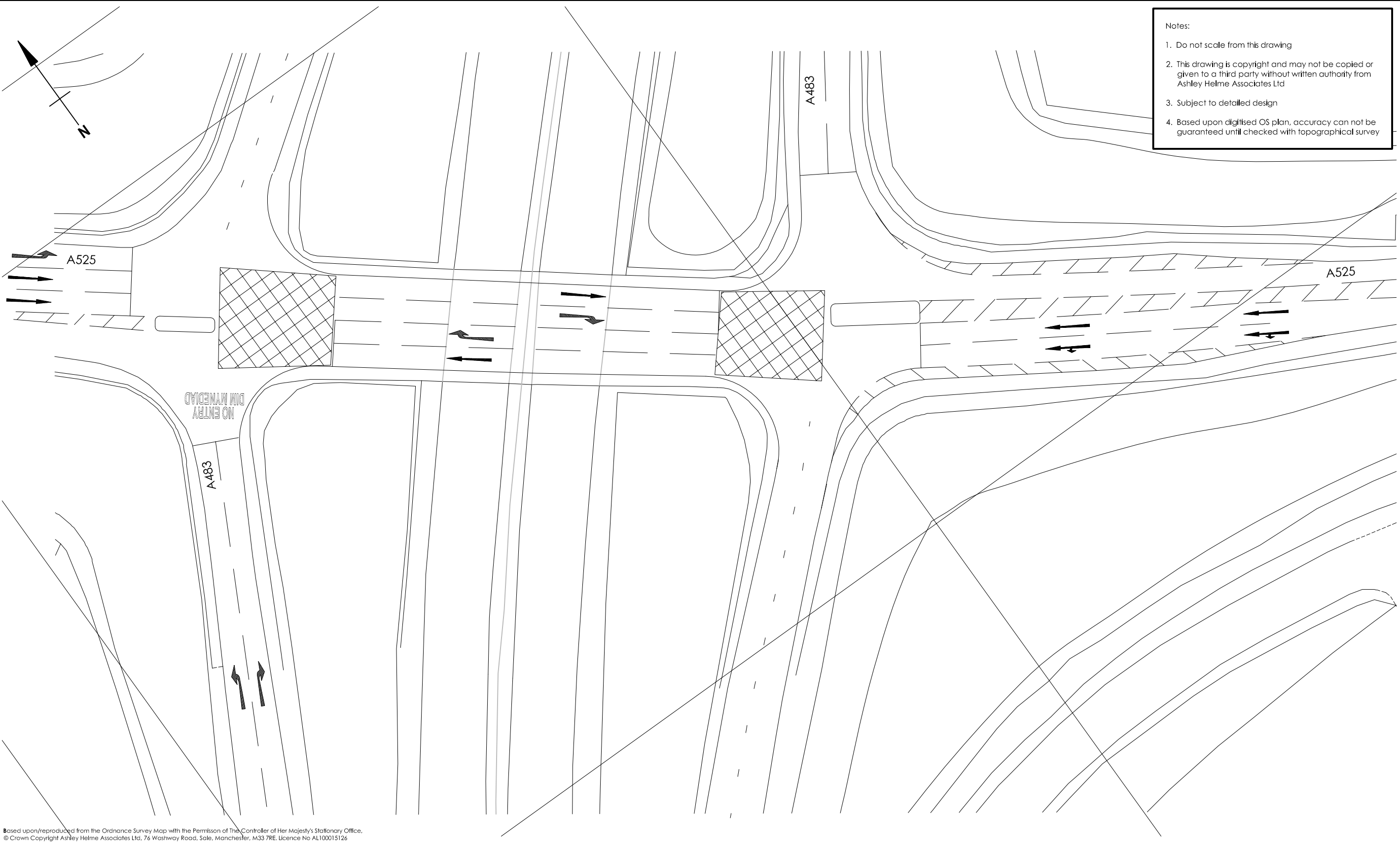
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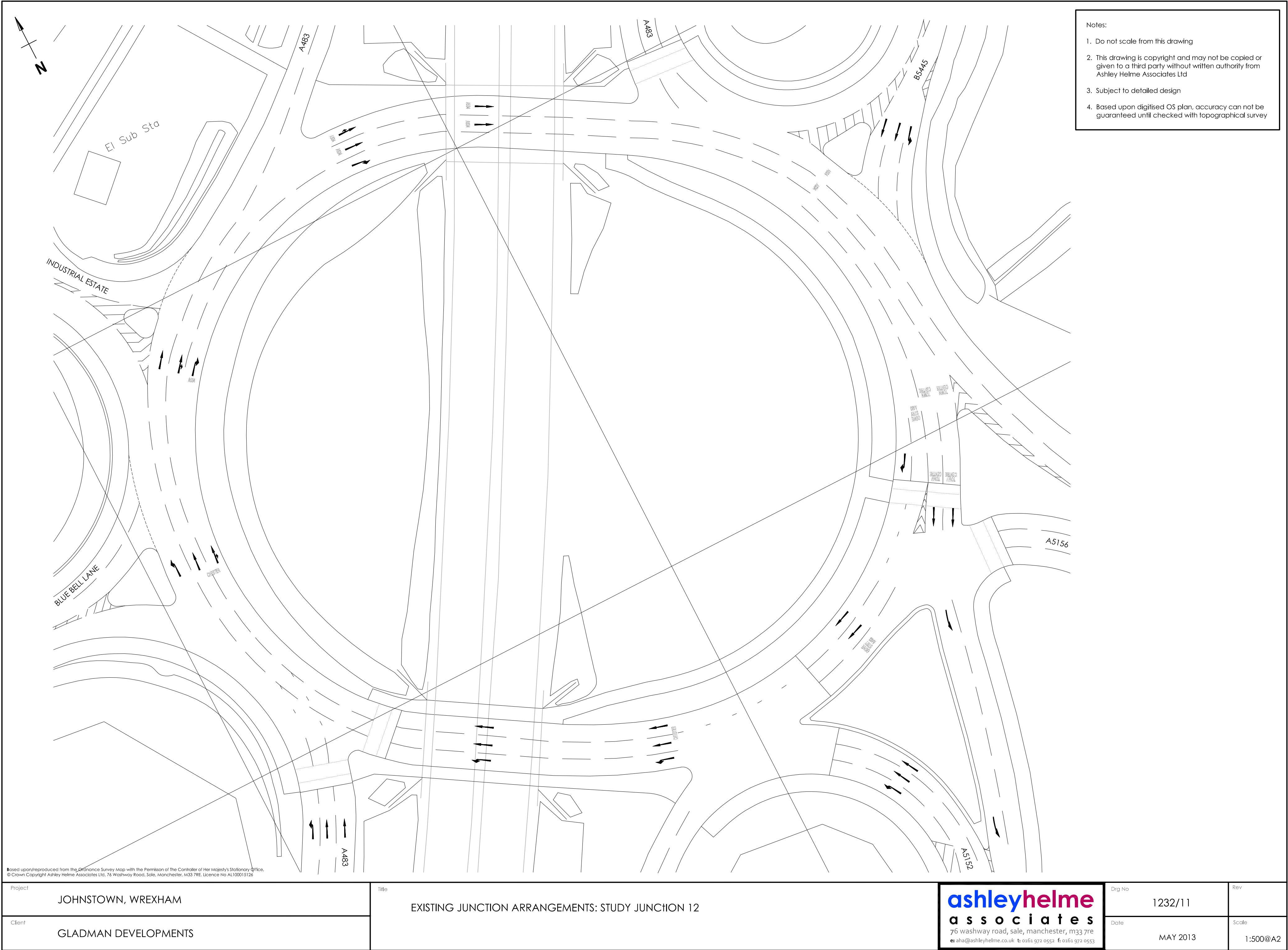
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Client	GLADMAN DEVELOPMENTS			Date	MAY 2013	Scale	1:500@A3

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Project	JOHNSTOWN, WREXHAM
Client	GLADMAN DEVELOPMENTS

Title	EXISTING JUNCTION ARRANGEMENTS: STUDY JUNCTION 12
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Key:

— 160m forward visibility

Rev	Description	Date
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Project		
JOHNSTOWN, WREXHAM		
Title		
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Date		Scale
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Drawing No		Revision
1232/13		

