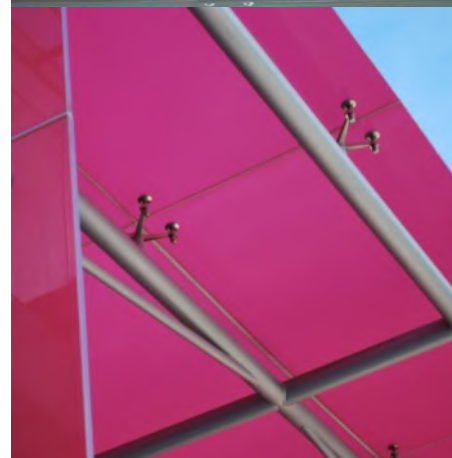
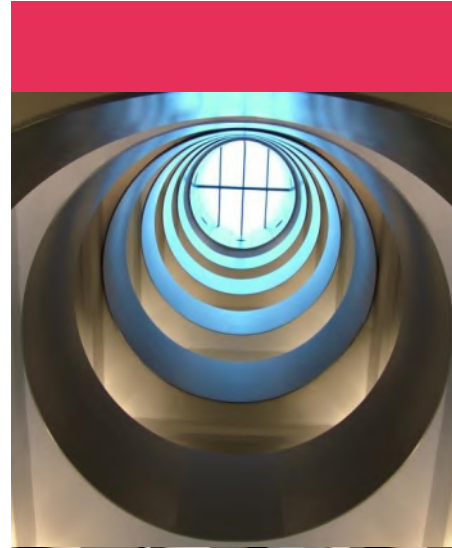


Home Farm Residential Development, Llay Transport Assessment

Curtins Ref: TPMA5021/TA
Revision: Final
Issue Date: 02 December 2014

Client Name: Michael Cunningham Architects



Merchant Exchange
17 – 19 Whitworth Street West
Manchester. M1 5WG.
Tel: 0161 236 2394
www.curtins.com

STRUCTURES • CIVILS • ENVIRONMENTAL • INFRASTRUCTURE • TRANSPORT PLANNING • SUSTAINABILITY • EXPERT ADVISORY SERVICES
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham



Control Sheet

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins with respect to the information contained in the report will not extend to any third party.

Author	Signature	Date
Danny Jones MPlan AMCIHT Graduate Engineer		02 December 2014

Reviewed	Signature	Date
Keith York FIHE MIHT Associate		02 December 2014

Authorised	Signature	Date
Keith York FIHE MIHT Associate		02 December 2014

Table of Contents

1.0	Introduction.....	1
1.1	Introduction.....	1
1.2	Purpose of this Report	1
1.3	Scope of the Report	1
1.4	Structure of the Report.....	2
2.0	Site Location and Highway Layout	3
2.1	Site Location.....	3
2.2	Existing Use	3
2.3	Existing Site Access	3
2.4	Surrounding Highway Network.....	3
2.5	Highway Safety	5
3.0	Development Proposals.....	7
3.1	Introduction.....	7
3.2	Vehicular Access.....	7
3.3	Servicing.....	8
3.4	Car Parking	8
3.5	Internal Layout.....	8
4.0	Accessibility by Sustainable Modes of Travel.....	10
4.1	Introduction.....	10
4.2	Pedestrian Accessibility	10
4.3	Cycle Accessibility.....	11
4.4	Public Transport Accessibility	12
4.5	Accessibility Summary	13
5.0	Traffic Forecasting	15
5.1	Introduction.....	15
5.2	Scope of Assessment	15
5.3	Baseline Data Acquisition	15
5.4	Assessment Years and Traffic Growth.....	16
5.5	Committed Development.....	16
5.6	Residential Traffic Generation.....	17
5.7	Oakfield Park Home Estate/Meadow Rise Base Flows	17
5.8	Traffic Distribution	18
5.9	Additional Assessment Scenarios.....	18
6.0	Highway Impact	19
6.1	Introduction.....	19
6.2	Methodology	19
6.3	Interpretation of Model Results	19
6.4	Future Year Scenarios	19
6.5	Site Access Modelling Results	20
6.6	Local Road Network Results.....	22
6.7	Summary.....	30

7.0	Transport Planning Policy	31
7.1	Introduction.....	31
7.2	Planning Policy Wales.....	31
7.3	Wrexham Unitary Development Plan	32
7.4	Local Planning Guidance Notes.....	33
7.5	Transport Planning Policy Summary.....	34
8.0	Transport Implementation Strategy	35
8.1	Introduction.....	35
8.2	Policy Requirements and Objectives	35
8.3	Measures.....	35
8.4	Targets and Monitoring	36
9.0	Summary and Conclusions	37
9.1	Summary	37
9.2	Conclusions	38

Tables

Table 4.1	– CIHT Recommended Walking Distances.....	10
Table 4.2	– Bus Services Local to the site	13
Table 5.1	– Traffic Growth Factors.....	16
Table 5.2	– Development Trip Rates and Trip Generation (365 units)	17
Table 5.3	– Oakfield Park Home Estate/Meadow Rise Base Flows Trip Rates and Trip Generation (365 units).....	17
Table 6.1	– Site Access 1: ‘2019 Base + Proposed and Committed Development’ Scenarios	20
Table 6.2	– Site Access 1: ‘2024 Base + Proposed and Committed Development’ Scenarios	20
Table 6.3	– Site Access 2: ‘2019 Base + Proposed and Committed Development’ Scenarios	21
Table 6.4	– Site Access 2: ‘2024 Base + Proposed and Committed Development’ Scenarios	21
Table 6.5	– Site Access 3: ‘2019 Base + Proposed and Committed Development’ Scenarios	21
Table 6.6	– Site Access 3: ‘2024 Base + Proposed and Committed Development’ Scenarios	21
Table 6.7	– Junction 1: ‘2014 Observed Flows’ Scenarios	22
Table 6.8	– Junction 1: ‘2019 Base Flows’ and ‘2019 Base + Full Development’ Scenarios	22
Table 6.9	– Junction 1: ‘2024 Base Flows’ and ‘2024 Base + Full Development’ Scenarios	23
Table 6.10	– Junction 1: ‘2019 Base Flows’ and ‘2019 Base + Full Development + Junction Improvements’ Scenarios	24
Table 6.11	– Junction 1: ‘2024 Base Flows’ and ‘2024 Base + Full Development’ Scenarios	24
Table 6.12	– Junction 2: ‘2014 Observed Flows’ Scenarios	25
Table 6.13	– Junction 2: ‘2019 Base Flows’ and ‘2019 Base + Full Development’ Scenarios	25
Table 6.14	– Junction 2: ‘2024 Base Flows’ and ‘2024 Base + Full Development’ Scenarios	26
Table 6.15	– Junction 3: ‘2014 Observed Flows’ Scenarios	26
Table 6.16	– Junction 3: ‘2019 Base Flows’ and ‘2019 Base + Full Development’ Scenarios	27
Table 6.17	– Junction 3: ‘2024 Base Flows’ and ‘2024 Base + Full Development’ Scenarios	27
Table 6.18	– Junction 4: ‘2019 + Committed Development’ and ‘2019 Base + Full Development’ Scenarios	28
Table 6.19	– Junction 4: ‘2024 + Committed Development’ and ‘2024 Base + Full Development’ Scenarios	28
Table 6.20	– Junction 5: ‘2014 Observed Flows’ Scenarios	29
Table 6.21	– Junction 5: ‘2019 Base Flows’ and ‘2019 Base + Full Development’ Scenarios	29
Table 6.22	– Junction 5: ‘2024 Base Flows’ and ‘2024 Base + Full Development’ Scenarios	30
Table 7.1	– Wrexham Parking Standards: C3 - Dwellings.....	34

Plans

Plan TPMA5021_001 – Regional Site Location Plan
Plan TPMA5021_002 – Local Site Location Plan
Plan TPMA5021_003 – Pedestrian Catchment Plan
Plan TPMA5021_004 – Cycle Catchment Plan
Plan TPMA5021_005 – TRACC Public Transport Accessibility Plan

Drawings

Drawing TPMA5021_002 – Proposed Site Access 2
Drawing TPMA5021_003 – Proposed Site Access 3
Drawing TPMA5021_004 – Proposed Site Access Overview
Drawing TPMA5021_005 – Proposed Site Access 1
Drawing TPMA5021_006 – Proposed Site Access 1: 16m Articulated Vehicle Swept Path Analysis
Drawing TPMA5021_007 – Proposed Site Access 1: Single Deck Bus Swept Path Analysis
Drawing TPMA5021_008 – Proposed Site Access 1: Large Refuse Vehicle Swept Path Analysis
Drawing TPMA5021_009 – Proposed Site Access 1: Large Car Swept Path Analysis
Drawing TPMA5021_010 – Proposed Site Access 2: Large Refuse Vehicle Swept Path Analysis
Drawing TPMA5021_011 – Proposed Site Access 2: Large Car Swept Path Analysis
Drawing TPMA5021_012 – Proposed Site Access 2: Single Deck Bus Swept Path Analysis
Drawing TPMA5021_013 – Proposed Site Access 3: Large Refuse Vehicle Swept Path Analysis
Drawing TPMA5021_014 – Proposed Site Access 3: Large Car Swept Path Analysis
Drawing TPMA5021_015 – Proposed Site Access 3: Single Deck Bus Swept Path Analysis

Traffic Figures

Traffic Figure 1 – AM Observed Flows
Traffic Figure 2 – PM Observed Flows
Traffic Figure 3 – AM 2019 Base
Traffic Figure 4 – PM 2019 Base
Traffic Figure 5 – AM 2024 Base
Traffic Figure 6 – PM 2024 Base
Traffic Figure 7 – AM Committed Development
Traffic Figure 8 – PM Committed Development Traffic
Traffic Figure 9 – Residential Distribution Pattern
Traffic Figure 10 – AM Proposed Development Traffic
Traffic Figure 11 – PM Proposed Development Traffic
Traffic Figure 12 – AM 2019 Base + Committed Development Traffic
Traffic Figure 13 – PM 2019 Base + Committed Development Traffic
Traffic Figure 14 – AM 2019 Base + Proposed Development Traffic
Traffic Figure 15 – PM 2019 Base + Proposed Development Traffic
Traffic Figure 16 – AM 2019 Base + Committed and Proposed Development Traffic
Traffic Figure 17 – PM 2019 Base + Committed and Proposed Development Traffic
Traffic Figure 18 – AM 2024 Base + Committed Development Traffic
Traffic Figure 19 – PM 2024 Base + Committed Development Traffic

Traffic Figure 20 – AM 2024 Base + Proposed Development Traffic

Traffic Figure 21 – PM 2024 Base + Proposed Development Traffic

Traffic Figure 22 – AM 2024 Base + Committed and Proposed Development Traffic

Traffic Figure 23 – PM 2024 Base + Committed and Proposed Development Traffic

Appendices

Appendix A – Highway Safety Records

Appendix B – Indicative Masterplan Drawing

Appendix C – Committed Development Surveyed Traffic Flows

Appendix D – Committed Development Traffic Assignment

Appendix E – TRICS Outputs

Appendix F – SWS Census Distribution Summary

Appendix G – Proposed Committed Development Access Junction

Appendix H – Junction Modelling Outputs

1.0 Introduction

1.1 Introduction

- 1.1.1 This Transport Assessment (TA) has been prepared by Curtins to support an outline planning application for a residential development at Home Farm in Llay, Wrexham. The application is for c.365 residential dwellings.

1.2 Purpose of this Report

- 1.2.1 The TA has been prepared to inform Highways Officers at Wrexham County Borough Council (WCBC) with regard to all traffic and transportation matters associated with the development.

1.3 Scope of the Report

- 1.3.1 Initial scoping discussions took place with WCBC, and a pre-application note was issued by the council to the client on 5th December 2013. In terms of highways, the note stated that a Transport Assessment would be required. The note also stated that the capacity of the Llay Road, Rackery Lane, Chapel Lane, The Straight Mile and Gresford Road junction would need to be considered.

- 1.3.2 More recently, further discussions regarding the scope of the assessment were undertaken directly with Highways Officers at WCBC. It was agreed that the following scope would be appropriate:

- A description of the existing highway network surrounding the site;
- A review of highway safety on the network surrounding the site for the most recent five years using the Wales.gov road casualties interactive map;
- A summary of the development proposals for the site;
- Details regarding the access strategy for the site;
- Consideration of relevant transport planning policy;
- A review of accessibility by sustainable modes of travel; and
- Traffic Forecasting/Highway Impact sections.

- 1.3.3 Further to the above, the Traffic Forecasting/Highway Impact sections of the TA would include:

- An assessment of the potential level of traffic generation associated with the development proposals based on average trip rates obtained from the TRICS database;
- An assessment of the highway impact as a result of the development to include the following development scenarios:
 - Application year observed flows (2014);
 - Anticipated full build year (2019); and
 - Future year comprising year of completion + 5 years (2024).

- The traffic growth to be calculated using TEMPRO for LGVs and NTM Forecasts for HGVs;
- Capacity assessments at four off-site junctions to include:
 - Crown crossroads B5102 / B5373 junction;
 - B5102 / B5425 roundabout at Llay Miners institute;
 - A483 Rossett interchange / B5102 junction; and
 - B5373 Gresford Road junction with B5445 Gresford.
- An additional capacity assessment is included to assess the development impact on a proposed roundabout at the existing Rhosrobin Road / Llay New Road priority junction. This is being put forward by a 3rd party in order to serve its proposed development for 117 dwellings to the east of the existing junction (at the time of writing this Transport Assessment it is understood that the associated planning application has been refused by the planning authority);
- Notwithstanding this, for robustness all capacity assessments contained within this report will consider the development traffic associated with the Rhosrobin development as 'committed' development (Rhosrobin proposed development flows and proposed junction geometries obtained from the application TA as submitted to WCBC); and
- Consideration of any mitigation measures that may be required.

1.4 Structure of the Report

- 1.4.1 Following this introduction, **Section 2** of the report provides a description of the site location, the highway network in the vicinity of the site, and a summary of the highway safety record.
- 1.4.2 **Section 3** of the report provides details of the development proposals, including demonstration of appropriate vehicular access and details of the proposed pedestrian/cycle access strategy.
- 1.4.3 **Section 4** considers the accessibility of the site by sustainable modes of travel. This covers accessibility on foot, by cycle and by public transport.
- 1.4.4 The Traffic Forecasting methodology is discussed throughout **Section 5**, providing details regarding traffic growth, proposed development trip generation and traffic distribution.
- 1.4.5 **Section 6** contains the results of capacity assessments for the local highway network, and provides a commentary on the projected impacts of the proposed development.
- 1.4.6 A review of the relevant local and national transport planning policy is included in **Section 7**. The national Technical Advice Note 18 (TAN18) outlines the importance of producing a "Transport Implementation Strategy". This is subsequently provided in **Section 8**.
- 1.4.7 The report is summarised and concluded in **Section 9**.

2.0 Site Location and Highway Layout

2.1 Site Location

- 2.1.1 The site is located at the north eastern edge of Llay, bound by the B5102 The Straight Mile to the north and the B5373 Gresford Road to the west. Undeveloped land binds the site to the east and west.
- 2.1.2 **Plan TPMA5021_001** illustrates the location of the site in relation to the surrounding areas, and **Plan TPMA5021_002** shows the site in a more local context relating to the local highway network.

2.2 Existing Use

- 2.2.1 The site comprises a small collection of agricultural working space, and agricultural land.

2.3 Existing Site Access

- 2.3.1 Vehicular access to the site is currently obtained from a gate and gap in the hedgerow along The Straight Mile, approximately 300m east of the signalised junction with Chapel Lane, Rackery Lane, Llay Road and Gresford Road.

2.4 Surrounding Highway Network

B5102 The Straight Mile

- 2.4.1 The B5102 The Straight Mile runs eastwards from a signalised junction at the north west corner of the site for approximately 1.5km until the carriageway continues as Croeshowell Hill. The Straight Mile forms the northern site boundary.
- 2.4.2 In the vicinity of the site, the B5102 The Straight Mile forms a single lane, two-way carriageway approximately 7m in width. There is a footway on the northern side of the road which is less than 1m wide. The carriageway has a speed limit of 60mph, and there is no street lighting present.

B5373 Gresford Road

- 2.4.3 The B5373 Gresford Road runs southwards from a signalised junction at the north west corner of the site for approximately 2.5km until it forms a priority junction with the B5445 Chester Road. Gresford Road forms the western site boundary.
- 2.4.4 In the vicinity of the site, the B5373 Gresford Road forms a single lane, two-way carriageway approximately 6m in width. There is a footway on the southern side of the road which is approximately 2m wide. The carriageway has a speed limit of 30mph, and there is street lighting present.

B5012 Llay Road

- 2.4.5 The B5102 Llay Road runs south west from the signalised junction at the north west corner of the site for approximately 2.5km until it forms a priority junction with the A541 Wrexham Road at Cefn-y-bedd. At the signalised junction, there are pedestrian refuge islands to allow pedestrians to cross over the carriageway.
- 2.4.6 Llay Road also forms a roundabout junction with Llay New Road and First Avenue approximately 450m south west of the signalised junction. Here, there are also refuge islands to allow pedestrians to cross the carriageway, as well as cyclists crossing between off-road cycle routes along Llay Road and Llay New Road. The crossing points have dropped kerbs and tactile paving.
- 2.4.7 In the wider vicinity of the site, the B5102 Llay Road forms a single lane, two-way carriageway approximately 7m in width. There is a footway on both sides of the road which are approximately 1.5m – 2m wide. The carriageway has a speed limit of 40mph within Llay, although this is increased to 60mph west of the roundabout. There is street lighting present along the 40mph sections of carriageway.

B5373 Rackery Lane

- 2.4.8 The B5373 Rackery Lane runs north west from the signalised junction at the north west corner of the site for approximately 1.5km until the B5373 continues once again named as Gresford Road at Caer-Estyn. At the signalised junction, there are pedestrian refuge islands to allow pedestrians to cross over the carriageway.
- 2.4.9 In the wider vicinity of the site, the B5373 Rackery Lane forms a single lane, two-way carriageway. The road is typically approximately 8m in width, although the carriageway does widen to provide a right-hand turning pocket to serve Miners Road, approximately 250m north west of the signalised junction. There is a footway on the southern side of the road, and an intermittent footway on the northern side. The footways are approximately 1.5m – 2m wide. The carriageway has a speed limit of 40mph, and there is street lighting present.

Chapel Lane

- 2.4.10 Chapel Lane runs north east from the signalised junction at the north west corner of the site for approximately 900m until a priority junction with Dark Lane and Lon Uchaf.
- 2.4.11 In the wider vicinity of the site, Chapel Lane forms a single lane, two-way carriageway approximately 5.5m in width. There is no footpath provision. The carriageway has a speed limit of 30mph, and there is intermittent street lighting present.

B5445 Chester Road

- 2.4.12 The B5445 Chester Road can be accessed via Clappers Lane (accessed from Gresford Road), approximately 2.5km south of the site. Chester Road links the A483 to Gresford, forming the main route through to Marford.
- 2.4.13 Typically, the road is approximately 8m wide and there is footway provision along the length of the eastern side of the carriageway, and an intermittent footway is provided along the western side as the road progresses through Gresford. Northwards from the A483, the carriageway has an initial speed limit of 60mph, but this is decreased to 30mph approximately 120m south of the priority junction with the B5373 Gresford Road. There is intermittent street lighting present along the carriageway.

Llay New Road

- 2.4.14 Llay New Road runs south from the roundabout with Llay Road and First Avenue for approximately 4km until it reaches Old Rhosrobin. Adjacent to the roundabout, there are dropped kerbs and tactile paving to aid pedestrians and cyclists crossing the carriageway. Approximately 70m south of the roundabout, there is also a pedestrian refuse island with dropped kerbs and tactile paving.
- 2.4.15 In the wider vicinity of the roundabout junction, Llay New Road forms a single lane, two-way carriageway approximately 6m in width. There is a footway on the eastern side of the road which is approximately 2m wide, and a shared footway/cycleway on the western side of the carriageway. Llay New Road has a speed limit of 30mph within Llay, and this is increased to 60mph approximately 1.2km south of the roundabout. There is street lighting present along the carriageway throughout Llay.

First Avenue

- 2.4.16 First Avenue runs south east from the roundabout with Llay Road and Llay New Road for approximately 400m until it reaches Fifth Avenue. Adjacent to the roundabout, there are dropped kerbs and tactile paving to aid pedestrians crossing the carriageway.
- 2.4.17 Llay New Road forms a single lane, two-way carriageway approximately 5.5m in width. There are wide footways on both sides of the road, measuring approximately 3m – 5m in width. There is a speed limit of 30mph along the carriageway, and there is street lighting present.

2.5 Highway Safety

- 2.5.1 During scoping discussions with Highways Officers at WCBC, it was agreed that this TA should include an assessment of Personal Injury Accident (PIA). It was also agreed that the data should be obtained from online records available at <http://data.wales.gov.uk/apps/roadcasualties/>.

- 2.5.2 The PIA data obtained for the last five years in the vicinity of the site is included in **Appendix A** to the rear of this report.
- 2.5.3 **Appendix A** shows that a total of six casualties occurred within the highlighted red study area, all of which were categorised as being 'Minor' in severity. There have not been any 'Fatal' or 'Severe' casualties recorded within the study area within the five year period of 2009 to 2013.
- 2.5.4 It is considered that the accident records do not indicate any road safety problems along the surrounding highway network which would be exacerbated by the proposed development.

3.0 Development Proposals

3.1 Introduction

- 3.1.1 This Transport Assessment has been prepared in order to support an outline application for a residential development at Home Farm in Llay, Wrexham. It is envisaged that the site could accommodate in the region of 365 residential dwellings.
- 3.1.2 There is also a proposed small commercial element situated in the heart of the development site. It is not envisaged that this would generate any vehicular trips in its own right.
- 3.1.3 An indicative site plan is included within **Appendix B** to the rear of this report.

3.2 Vehicular Access

- 3.2.1 Vehicular access is proposed at three separate points, comprising:

- Site Access 1 – The Straight Mile
- Site Access 2 – Gresford Road
- Site Access 3 – Gresford Road

- 3.2.2 The site access strategy is demonstrated in Drawing **TPMA5021_004** to the rear of this report.

Site Access 1

- 3.2.3 It is envisaged that Site Access 1 would comprise a compact roundabout. **Drawing TPMA5021_005** illustrates the junction layout, demonstrating visibility splays to the tangent point of the roundabout in accordance with DMRB.
- 3.2.4 The operation of Site Access 1 is demonstrated in **Drawings TPMA5021_006, TPMA5021_007, TPMA5021_008, and TPMA5021_009**. The drawings show a 16m articulated vehicle, single deck bus, large refuse vehicle and large car accessing and egressing the proposed development via Site Access 1.
- 3.2.5 In order to facilitate Site Access 1, discussions have taken place with Highways Officers at WCBC regarding a potential speed reduction along The Straight Mile. In light of a current review of all “A” and “B” classified roads throughout the County Borough, this will be considered further as the project progresses.

Site Access 2

- 3.2.6 It is envisaged that Site Access 2 would comprise a mini-roundabout. **Drawing TPMA5021_002** illustrates the junction layout.

- 3.2.7 The operation of Site Access 2 is demonstrated in **Drawings TPMA5021_010, TPMA5021_011 and TPMA5021_012**. The drawings show a large refuse vehicle, large car and single deck bus accessing and egressing the proposed development via Site Access 2.

Site Access 3

- 3.2.8 It is envisaged that Site Access 3 would comprise a mini-roundabout. **Drawing TPMA5021_003** illustrates the junction layout.
- 3.2.9 The operation of Site Access 3 is demonstrated in **Drawings TPMA5021_013, TPMA5021_014 and TPMA5021_015**. The drawings show a large refuse vehicle, large car and single deck bus accessing and egressing the proposed development via Site Access 3.

Pedestrian/Cycle Access

- 3.2.10 Pedestrian and cycle access into the application site will be via all three access points. It is envisaged that 2m footways would be provided along both edges of the carriageway leading into the site for each of the access points.
- 3.2.11 It is envisaged that an internal footway would be provided in parallel to The Straight Mile, along the northern bounds of the site. This would provide a route that is adjacent to the road, yet screened from vehicular traffic.
- 3.2.12 There would also be pedestrian access points to the site from the Public Right of Way (PRoW) LLA/5, which extends parallel to the eastern boundary of the site.

3.3 Servicing

- 3.3.1 It is proposed that refuse and delivery vehicles will gain access to the site via the proposed junctions at Gresford Road and/or The Straight Mile. It is envisaged that waste would be collected at the kerbside.

3.4 Car Parking

- 3.4.1 Car parking will be in accordance with WCBCs parking standards, as discussed in **Section 7** of this report.

3.5 Internal Layout

- 3.5.1 It is envisaged that the internal layout would be in accordance with principles set out in Manual for Streets (MfS) guidance.
- 3.5.2 It is also envisaged that the internal highway layout would be designed to encourage low vehicle speeds, whilst also discouraging “rat-running” through the site from Gresford Road to The Straight Mile, and vice versa.

- 3.5.3 However in order to maintain the efficiency and attractiveness of any bus services that might pass through the site, it is considered that appropriate bus priority design features would be incorporated within the internal design.
- 3.5.4 This would most likely be in the form of a “bus-only” passage through the site, adjacent to the village green and the centre of the proposed development site.

4.0 Accessibility by Sustainable Modes of Travel

4.1 Introduction

4.1.1 One of the key elements of national and local planning policy is to ensure that new developments are located in areas where alternative modes of travel are available. Developments should not be isolated, but should instead be located close to complementary land uses. Encouraging the integration of planning and transport supports the aim of reducing overall travel and use of private car.

4.1.2 The accessibility of the proposed development is considered in this context for the following modes of travel:

- Pedestrian Accessibility;
- Cycle Accessibility; and
- Public Transport Accessibility.

4.2 Pedestrian Accessibility

4.2.1 Research has indicated that acceptable walking distances depend on a number of factors, including the quality of the development, the type of amenity offered, the surrounding area, and other local facilities.

4.2.2 The Chartered Institution of Highways and Transportation (CIHT) document entitled 'Providing for Journeys on Foot' suggests walking distances which are relevant to this planning application. These are reproduced in **Table 4.1** below.

CIHT Category	Town Centres (m)	Commuting/School/ Sightseeing (m)	Elsewhere (m)
Desirable	200	500	400
Acceptable	400	1,000	800
Preferred Maximum	800	2,000	1,200

Table 4.1 – CIHT Recommended Walking Distances

4.2.3 To assist in summarising the accessibility of the site by foot, an indicative pedestrian catchment plan has been produced. **Plan TPMA5021_003** shows distances of 500m, 1,000m and 2,000m which are termed 'Desirable', 'Acceptable' and the 'Preferred Maximum' by the CIHT for commuting trips and school trips. These are considered likely to be the most common trips that would occur at the development.

4.2.4 Within the 500m pedestrian catchment, there are existing residential areas to the south of the site located off Gresford Road including properties off roads such as Walnut Grove and Ffordd Y

Goedwig. Also within 500m walk of the site are the eastern most points of the Llay Industrial Estate, which includes providing employment opportunities in the engineering, construction and automotive industries.

- 4.2.5 Within 1,000m of the centre of the proposed development, there are additional residential properties off roads to the south, such as Ffordd Gwenllian, and to the west off roads such as Acacia Court. Additional businesses and employment opportunities at the Llay Industrial Estate are accessible. Also to the west of the site and approximately 1,000m from the centre of the site is the Llay Miner's Institute.
- 4.2.6 Still within the 1,000m pedestrian catchment from the centre of the site are a number of facilities along situated at the centre of Llay. These include Park Community Infants and Primary Schools, and the Alyn Family Doctors. Along Fifth Avenue there is a community garden adjacent to a collection of facilities which are situated marginally outside the 1,000m catchment including Llay Library, a pharmacy, convenience foodstore, take-away food outlet, The Church of Saint Martin of Tours, and Llay Park Resource Centre. In addition along Second Avenue there is the Tir-Y-Capel place of worship.
- 4.2.7 Further south within the 2,000m pedestrian catchment is Llay United Youth Football Club, the Llay Royal British Legion and Bethel Baptist Church. The full extent of Llay Industrial Estate is also accessible within the 2,000m pedestrian catchment.

Pedestrian Accessibility Summary

- 4.2.8 In summary, it is considered that there are a significant number of employment, education, place of worship, retail, health and leisure opportunities within walking distance of the centre of the proposed development site.
- 4.2.9 The site is situated to the north of an established residential area, and walking is therefore likely to be an attractive option for many future residents of the site, as they walk southwards and westwards to existing services and facilities.

4.3 Cycle Accessibility

- 4.3.1 To assist in assessing the accessibility of the site by cycle, a 5km cycle catchment from the centre of the site is shown on **Plan TPMA5021_004**. The 5km distance equates to a journey time of around 25 minutes, while cycling at a speed of 12km per hour.
- 4.3.2 The 5km cycle catchment includes all of Llay and incorporates some surrounding residential areas such as Rossett, Marford, Gresford, Cefn-y-bedd, Caergwrle and Hope. The cycle catchment also includes northern areas of Wrexham town.

- 4.3.3 Cefn-y-bedd, Caergwrle and Hope (Flintshire) Railway Stations are all within the 5km cycle catchment, so it is considered that future residents could cycle to a station as part of a multi-modal trip involving rail.
- 4.3.4 There is a designated local cycle route along Llay New Road which links the previously described roundabout with Llay Road and First Avenue with New Rhosrobin in approximately 2.5km. Adjacent to the Fore Golf leisure facility, the route also branches to the west into some woodland area adjacent to the River Alyn. The cycle route is formed almost entirely of a designated off-road cycle provision, with just a short section of approximately 180m in Llay being on the road itself.

Cycle Accessibility Summary

- 4.3.5 In summary, it is considered that cycling is likely to be a realistic mode of travel for residents wanting to access local services, but also for residents who want to travel further afield as either a commuting or leisure based trip. It is considered that a multi-modal trip involving rail could also be a viable option for some future residents.

4.4 Public Transport Accessibility

- 4.4.1 To assist in assessing the accessibility of the site by public transport, a plan has been produced using specialist GIS software to illustrate journey times from the site. **Plan TPMA 5021_005** shows the range of areas accessible by public transport from the site illustrated in 10 minute journey times up to half an hour.
- 4.4.2 The plan shows that parts of Wrexham town centre are accessible within 10 – 20 minutes to the south of the site, as are Gwersyllt, Wrexham General and Wrexham Central railway stations.
- 4.4.3 To the north of the site, areas of Hope and Penyffordd are accessible within 10 – 20 minutes, as is Hope Railway Station. Parts of Buckley are accessible within 20 – 30 minutes.
- 4.4.4 Further analysis of rail and bus accessibility is presented in the following corresponding subsections.

Rail

- 4.4.5 The closest Railway Station to the development is Cefn-y-bedd, located 2.9km to the north west of the site. It offers hourly services to Wrexham Central and Bidston railway stations.
- 4.4.6 These services call at Caergwrle and Hope (Flintshire) railway stations as previously mentioned, in addition to a number of other stations along the Borderlands Line including Shotton, Buckley and Wrexham General.
- 4.4.7 Wrexham General offers additional services to destinations across Wales and the UK, including Llanelli, Holyhead and Birmingham International.

Bus

- 4.4.8 The Chartered Institution of Highways and Transportation (CIHT) document, Planning for Public Transport in Developments recommends that developments should ideally be within 400m of a bus stop.
- 4.4.9 There are various bus stops located along Gresford Road at the western boundary of the site. In addition, there are stops located along Llay Road which may be even more accessible for some future residents. A summary of the services which call at these stops is provided below:

Service	Stop Location	Route	Frequency		
			Weekday	Saturdays	Sundays / Hols
28A	Llay Road	Wrexham – Flint (via Llay, Hope, Penyffordd, Buckley and Mold)	6 Services a day	6 Services a day	-
34	Gresford Road & Llay Road	Wrexham – Trevalyn (via Pandy, Gwersyllt, Bradley, Llay Gresford Road and Burton)	3 Services a day	3 Services a day	-
PC1	Llay Road	Coedpoeth – Brynteg – Gwersyllt – Bradley – Llay Industrial Estate	1 AM and PM Peak Service	-	-
PC2	Llay Road	Gatewen – Wrexham – Hightown – Rhosrobin – Llay Industrial Estate	1 AM and PM Peak Service	-	-

Table 4.2 – Bus Services Local to the site

- 4.4.10 There are a total of 4 services which call at stops adjacent to the site. As detailed throughout the Transport Implementation Strategy contained as **Section 8** of this Transport Assessment, it is proposed that internal infrastructure is provided in order to facilitate the re-routing of buses through the site.
- 4.4.11 It is considered that any re-routing of bus services may also enhance the attractiveness of travelling by rail, as part of a multi-modal journey.

4.5 Accessibility Summary

- 4.5.1 In summary, it is considered that the site is well located to benefit from existing pedestrian and cycle infrastructure. There is a wide range of facilities, employment opportunities and other residential areas within CIHT recommended walking distance of the site, and more located just over 1,000m walk of the site along Fifth Avenue. The development would also provide links to the existing PRow network and surrounding residential area.
- 4.5.2 It is also considered that the surrounding area is relatively conducive to cycling, with infrastructure present at the nearby roundabout at the Llay Miners Institute in the form of off-road cycle routes and

crossing points with dropped kerbs. The off road route runs south from the roundabout for approximately 2.5km to Rhosrobin, with only a small section of on-road route.

4.5.3 Paragraph 8.1.3 of the Planning Policy Wales document states that:

“The Welsh Government supports a transport hierarchy in relation to new development that establishes priorities in such a way that, wherever possible, they are accessible in the first instance by walking and cycling, then by public transport and then finally by private motor vehicles.”

4.5.4 As the site is considered accessible by walking and cycling, the development can be viewed as satisfying the more important elements of the transport hierarchy.

4.5.5 The site is considered accessible by bus services which run along Gresford Road and Llay Road. In order to further enhance bus accessibility, it is proposed that the development will provide appropriate internal infrastructure in order to facilitate the re-routing of services through the site.

4.5.6 It is considered that multi-modal trips involving rail travel is a viable option for some future residents. It is envisaged that any bus re-routing through the site may also enhance the appeal of rail as a mode of transport. The site is also highly accessible from the wider strategic highway network, in particular via the A483 at the Rossett Interchange.

5.0 Traffic Forecasting

5.1 Introduction

- 5.1.1 This section of the report details the methodology used to predict the demand associated with the proposed development, and derive future year traffic flows in order to test the impact of the proposed development.

5.2 Scope of Assessment

- 5.2.1 During scoping discussions with WCBC, it was agreed that the following junctions would require consideration;

- Crown crossroads B5102 / B5373 junction;
- B5102 / B5425 roundabout at Llay Miners institute;
- A483 Rossett Interchange / B5102 junction; and
- B5373 Gresford Road junction with B5445 at Gresford.

- 5.2.2 In addition, the following junction is also considered as a committed development. It is proposed as part of a separate residential development to deliver 117 dwellings in Rhosrobin:

- Rhosrobin Road / Llay New Road proposed roundabout junction.

5.3 Baseline Data Acquisition

- 5.3.1 Traffic surveys were undertaken at all of the existing junctions listed above on Thursday 11th September 2014. These surveys were undertaken between the hours of 07:30 – 09:30 and 16:30 – 18:30.

- 5.3.2 In addition to the traffic counts, there were also Automatic Traffic Counters (ATCs) placed along The Straight Mile and Gresford road in order to provide a more accurate representation of traffic flows along the site access roads. Due to technical complications, the ATC along Gresford Road was removed, and a RADAR survey was commissioned in its place.

- 5.3.3 Following analysis of the traffic survey data, it was determined that the AM peak period on the highway network occurred between 07:45 and 08:45, whilst the PM peak occurred between 16:30 and 17:30. These peak hours have been used as the basis for this assessment.

- 5.3.4 In terms of the Rhosrobin Road / Llay New Road proposed roundabout junction, Curtins has obtained the 2014 Surveyed Traffic Flows (Figure TA3) from the Transport Assessment submitted as part of the planning application (Planning Application Number: P/2014/0480). Figure TA3 obtained from the committed development Transport Assessment can be found in **Appendix C** to the rear of this report.

5.3.5 **Traffic Figure 1** and **Traffic Figure 2** at the rear of the report show the observed traffic count data for the AM and PM peak periods.

5.4 Assessment Years and Traffic Growth

5.4.1 In order to undertake a robust assessment of the development impact taking into account background traffic growth, this report considers the projected full development completion year (2019) and five years after completion (2024).

5.4.2 In order to calculate baseline flows for these scenarios, the observed traffic flows have been factored to the 2019 and 2024 assessment year using specialised growth factors.

5.4.3 Growth factors have been taken from the National Traffic Model (NTM) with TEMPRO for the Llay area for cars/LGVs, and for the Wales region for HGVs. The resultant growth factors are shown in **Table 5.1**:

Data Source	Peak	Area	Growth Factor	
			2019	2024
TEMPRO	AM	Llay, North Wales	1.0502	1.1127
TEMPRO	PM	Llay, North Wales	1.0528	1.1163
NTM Forecasts	Both	Wales	1.0390	1.0460

Table 5.1 – Traffic Growth Factors

5.4.4 The factors listed have been applied to the 2014 Base traffic flows to derive 2019 AM and 2019 PM Base scenarios (**Traffic Figure 3** and **Traffic Figure 4**), and again to derive 2024 AM and 2024 PM Base scenarios (**Traffic Figure 5** and **Traffic Figure 6**).

5.5 Committed Development

As previously mentioned, the proposed Rhosrobin residential development is being considered throughout this assessment as a ‘committed’ development. Curtins has obtained the Proposed Residential Development Traffic Assignment (Figure TA10) from the Transport Assessment submitted as part of the planning application (Planning Application Number: P/2014/0480). Figure TA10 obtained from the committed development Transport Assessment can be found in **Appendix D** to the rear of this report.

5.5.1 **Traffic Figure 7** and **Traffic Figure 8** at the rear of the report show the committed development traffic for the AM and PM peak periods. Traffic distribution onto the wider assessment network from the proposed Rhosrobin Road / Llay New Road roundabout junction has been calculated using the same method of distribution as discussed in the Proposed Development Traffic Distribution subsection.

5.6 Residential Traffic Generation

5.6.1 In order to generate trip rates for the proposed residential development uses, the TRICS database has been used. TRICS is the industry recognised tool for calculating the anticipated future trip demand of a proposed development. The database contains multi-modal surveys of varying land uses in multiple destinations across the UK including residential uses.

5.6.2 **Table 5.2** shows TRICS AM and PM peak trip rates for houses (privately owned) and the associated trip generations for a 365 unit development. All trip rates are per single residential unit, and the full outputs from the TRICS assessments can be found in **Appendix E** at the rear of this report.

TRICS – Private Housing	Average Trip Rates					
	AM Peak			PM Peak		
	Arrive	Depart	Total	Arrive	Depart	Total
Trip Rate	0.140	0.413	0.553	0.387	0.246	0.633
Total Trips	51	151	202	141	90	231

Table 5.2 – Development Trip Rates and Trip Generation (365 units)

5.6.3 **Table 5.2** demonstrates that the proposed development is anticipated to generate in the region of 202 and 231 two-way trips in the AM and PM Peak hour periods respectively.

5.7 Oakfield Park Home Estate/Meadow Rise Base Flows

5.7.1 The traffic data collection exercise did not incorporate every side road which connects onto Gresford Road, therefore in order to quantify the existing residential traffic movements to/from Oakfield Park Home Estate and Meadow Rise for the purposes of the site access assessments, a TRICS assessment has been undertaken..

5.7.2 **Table 5.3** shows TRICS AM and PM peak trip rates for houses (privately owned) and the associated trip generations for a 60 unit development (Oakfield Park Home Estate) and a 30 unit development (Meadow Rise).

5.7.3 All trip rates are per single residential unit, and the full outputs from the TRICS assessments can be found in **Appendix E** at the rear of this report.

TRICS – Private Housing	Average Trip Rates					
	AM Peak			PM Peak		
	Arrive	Depart	Total	Arrive	Depart	Total
Trip Rate	0.140	0.413	0.553	0.387	0.246	0.633
Oakfield Park Home Estate	8	25	33	23	15	38
Meadow Rise	4	12	17	12	7	19

Table 5.3 – Oakfield Park Home Estate/Meadow Rise Base Flows Trip Rates and Trip Generation (365 units)

5.8 Traffic Distribution

- 5.8.1 A trip distribution pattern for the proposed and committed development and existing residential properties off Oakfield Park Home Estate and Meadow Rise has been derived. The distribution pattern is based upon SWS census data, using a number of output areas adjacent to the site. A summary of the distribution and assignment pattern is included within **Appendix F** to the rear of this report, and the resultant turning proportions shown in **Traffic Figure 9**.
- 5.8.2 These turning proportions have been applied to the trip generation values shown above in **Table 5.2** and the resultant AM and PM Proposed Development flows are subsequently illustrated in **Traffic Figure 10** and **Traffic Figure 11**.

5.9 Additional Assessment Scenarios

- 5.9.1 Considering the methodology as outlined throughout this section, additional assessment scenarios have also been considered throughout the following Highway Impact Section to include the following:
- AM and PM 2019 Base + Committed Development Traffic (**Traffic Figure 12** and **13**);
 - AM and PM 2019 Base + Proposed Development Traffic (**Traffic Figure 14** and **15**);
 - AM and PM 2019 Base + Committed Development and Proposed Development Traffic (**Traffic Figure 16** and **17**);
 - AM and PM 2024 Base + Committed Development Traffic (**Traffic Figure 18** and **19**);
 - AM and PM 2024 Base + Proposed Development Traffic (**Traffic Figure 20** and **21**); and
 - AM and PM 2024 Base + Committed Development and Proposed Development Traffic (**Traffic Figure 22** and **23**).

6.0 Highway Impact

6.1 Introduction

- 6.1.1 The following section contains the results of capacity assessments at the site access points and on the local highway network.

6.2 Methodology

- 6.2.1 Each junction was modelled using an industry-standard software package relevant to the junction type. The priority junctions were modelled using PICADY 5, roundabout junctions using ARCADY 7 and signalised junctions were modelled using LinSig 3.2.
- 6.2.2 All models for existing junctions were constructed using Ordnance Survey mapping/topographical survey data. Traffic signal timing data was obtained from WCBC to inform the LinSig model.
- 6.2.3 The model for the proposed roundabout at Rhosrobin to be considered as a committed development has been constructed using the proposed roundabout access junction drawing contained in the drawings section of the application TA (Planning Application Number: P/2014/0480). This drawing is also contained at the rear of this report, in **Appendix G**.
- 6.2.4 All junction model outputs are included as **Appendix H** to the rear of this report, and the results are summarised throughout this section below.

6.3 Interpretation of Model Results

- 6.3.1 ARCADY results refer to the Ratio of Flow to Capacity (RFC) and the queue length predicted on each arm of the junction. An RFC of 1.00 indicates that the arm in question is operating at its theoretical capacity, whilst an RFC of 0.85 or less indicates that the arm is operating within its practical capacity.
- 6.3.2 LinSig results refer to the Degree of Saturation (DoS) and Mean Maximum Queue (MMQ) predicted in each lane of the junction. A DoS of 100% indicates that the lane in question is operating at its theoretical capacity (point of saturation), whilst a DoS of 90% or less indicates that the lane is operating within its practical capacity.

6.4 Future Year Scenarios

- 6.4.1 A detailed description of the traffic flows used within these assessments is set out in **Section 5**. To summarise, the following traffic flow scenarios are used to ascertain the existing operation of the junctions assessed and the impact of the proposed development in the future year:

- 2014 Base;
- 2019 Base;
- 2019 Base + Committed and Proposed Development;
- 2024 Base; and
- 2024 Base + Committed and Proposed Development.

6.5 Site Access Modelling Results

- 6.5.1 The site access strategy can be seen in the illustrative masterplan as contained in **Appendix H**. As the masterplan shows, it is proposed that the site be accessed at three points; two along Gresford Road and one along The Straight Mile.
- 6.5.2 It is also proposed that the three vehicular site access points would comprise a compact roundabout and two mini-roundabouts, as illustrated in **Drawing TPMA5021_004**.
- 6.5.3 The capacity of all three of the proposed access points has therefore been modelled using ARCADY in order to consider the development impact at the “Base + Committed and Proposed Development” scenarios for both AM and PM peak periods for the future assessment years of 2019 and 2024.

Site Access 1

- 6.5.4 The ARCADY results for Site Access 1 along The Straight Mile are shown in **Tables 6.1** and **6.2**:

Approach	AM 2019 Base + Proposed and Committed Dev		PM 2019 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Straight Mile (E)	0.360	0.27	0.630	0.39
Site Access 1	0.060	0.06	0.040	0.04
Straight Mile (W)	0.410	0.29	0.450	0.31

Table 6.1 – Site Access 1: ‘2019 Base + Proposed and Committed Development’ Scenarios

Approach	AM 2024 Base + Proposed and Committed Dev		PM 2024 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Straight Mile (E)	0.390	0.28	0.680	0.41
Site Access 1	0.060	0.06	0.040	0.04
Straight Mile (W)	0.440	0.30	0.480	0.33

Table 6.2 – Site Access 1: ‘2024 Base + Proposed and Committed Development’ Scenarios

- 6.5.5 The results clearly indicate that the proposed junction is predicted to accommodate the committed and proposed development during each peak period in 2019 and 2024.

Site Access 2

- 6.5.6 The ARCADY results for Site Access 2 along Gresford Road are shown in **Tables 6.3** and **6.4**:

Approach	AM 2019 Base + Proposed and Committed Dev		PM 2019 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Gresford Rd (N)	0.290	0.42	0.460	0.83
Site Access 2	0.070	0.08	0.050	0.05
Gresford Rd (S)	0.480	0.93	0.510	1.05
Oakfield Park Home Estate	0.060	0.07	0.040	0.04

Table 6.3 – Site Access 2: '2019 Base + Proposed and Committed Development' Scenarios

Approach	AM 2024 Base + Proposed and Committed Dev		PM 2024 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Gresford Rd (N)	0.310	0.44	0.480	0.90
Site Access 2	0.070	0.08	0.050	0.05
Gresford Rd (S)	0.510	1.02	0.540	1.17
Oakfield Park Home Estate	0.070	0.07	0.040	0.04

Table 6.4 – Site Access 2: '2024 Base + Proposed and Committed Development' Scenarios

- 6.5.7 The results clearly indicate that the proposed junction is predicted to accommodate the committed and proposed development during each peak period in 2019 and 2024.

Site Access 3

- 6.5.8 The ARCADY results for Site Access 3 along Gresford Road are shown in **Tables 6.5** and **6.6**:

Approach	AM 2019 Base + Proposed and Committed Dev		PM 2019 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Gresford Rd (N)	0.320	0.47	0.420	0.71
Site Access 3	0.080	0.09	0.050	0.05
Gresford Rd (S)	0.450	0.80	0.520	1.07
Meadow Rise	0.020	0.02	0.020	0.02

Table 6.5 – Site Access 3: '2019 Base + Proposed and Committed Development' Scenarios

Approach	AM 2024 Base + Proposed and Committed Dev		PM 2024 Base + Proposed and Committed Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Gresford Rd (N)	0.330	0.50	0.430	0.74
Site Access 3	0.080	0.09	0.050	0.05
Gresford Rd (S)	0.470	0.87	0.540	1.17
Meadow Rise	0.030	0.03	0.020	0.02

Table 6.6 – Site Access 3: '2024 Base + Proposed and Committed Development' Scenarios

- 6.5.9 The results clearly indicate that the proposed junction is predicted to accommodate the committed and proposed development during each peak period in 2019 and 2024.

6.6 Local Road Network Results

Junction 1: Crown Crossroads B5102 / B573 (Without any Junction Improvements)

- 6.6.1 The Crown Crossroads B5102 / B573 takes the form of a 5-arm signal controlled junction, and has been assessed using LinSig. Results for the 2014 Base scenarios are summarised in **Table 6.7**:

Approach	AM Peak Obs 2014		PM Peak Obs 2014	
	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)
B5102 Straight Mile	93.3%	13.90	89.1%	15.20
B5373 Gresford Road	91.3%	14.60	89.5%	10.80
Llay Road	80.6%	23.50	66.1%	14.60
Rackery Lane	93.5%	15.50	89.1%	20.40
Chapel Lane	24.7%	1.20	25.4%	1.20

Table 6.7 – Junction 1: '2014 Observed Flows' Scenarios

- 6.6.2 The results demonstrate that the junction currently operates close to but within its practical capacity during the PM peak period. However there is some queuing present during the PM peak, particularly along the Rackery Lane arm.
- 6.6.3 During the AM peak, it appears Junction 1 is operating outside of its practical capacity, but still within its theoretical capacity. The resulting vehicle queueing is most prevalent along Llay Road.
- 6.6.4 The results derived from the queue surveys undertaken on-site indicate that current queuing is reflective of the above figures. Therefore it is considered the model used to assess Junction 1 is suitable to assess the impact of the proposed development in a given future year.
- 6.6.5 **Table 6.8** sets out the results of the 2019 future year assessments:

Approach	AM Peak				PM Peak			
	2019 Base		2019 Base + Com. + Dev		2019 Base		2019 Base + Com. + Dev	
	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)
B5102 Straight Mile	100.0%	19.00	110.4%	30.70	93.7%	25.30	99.3%	27.10
B5373 Gresford Road	100.3%	21.80	109.1%	43.10	93.9%	14.90	98.7%	20.30
Llay Road	82.0%	25.60	82.2%	23.20	69.1%	20.50	72.5%	18.00
Rackery Lane	100.6%	25.20	110.9%	56.20	94.2%	29.30	99.9%	38.80
Chapel Lane	24.7%	1.20	24.7%	1.20	25.4%	1.20	25.4%	1.20

Table 6.8 – Junction 1: '2019 Base Flows' and '2019 Base + Full Development' Scenarios

- 6.6.6 The results demonstrate that by 2019, the junction is forecast to operate over its theoretical capacity during the AM peak period even without considering any proposed or committed development. During the PM peak period, Junction 1 is forecast over its practical capacity, close to theoretical capacity.

6.6.7 Once the committed and proposed development is considered, there is an additional impact during the AM and PM peak periods.

6.6.8 **Table 6.9** sets out the results of the 2024 future year assessments:

Approach	AM Peak				PM Peak			
	2024 Base		2024 Base + Com. + Dev		2024 Base		2024 Base + Com. + Dev	
	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)
B5102 Straight Mile	105.0%	27.40	117.6%	41.00	102.2%	30.80	110.4%	49.20
B5373 Gresfor Road	106.1%	32.10	117.3%	57.50	101.5%	18.00	109.4%	30.70
Llay Road	91.1%	30.40	83.4%	23.90	71.0%	17.90	110.1%	70.40
Rackery Lane	107.8%	46.40	119.1%	79.20	101.9%	49.80	110.7%	93.90
Chapel Lane	27.7%	1.40	27.7%	1.40	25.4%	1.20	25.4%	1.20

Table 6.9 – Junction 1: '2024 Base Flows' and '2024 Base + Full Development' Scenarios

6.6.9 The results demonstrate that by 2024, the junction is forecast to operate over its theoretical capacity during the AM and PM peak periods, even without considering any proposed or committed development. Once the committed and proposed development is considered, there is an additional impact during both peak periods.

6.6.10 Considering the above figures and regardless of whether the committed and proposed development is considered or otherwise, it is apparent that Junction 1 is forecast to operate over capacity at future year levels in the absence of any junction improvement measures.

Junction 1: Crown Crossroads B5102 / B573 (Including Proposed Junction Improvements)

6.6.11 It is considered that the main contributory factor towards the currently observed operation of junction 1 is the inefficient staging and fixed signal timings present during peak periods.

6.6.12 Although the introduction of the committed and proposed development has a relatively small impact when considering the projected 2019 and 2024 base, in light of the above, it is felt that the installation of Microprocessor Optimised Vehicle Actuation (MOVA) and a review of the signal timings would compensate for any adverse impacts brought about by the addition of the Home Farm residential development traffic at Junction 1.

6.6.13 Therefore, additional LinSig modelling has been carried out in order to forecast the future year scenarios considering the proposed junction signal timing and optimisation improvements.

6.6.14 **Table 6.10** sets out the results of the adjusted 2019 future year assessments to account for the installation of MOVA and review of signal timings:

Approach	AM Peak				PM Peak			
	2019 Base		2019 Base + Com. + Dev + Junction Improvements		2019 Base		2019 Base + Com. + Dev + Junction Improvements	
	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)
B5102 Straight Mile	100.0%	19.00	87.2%	13.80	93.7%	25.30	82.1%	18.50
B5373 Gresford Road	100.3%	21.80	77.9%	15.70	93.9%	14.90	32.7%	6.90
Llay Road	82.0%	25.60	71.2%	23.30	69.1%	20.50	64.4%	21.00
Rackery Lane	100.6%	25.20	87.1%	15.40	94.2%	29.30	82.7%	24.30
Chapel Lane	24.7%	1.20	48.0%	2.60	25.4%	1.20	24.7%	1.20

Table 6.10 – Junction 1: '2019 Base Flows' and '2019 Base + Full Development + Junction Improvements' Scenarios

6.6.15 The above **Table 6.10** shows that the proposed junction improvements would have a significant positive impact on the operation of Junction 1 in comparison to the 2019 Base, despite the addition of proposed and committed development traffic. The results of the future 'with development' scenarios also indicate that the junction could in fact operate more efficiently than the currently observed 2014 base level.

6.6.16 **Table 6.11** sets out the results of the adjusted 2024 future year assessments to account for the installation of MOVA and review of signal timings:

Approach	AM Peak				PM Peak			
	2024 Base		2024 Base + Com. + Dev + Junction Improvements		2024 Base		2024 Base + Com. + Dev + Junction Improvements	
	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)	DoS	Mean Max Queue (PCU)
B5102 Straight Mile	105.0%	27.40	98.0%	19.80	102.2%	30.80	88.6%	18.20
B5373 Gresford Road	106.1%	32.10	85.4%	15.60	101.5%	18.00	45.5%	8.20
Llay Road	91.1%	30.40	74.1%	24.90	71.0%	17.90	66.7%	18.40
Rackery Lane	107.8%	46.40	98.4%	24.50	101.9%	49.80	91.2%	31.10
Chapel Lane	27.7%	1.40	53.9%	2.90	25.4%	1.20	24.7%	1.20

Table 6.11 – Junction 1: '2024 Base Flows' and '2024 Base + Full Development' Scenarios

6.6.17 The above **Table 6.11** shows that the proposed junction improvements would continue to have a positive impact on the operation of Junction 1, despite the addition of proposed and committed development traffic.

6.6.18 The analysis throughout this subsection shows that the proposed junction improvement scheme of introducing MOVA and a review of the current signal timings would have a significantly positive impact on Junction 1. It is considered that this measure would mean that, in overall terms, the delivery of the development along with these mitigation measures would have a positive impact on the operation of Junction 1.

Junction 2: B5102 / B5425 roundabout at Llay Miners institute

- 6.6.19 The B5102 / B5425 junction at Llay Miners institute takes the form of a 4-arm roundabout junction, and has been assessed using ARCADY. Results for the 2014 Base scenarios are summarised in **Table 6.12**:

Approach	AM Peak Obs 2014		PM Peak Obs 2014	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
B5102 Llay Road (NE)	0.430	1	0.670	2
First Avenue	0.100	0	0.110	0
B5425 Llay New Road	0.510	1	0.420	1
B5102 Llay Rd (SW)	0.290	0	0.190	0

Table 6.12 – Junction 2: '2014 Observed Flows' Scenarios

- 6.6.20 The results clearly indicate that the junction currently operates within its practical capacity. The largest maximum queue is at the Llay Road (NE arm) approach, where there is maximum queuing of approximately 2 vehicles in the PM peak period.
- 6.6.21 The results derived from the queue surveys undertaken on-site indicate that queuing is relatively minor, and are reflective of the above figures. Therefore it is considered the model used to assess Junction 2 is suitable to assess the impact of the proposed development in a future year.
- 6.6.22 **Table 6.13** sets out the results of the 2019 future year assessments:

Approach	AM Peak				PM Peak			
	2019 Base		2019 Base + Com. + Dev		2019 Base		2019 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
B5102 Llay Road (NE)	0.450	0.83	0.490	0.97	0.700	2.32	0.730	2.59
First Avenue	0.110	0.12	0.110	0.13	0.120	0.14	0.130	0.15
B5425 Llay New Road	0.540	1.16	0.570	1.29	0.440	0.78	0.490	0.94
B5102 Llay Rd (SW)	0.310	0.45	0.320	0.47	0.200	0.25	0.210	0.27

Table 6.13 – Junction 2: '2019 Base Flows' and '2019 Base + Full Development' Scenarios

- 6.6.23 The results suggest that the junction is forecast to operate within its practical capacity at the 2019 Base scenario during both peak periods.
- 6.6.24 Following the addition of the projected committed development and proposed development traffic, the results forecast that the junction will continue to operate within capacity during the 2019 AM and PM scenarios.
- 6.6.25 **Table 6.14** sets out the results of the 2024 future year assessments:

Approach	AM Peak				PM Peak			
	2024 Base		2024 Base + Com. + Dev		2024 Base		2024 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
B5102 Llay Road (NE)	0.480	0.92	0.520	1.07	0.750	2.85	0.770	3.23
First Avenue	0.120	0.13	0.120	0.14	0.130	0.15	0.140	0.16
B5425 Llay New Road	0.570	1.33	0.600	1.47	0.470	0.87	0.510	1.05
B5102 Llay Rd (SW)	0.340	0.51	0.340	0.52	0.220	0.28	0.230	0.29

Table 6.14 – Junction 2: '2024 Base Flows' and '2024 Base + Full Development' Scenarios

- 6.6.26 The results forecast that the junction will operate within its practical capacity at the 2024 Base scenario during both peak periods.
- 6.6.27 Following the addition of the projected committed development and proposed development traffic, the results forecast that the junction will continue to operate within capacity during the 2024 AM and PM scenarios.
- 6.6.28 The above assessments suggest that the B5102 / B5425 roundabout at Llay Miners institute (Junction 2) would continue to operate within its practical capacity five years post build completion, whilst considering the impact of the proposed development and the nearby committed development at Rhosrobin.

Junction 3: A483 Rossett Interchange / B5102 junction

- 6.6.29 The A483 Rossett Interchange / B5102 junction takes the form of a Dunball roundabout junction, and has been assessed using ARCADY. Results for the 2014 Base scenarios are summarised in **Table 6.15**:

Approach	AM Peak Obs 2014		PM Peak Obs 2014	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
A483 (N)	0.120	0.14	0.170	0.21
B5102	0.190	0.25	0.260	0.35
A483 (S)	0.330	0.51	0.190	0.26
Llay Road	0.320	0.50	0.210	0.28

Table 6.15 – Junction 3: '2014 Observed Flows' Scenarios

- 6.6.30 The results clearly indicate that the junction currently operates within its practical capacity, with no significant queuing at either peak period.
- 6.6.31 The results derived from the queue surveys undertaken on-site indicate that queuing is minor, and are reflective of the above figures. Therefore it is considered the model used to assess Junction 3 is suitable to assess the impact of the proposed development in a future year.

6.6.32 **Table 6.16** sets out the results of the 2019 future year assessments:

Approach	AM Peak				PM Peak			
	2019 Base		2019 Base + Com. + Dev		2019 Base		2019 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
A483 (N)	0.130	0.15	0.140	0.16	0.180	0.22	0.200	0.25
B5102	0.200	0.26	0.210	0.26	0.270	0.38	0.280	0.39
A483 (S)	0.350	0.53	0.350	0.54	0.210	0.26	0.210	0.27
Llay Road	0.340	0.52	0.370	0.59	0.230	0.29	0.240	0.32

Table 6.16 – Junction 3: '2019 Base Flows' and '2019 Base + Full Development' Scenarios

6.6.33 The results forecast that the junction will operate within its practical capacity at the 2019 Base scenario during both peak periods.

6.6.34 Following the addition of the projected committed development and proposed development traffic, the results forecast that the junction will continue to operate within capacity during the 2019 AM and PM scenarios.

6.6.35 **Table 6.17** sets out the results of the 2024 future year assessments:

Approach	AM Peak				PM Peak			
	2024 Base		2024 Base + Com. + Dev		2024 Base		2024 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
A483 (N)	0.140	0.17	0.150	0.18	0.190	0.24	0.210	0.27
B5102	0.220	0.28	0.220	0.28	0.290	0.42	0.300	0.43
A483 (S)	0.370	0.59	0.370	0.60	0.230	0.29	0.230	0.30
Llay Road	0.370	0.59	0.400	0.67	0.240	0.32	0.260	0.35

Table 6.17 – Junction 3: '2024 Base Flows' and '2024 Base + Full Development' Scenarios

6.6.36 The results forecast that the junction will operate within its practical capacity at the 2024 Base scenario during both peak periods.

6.6.37 Following the addition of the projected committed development and proposed development traffic, the results forecast that the junction will continue to operate within capacity during the 2024 AM and PM scenarios.

6.6.38 The above assessments suggest that the A483 Rossett Interchange / B5102 junction (Junction 3) would continue to operate within its practical capacity five years post build completion, whilst considering the impact of the proposed development and the nearby committed development at Rhosrobin.

Junction 4: Proposed Roundabout Scheme at Rhosrobin

6.6.39 The Proposed Roundabout Scheme at Rhosrobin is planned to take the form of a 4-arm roundabout junction, and has been assessed using ARCADY. Results for the 2019 scenarios are summarised in **Table 6.18**:

Approach	AM Peak				PM Peak			
	2019 Base + Com.		2019 Base + Com. + Dev		2019 Base + Com.		2019 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
B5425 (S)	0.520	1.08	0.530	1.12	0.760	3.02	0.780	3.45
Rhosrobin Road	0.410	0.69	0.410	0.70	0.280	0.39	0.290	0.40
B5425 (N)	0.770	3.15	0.790	3.71	0.560	1.27	0.580	1.35
Committed Development	0.090	0.10	0.100	0.11	0.070	0.07	0.070	0.07

Table 6.18 – Junction 4: '2019 + Committed Development' and '2019 Base + Full Development' Scenarios

6.6.40 The results clearly indicate that the junction is forecast to operate within its practical capacity at the 2019 Base + Committed development scenarios during both peak periods. The largest maximum queue is at the B5425 Llay New Road (N arm) approach, where there is maximum queuing of approximately 4 vehicles in the AM peak period.

6.6.41 The above results and subsequent analysis compares to the capacity assessment undertaken in the Transport Assessment for the proposed Rhosrobin scheme for 2022 (Planning Application Number: P/2014/0480).

6.6.42 The results also indicate that the junction is forecast to operate within practical capacity at the 2019 Base + committed and proposed development scenarios during both peak periods.

6.6.43 **Table 6.19** sets out the results of the 2024 future year assessments:

Approach	AM Peak				PM Peak			
	2024 Base + Com.		2024 Base + Com. + Dev		2024 Base + Com.		2024 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
B5425 (S)	0.550	1.19	0.560	1.25	0.800	3.91	0.830	4.54
Rhosrobin Road	0.440	0.77	0.440	0.79	0.300	0.43	0.310	0.45
B5425 (N)	0.810	4.11	0.840	5.00	0.600	1.46	0.610	1.56
Committed Development	0.080	0.09	0.100	0.11	0.070	0.07	0.070	0.08

Table 6.19 – Junction 4: '2024 + Committed Development' and '2024 Base + Full Development' Scenarios

6.6.44 The results indicate that the junction is forecast to operate within capacity at the 2024 Base + committed development scenario during both peak periods.

- 6.6.45 Following the addition of the projected proposed development traffic, the junction continues to operate within capacity during the 2024 AM and PM scenarios.
- 6.6.46 The above assessments suggest that the roundabout scheme proposed to provide access to a forthcoming residential scheme at Rhosrobin (Junction 4) would continue to operate within its practical capacity five years post build completion, whilst accommodating the proposed development traffic.

Junction 5: B5373 Clappers Lane / B5445 Chester Road junction

- 6.6.47 B5373 Clappers Lane / B5445 Chester Road junction takes the form of a 4-arm priority T-junction. Whilst travelling from the Chester Road south arm to the Clappers Lane arm, there is a one-way spur that precedes the junction and joins Clappers lane slightly further north at a give-way point. For the purposes of a robust assessment, this spur has been ignored. The junction has been assessed using PICADY. The PICADY results for are shown in **Table 6.20**:

Approach	AM Peak Obs 2014		PM Peak Obs 2014	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Pikey Lane	0.060	0.06	0.046	0.05
B5445 Chester Road (N)	0.074	0.13	0.056	0.09
B5373 Clappers Lane	0.438	0.76	0.378	0.60
B5445 Chester Road (S)	0.008	0.01	0.022	0.03

Table 6.20 – Junction 5: '2014 Observed Flows' Scenarios

- 6.6.48 The results clearly indicate that the junction currently operates within capacity. The only instance of queuing is at the B5373 Clappers Lane approach, where there is maximum queuing of approximately 1 vehicle in the PM peak period.
- 6.6.49 The results derived from the queue surveys undertaken on-site indicate that queuing is minor, and are reflective of the above figures. Therefore it is considered the model used to assess Junction 5 is suitable to assess the impact of the proposed development in a future year.
- 6.6.50 **Table 6.21** sets out the results of the 2019 future year assessments:

Approach	AM Peak				PM Peak			
	2019 Base		2019 Base + Com. + Dev		2019 Base		2019 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Pikey Lane	0.064	0.07	0.064	0.07	0.047	0.05	0.047	0.05
B5445 Chester Road (N)	0.078	0.14	0.082	0.15	0.063	0.10	0.074	0.13
B5373 Clappers Lane	0.470	0.87	0.605	1.49	0.407	0.68	0.506	1.00
B5445 Chester Road (S)	0.008	0.01	0.008	0.01	0.023	0.03	0.023	0.03

Table 6.21 – Junction 5: '2019 Base Flows' and '2019 Base + Full Development' Scenarios

- 6.6.51 The results indicate that the junction is forecast to operate within capacity at the 2019 Base scenario during both peak periods.
- 6.6.52 Following the addition of the projected committed development and proposed development traffic, the junction continues to operate within capacity during the 2019 AM and PM scenarios.
- 6.6.53 **Table 6.22** sets out the results of the 2024 future year assessments:

Approach	AM Peak				PM Peak			
	2024 Base		2024 Base + Com. + Dev		2024 Base		2024 Base + Com. + Dev	
	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)	Max RFC	Max Queue (PCU)
Pikey Lane	0.072	0.08	0.073	0.08	0.054	0.06	0.054	0.06
B5445 Chester Road (N)	0.086	0.17	0.090	0.18	0.069	0.12	0.080	0.15
B5373 Clappers Lane	0.509	1.01	0.649	1.77	0.448	0.80	0.547	1.18
B5445 Chester Road (S)	0.008	0.01	0.008	0.01	0.026	0.03	0.027	0.03

Table 6.22 – Junction 5: '2024 Base Flows' and '2024 Base + Full Development' Scenarios

- 6.6.54 The results indicate that the junction is forecast to operate within capacity at the 2024 Base scenario during both peak periods.
- 6.6.55 Following the addition of the projected committed development and proposed development traffic, the junction continues to operate within capacity during the 2024 AM and PM scenarios.
- 6.6.56 It has been demonstrated that the B5373 Clappers Lane / B5445 Chester Road junction (Junction 5) would continue to operate within capacity five years post build completion, considering the impact of the proposed development and the nearby committed development at Rhosrobin.

6.7 Summary

- 6.7.1 The above analysis indicates that the local highway network Junctions 2, 3, 4 and 5 are forecast to operate within practical capacity in the future years of 2019 and 2024. It is anticipated that some minor queuing may occur across the network, although it is considered that the proposed development would have minimal impact on this queuing.
- 6.7.2 Once the committed development traffic at Rhosrobin and the proposed development at Home Farm is considered, it is forecast that Junctions 2, 3, 4, and 5 will continue to operate within practical capacity in a future years of 2019 and 2024.
- 6.7.3 Junction 1 (The Crown Crossroads) has been forecast to operate over capacity at both future years of 2019 and 2024, even without considering the committed and proposed development traffic. Although the impact of the proposed development at this junction is relatively small, it is suggested that a mitigation measure is provided in the form of the installation of MOVA, and review of signal timings.

7.0 Transport Planning Policy

7.1 Introduction

- 7.1.1 This section of the report sets out the key national and local traffic and transport policies that are relevant to this application.

7.2 Planning Policy Wales

- 7.2.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. The document forms a total of 13 subject specific chapters, which are supplemented by a series of Technical Advice Notes (TANs).

PPW Chapter 8: Transport

- 7.2.2 Chapter 8 of PPW concerns Transport. The document sets out the aim of extending choice in transport and to extend accessibility in a way which supports sustainable development, which will be done by:

“...encouraging a more effective and efficient transport system, with greater use of the more sustainable and healthy forms of travel, and minimising the need to travel.”

- 7.2.3 It is recognised that land use planning can help to achieve the above aims in the following ways:

- *“Reducing the need to travel, especially by private car, by locating development where there is good access by public transport, walking and cycling;*
- *Locating development near other related uses to encourage multi-purpose trips and reduce the length of journeys;*
- *Improving accessibility by walking, cycling and public transport;*
- *Ensuring that transport is accessible to all, taking into account the needs of disabled and other less mobile people;*
- *Promoting walking and cycling;*
- *Supporting the provision of high quality public transport;*
- *Supporting traffic management measures;*
- *Supporting sustainable travel options in rural areas;*
- *Supporting necessary infrastructure improvements; and*
- *Ensuring that, as far as possible, transport infrastructure does not contribute to land take, urban sprawl or neighbourhood severance.”*

- 7.2.4 It is considered that the proposed development is consistent with these objectives. There is good access by walking and cycling, and the site is accessible by bus, and by train as part of a multi-modal

trip. In addition, bus accessibility (and therefore also train accessibility) could be improved by the provision of internal features to facilitate the re-routing of services. The site is also demonstrated to be being located near to existing services, which can be accessed by sustainable modes of travel.

- 7.2.5 The accompanying Interim Travel Plan has been produced in order to promote sustainable modes of transport.

Planning Policy Wales, Technical Advice Note 18: Transport

- 7.2.6 Chapter 8 of PPW is supplemented by Technical Advisory Note (TAN) 18 which provides detailed guidance on implementing the transport objectives contained in PPW Chapter 8.

- 7.2.7 TAN 18 outlines the need for, and the required content of Transport Assessments, for some classifications and scales of development in Wales. The document outlines the following aims of 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 modes.”*

- 7.2.8 TAN 18 also outlines the importance of producing a “Transport Implementation Strategy” (TIS) 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.”

- 7.2.9 A TIS for the development proposals is contained in the following **Section 8** of this TA.

7.3 Wrexham Unitary Development Plan

- 7.3.1 The Wrexham UDP 1996 - 2011 was adopted by WCBC on the 14th February 2005. It is scheduled to be replaced by the Local Development Plan 2 (currently being prepared) in December 2016, but currently remains the framework for local decision making in Wrexham.

- 7.3.2 The two relevant transport policies contained in the UDP comprise Policy T8 and Policy T9. These are discussed in greater detail below:

Wrexham UDP Policy T8

7.3.3 The UDP Policy T8 states:

“Development granted planning permission will be required to provide vehicle parking spaces either on site or nearby, in accordance with the Council's current parking standards. Special regard will be paid to the following factors, as appropriate:-

- a) the availability of public transport nearby,*
- b) proximity to public car parking,*
- c) proximity to local services and facilities,*
- d) road safety hazards and amenity considerations arising from on-street parking in the vicinity of the site.*

Where implementation difficulties arise in making parking provision on-site or nearby, the Council will require a developer to make financial contributions for measures to assist public transport, or walking and cycling as appropriate.”

7.3.4 The council's current parking standards are contained in Local Planning Guidance Note 16, which is considered in the following subsection. It is considered that the proposed on-site residential parking will be sufficient for the operation of the development.

Wrexham UDP Policy T9

7.3.5 The UDP 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. Opportunities for horse riding along these routes will be secured where appropriate.”

7.3.6 It is considered that the proposals provide good pedestrian and cycle connectivity throughout the site, and there are three access points which can also be utilised by such modes. Two of these access points provide access to an existing established residential area via Gresford Road.

7.4 Local Planning Guidance Notes

7.4.1 The Council has approved a series of Local Planning Guidance Notes (LPGNs) which amplify Development Plan policy. These are used where the study area is relatively small or the topic specific, often when flexibility and speed of response is required for Planning Control decisions.

7.4.2 The single relevant LPGN is No.16 – Parking Standards. The contents of LPNG No.16 are discussed in greater detail below:

Wrexham LPGN No. 16

7.4.3 Figure C of the LPGN illustrates the parking standards for residential dwellings, as below in **Table 7.1**:

Type of Development		Parking Standard	Cycle Parking Standard
C3 Dwellings	1 bedroom	1.5 car space per unit	Sufficient space to provide at least 2 secure cycle parking spaces per dwelling. In the case of flats, this should be provided via safe and secure communal parking areas.
	2 bedroom	2 car space per units	
	3/4 bedroom	3 car space per units	
	5 or more bedrooms	4 car space per units	

Table 7.1 – Wrexham Parking Standards: C3 - Dwellings

7.4.4 The development will provide appropriate parking in accordance with the above **Table 7.1**.

7.5 Transport Planning Policy Summary

7.5.1 In summary, it is considered that the development proposals accord with all relevant local and national transport planning policy. A TIS has also been prepared in the following **Section 8**.

8.0 Transport Implementation Strategy

8.1 Introduction

- 8.1.1 In line with the guidance contained in TAN 18, this section is intended to draw together the elements of a Transport Implementation Strategy for the proposed development.

8.2 Policy Requirements and Objectives

- 8.2.1 The previous **Section 7** of this Transport Assessment includes an examination of national and local transport policy relevant to the development. The main national and local policy objectives that have been identified following this examination can be summarised as follows:

- Reduce the need to travel, especially by private car;
- Improve accessibility by walking, cycling and public transport;
- Promote walking and cycling and sustainable modes of travel;
- Ensure that transport is accessible to all;
- Support the provision of high quality public transport; and
- Support necessary infrastructure improvements.

8.3 Measures

- 8.3.1 In order to successfully deliver the development whilst meeting the above objective the following measures are proposed:

Infrastructure Improvements

- New access arrangements are proposed at the site as summarised below:
 - Compact Roundabout from the Straight Mile;
 - Two Mini-roundabouts from Gresford Road; and
 - Pedestrian access points from PRow number LLA/5.
- Potential speed reduction along The Straight Mile to be discussed and co-ordinated further following a current review of all “A” and “B” classified roads throughout the county borough.
- New footways would be installed at the junction bellmouths at Gresford Road in order to provide pedestrian access.
- Internal features to facilitate the re-routing of service numbers 28A, 34, PC1 and PC2 to divert through the site.
- Inclusion of bus stops for service numbers 28A, 34, PC1 and PC2 to call at throughout the site.
- Provision of bus priority measures throughout the development to allow safe, reliable progression through the site.

- Installation of MOVA, and review of signal timings at Junction 1 (The Crown Crossroads).

Travel Planning and Demand Management

8.3.2 An Interim Travel Plan (**Doc. ref.: TPMA5021/ITP**) has been prepared to accompany the outline application. The key initiatives are summarised below:

- Welcome packs would be issued to all future residents of the site, which would provide details of:
 - Local walking and cycling routes;
 - Local bus timetable/route information;
 - Information on the health and environmental benefits of walking and cycling; and
 - Information on the benefits of car sharing.
- Notice boards to be provided at the village green to provide additional information regarding walking, cycling, public transport and car sharing opportunities.
- Appointment of a residential Travel Plan Coordinator (TPC).
- Limited time money off-vouchers for public transport services.

8.4 Targets and Monitoring

8.4.1 The effectiveness of the above measures will be monitored within the Travel Plan process.

8.4.2 It is important that an accurate baseline for modal split is ascertained so that realistic targets for modal shift can be set. However, such information is not available until the site has been developed and occupied. Therefore this TIS does not set a specific target.

8.4.3 Within three months of 50% of the development being occupied, travel surveys would be distributed to all residents, to establish baseline modal share figures. From this baseline scenario, targets will be set for achieving a shift towards sustainable modes of travel. The TPC would then undertake annual surveys to monitor modal shift, reporting these findings to the Local Authority.

9.0 Summary and Conclusions

9.1 Summary

- 9.1.1 This Transport Assessment (TA) has been prepared by Curtins to support an outline planning application for a residential development at Home Farm in Llay, Wrexham. The application is for c.365 residential dwellings.
- 9.1.2 The site is located at the north eastern edge of Llay, bound by the B5102 The Straight Mile to the north and the B5373 Gresford Road to the west. Undeveloped land binds the site to the east and west.
- 9.1.3 Vehicular access is proposed at three separate points, comprising:
- Site Access 1 – Compact roundabout from The Straight Mile
 - Site Access 2 – Mini-roundabout from Gresford Road
 - Site Access 3 – Mini-roundabout from Gresford Road
- 9.1.4 Appropriate vehicle tracking has been demonstrated at each access point.
- 9.1.5 It is considered that the site is well located to benefit from existing pedestrian and cycle infrastructure. There is a wide range of facilities, employment opportunities and other residential areas within CIHT recommended walking distance of the site, and it is considered that the surrounding area is relatively conducive to cycling.
- 9.1.6 The site is considered accessible by bus services which run along Gresford Road and Llay Road. In order to further enhance bus accessibility, it is proposed that the development will provide internal features to facilitate the re-routing of services. Multi-modal trips involving rail is also a viable option for some future residents. It is envisaged that any bus re-routing would also enhance the appeal of rail as a mode of transport.
- 9.1.7 Additional measures are also proposed to include:
- Potential speed reduction along The Straight Mile
 - New footways would be installed at the junction bellmouths at Gresford Road in order to provide pedestrian access; and
 - Installation of MOVA, and review of signal timings at Junction 1 (The Crown Crossroads).

9.2 Conclusions

- 9.2.1 Following a review of this Transport Assessment, it can be considered that there are no highways and transportation reasons to refuse planning permission for the proposed development, considering the proposed improvements outlined in the TIS.

Plans

Drg No:

TPMA5021 - 001

Rev:

/

Project: HOME FARM, LLAY

Drg Title: REGIONAL SITE LOCATION PLAN

Drawn: SG

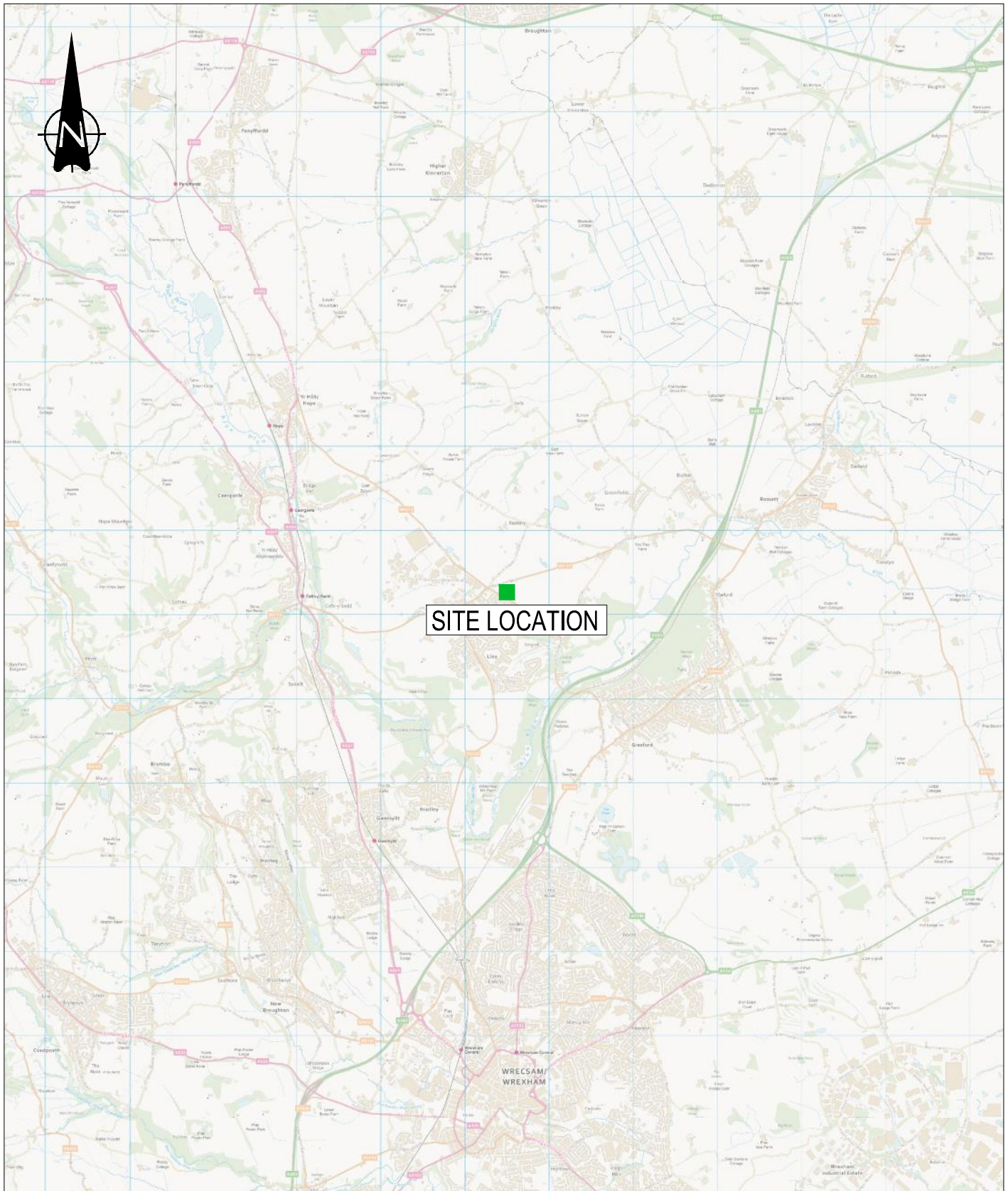
Checked: AT

Scale: NTS



Curtins Consulting Ltd,
Woodside Mews, Clayton Wood, Close, Leeds, LS16 6QE
t: 0113 274 8509
e: leeds@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham



Drg No:

TPMA5021 - 002

Rev:

/

Project: HOME FARM, LLAY

Drg Title: LOCAL SITE LOCATION PLAN

Drawn: SG

Checked: AT

Scale: NTS



Curtins Consulting Ltd,
Woodside Mews, Clayton Wood, Close, Leeds, LS16 6QE
t: 0113 274 8509
e: leeds@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham



Drg No:

TPMA5021 - 003

Rev:

/

Project: HOME FARM, LLAY

Drg Title: PEDESTRIAN CATCHMENT AREA

Drawn: SG

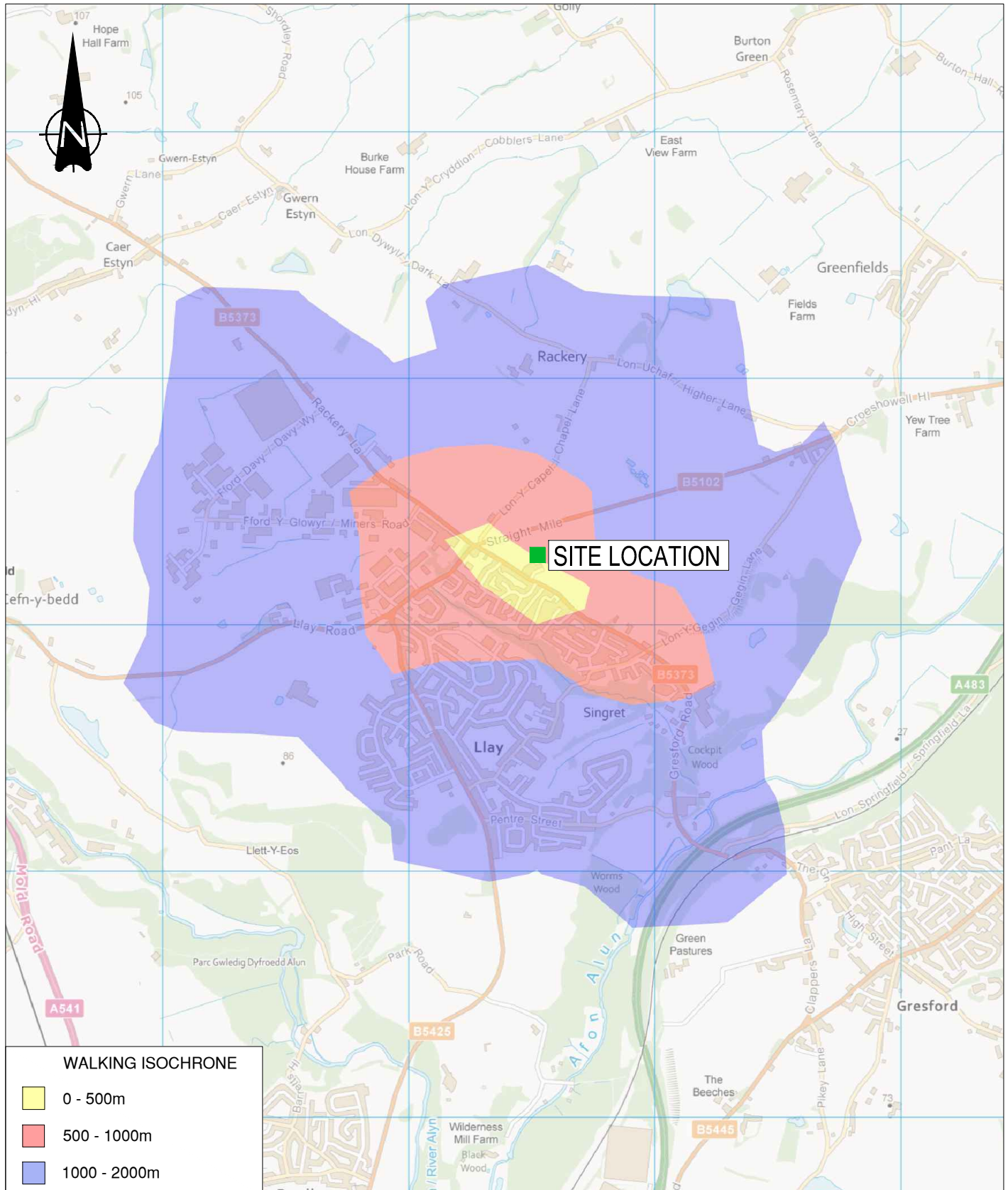
Checked: AT

Scale: NTS



Curtins Consulting Ltd,
Woodside Mews, Clayton Wood, Close, Leeds, LS16 6QE
t: 0113 274 8509
e: leeds@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham



Drg No:

TPMA5021 - 004

Rev:

/

Project: HOME FARM, LLAY

Drg Title: CYCLE CATCHMENT PLAN

Drawn: SG

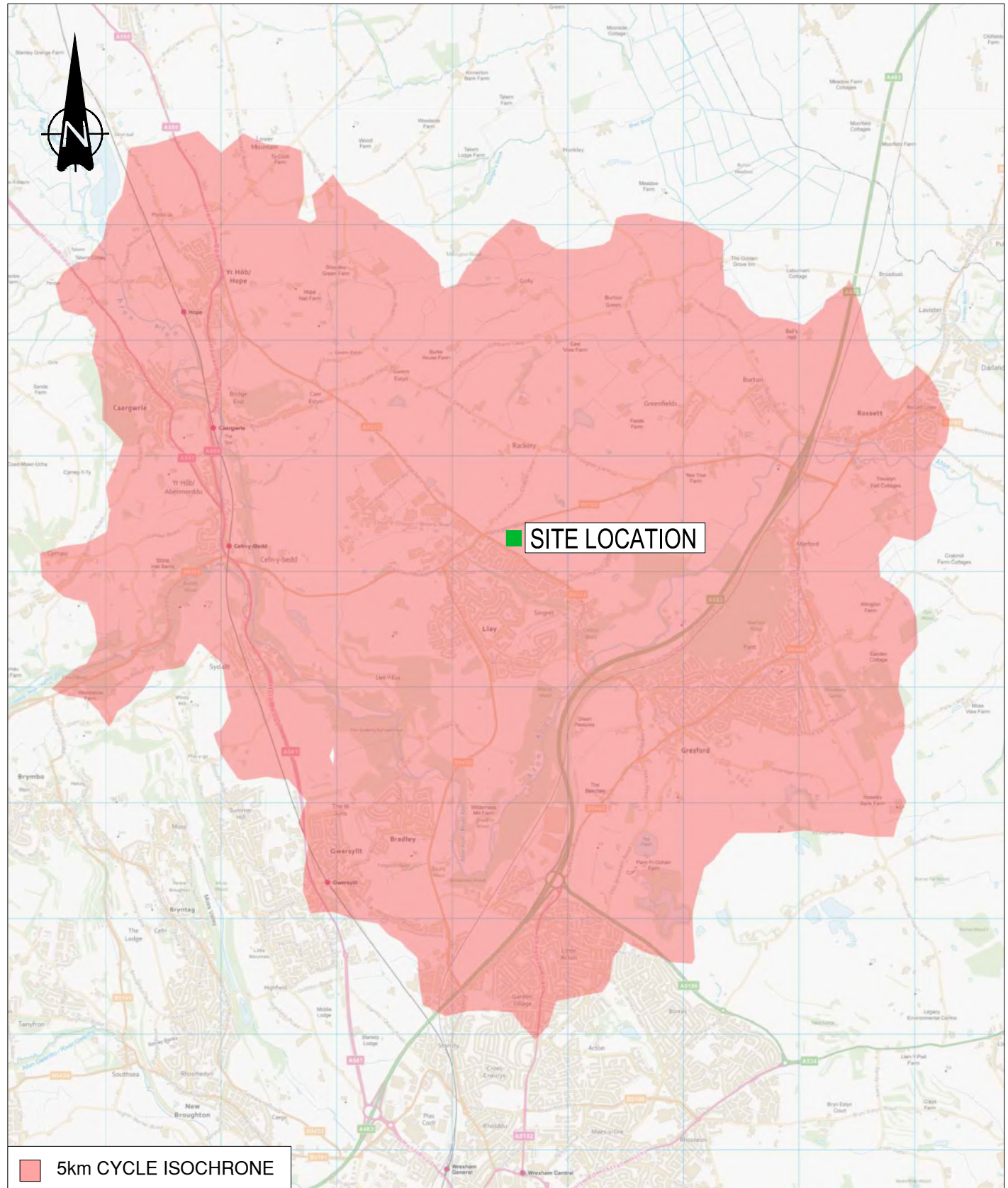
Checked: AT

Scale: NTS



Curtins Consulting Ltd,
Woodside Mews, Clayton Wood, Close, Leeds, LS16 6QE
t: 0113 274 8509
e: leeds@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham



Drg No:

TPMA5021 - 005

Rev:

/

Project: HOME FARM, LLAY

Drg Title: PUBLIC TRANSPORT ACCESSIBILITY

Drawn: SG

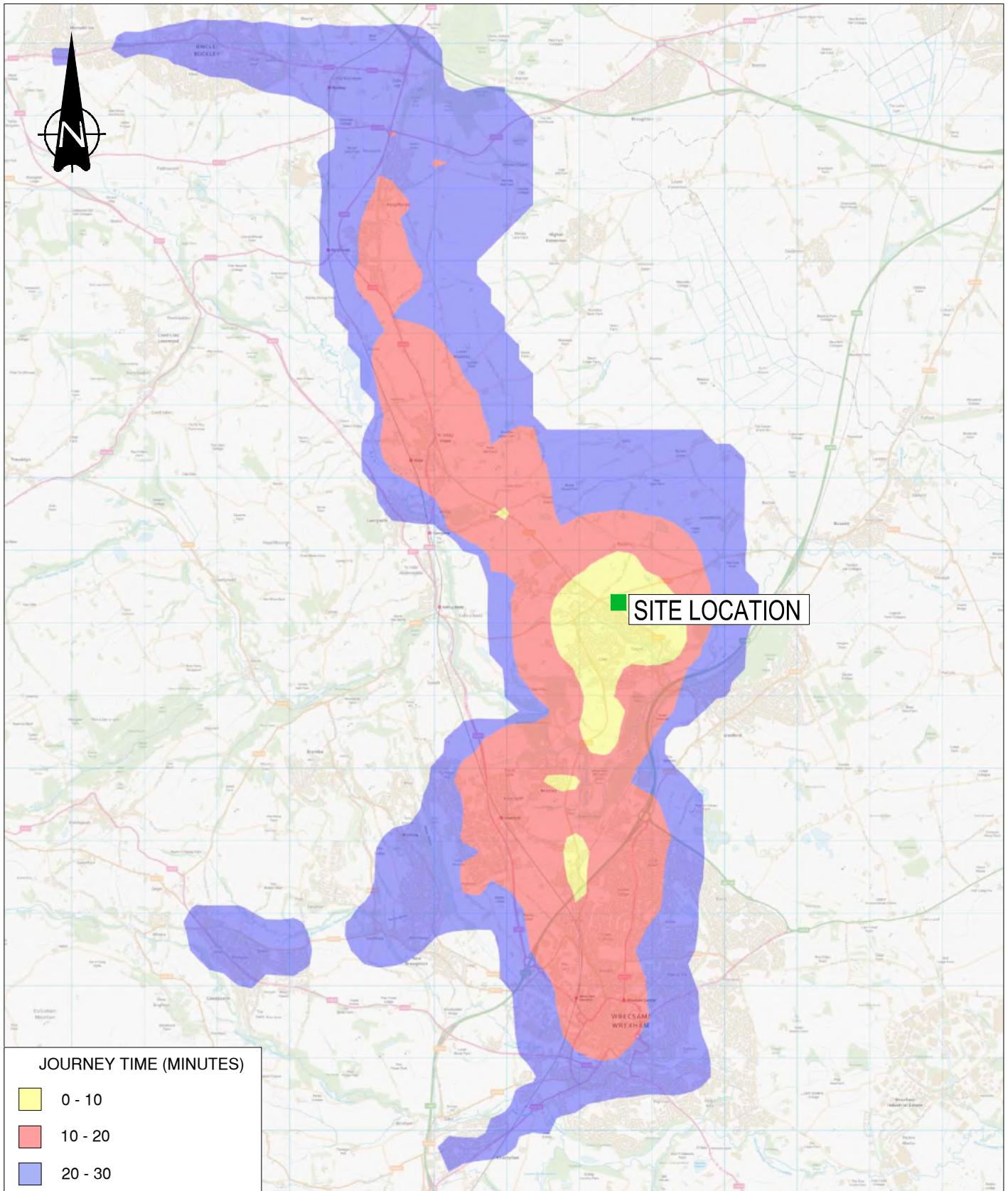
Checked: AT

Scale: NTS



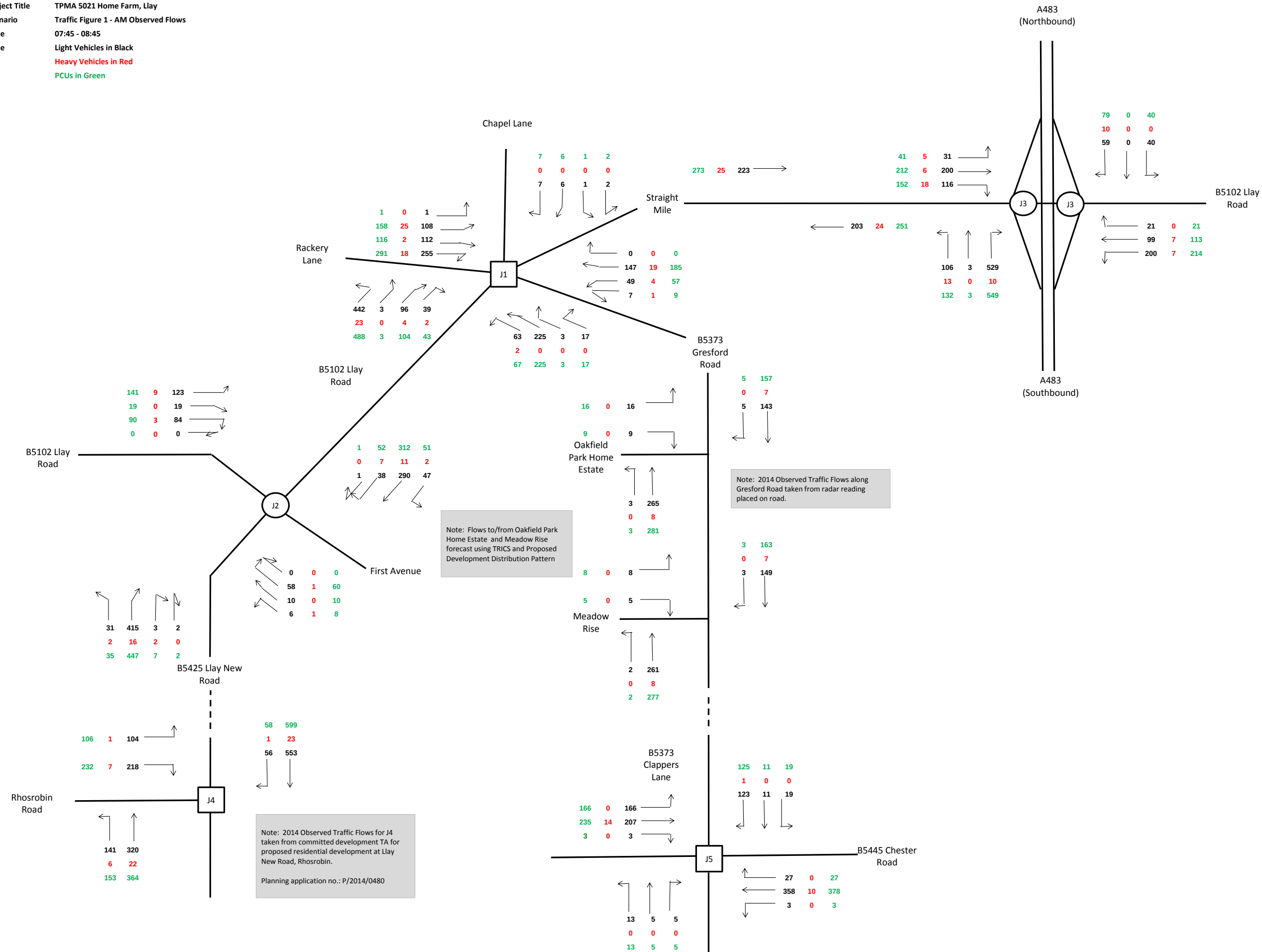
Curtins Consulting Ltd,
Woodside Mews, Clayton Wood, Close, Leeds, LS16 6QE
t: 0113 274 8509
e: leeds@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

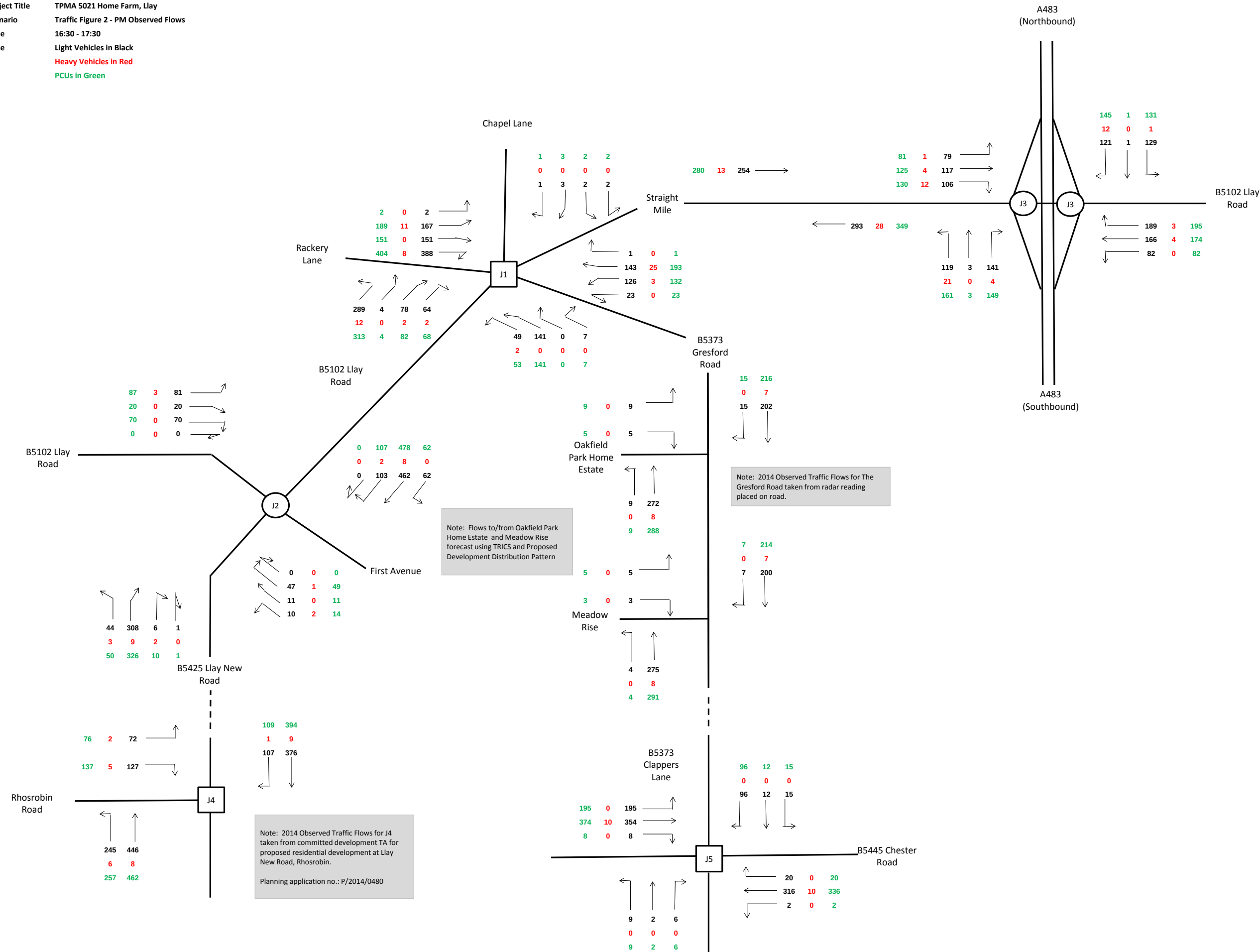


Traffic Figures

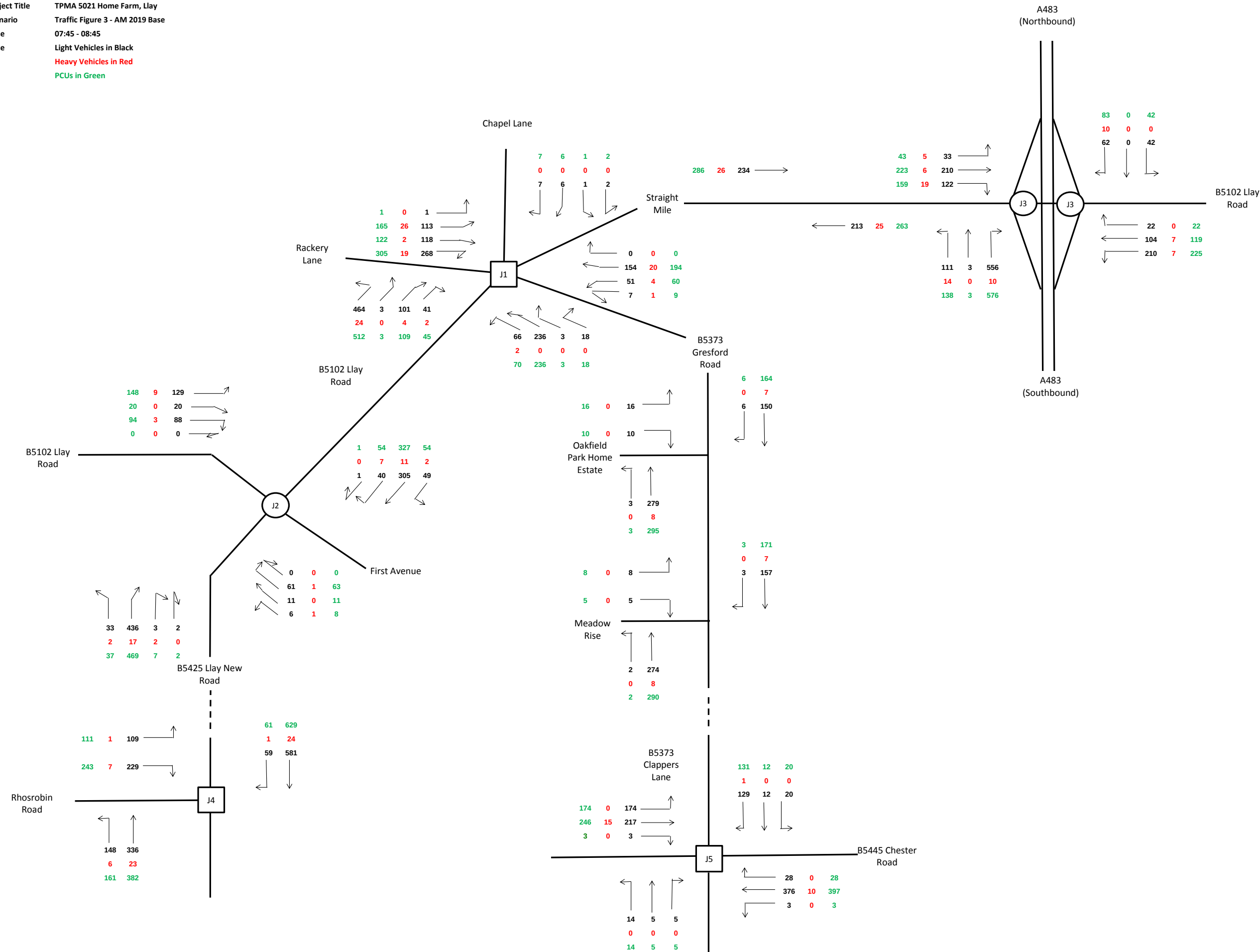
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 1 - AM Observed Flows
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



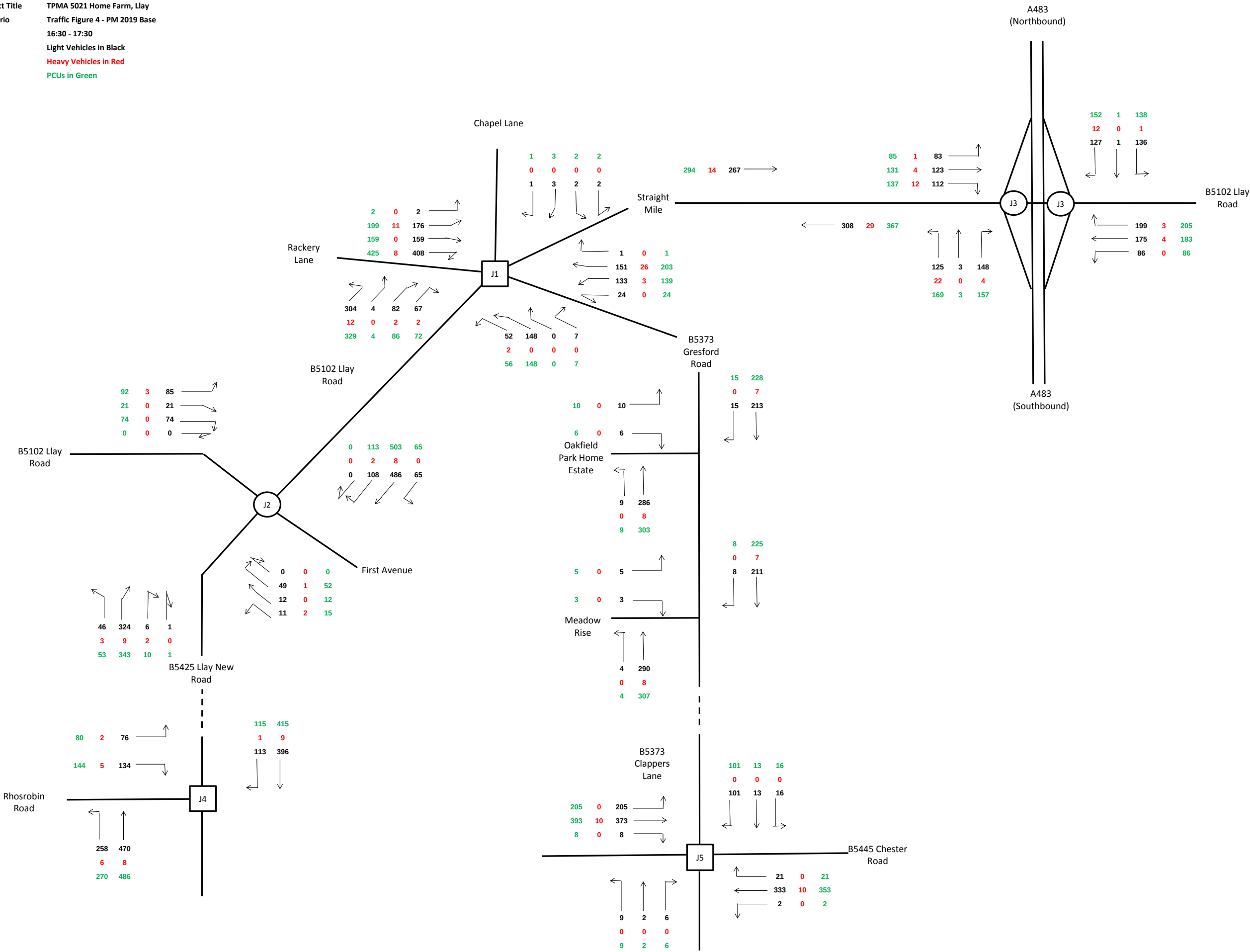
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 2 - PM Observed Flows
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 3 - AM 2019 Base
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

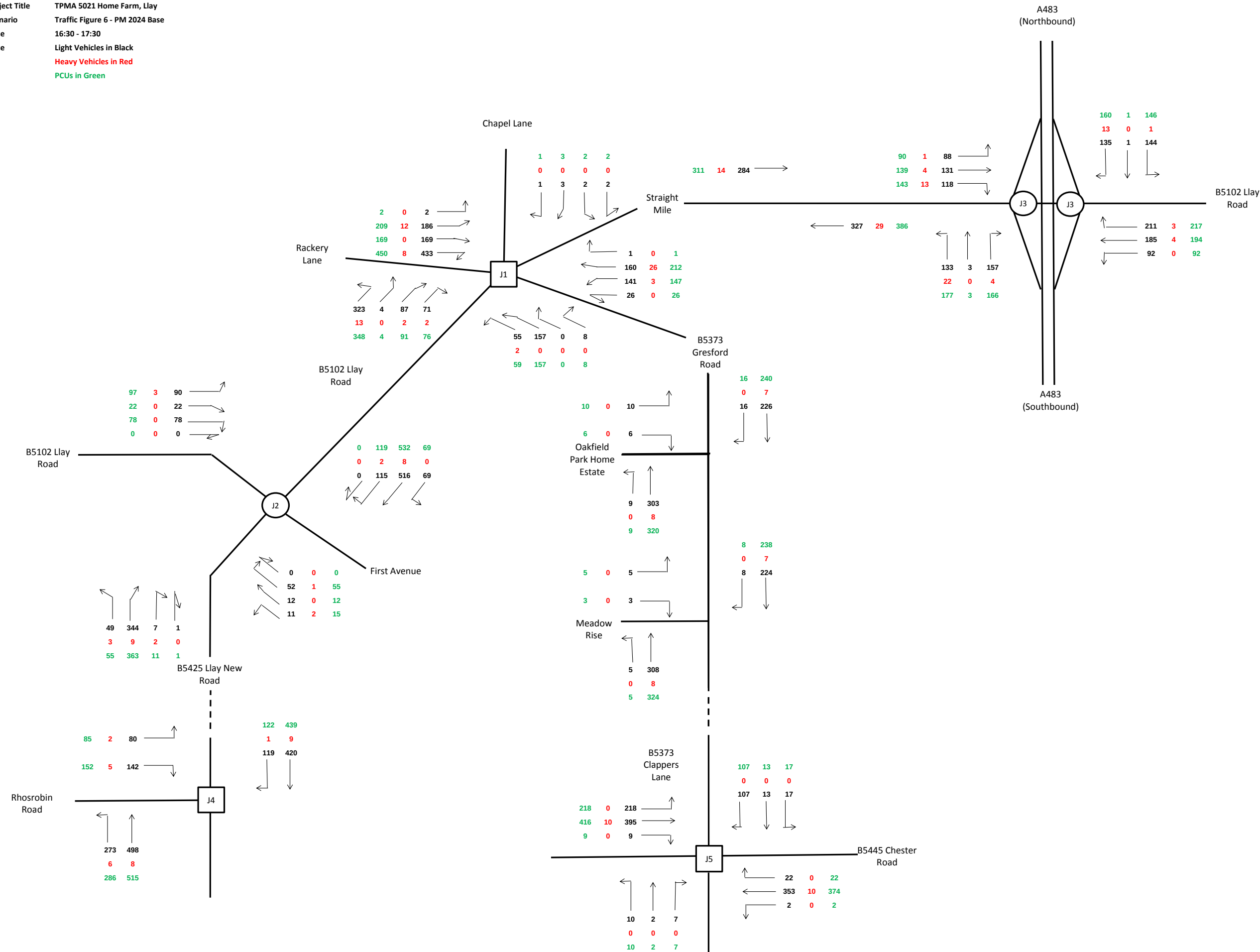


Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 4 - PM 2019 Base
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

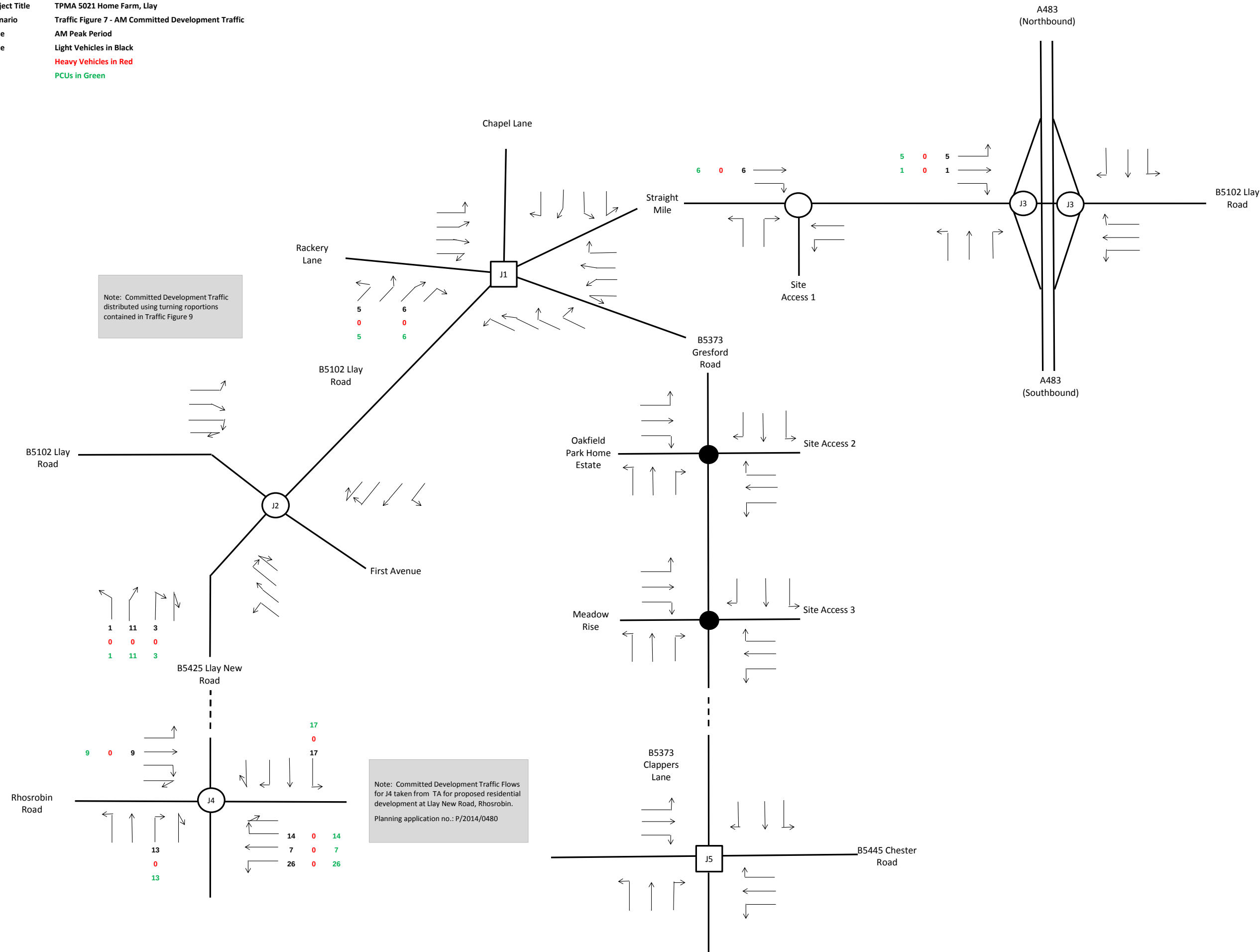


Project Title	TPMA 5021 Home Farm, Llay
Scenario	Traffic Figure 5 - AM 2024 Base
Time	07:45 - 08:45
Note	Light Vehicles in Black Heavy Vehicles in Red PCUs in Green

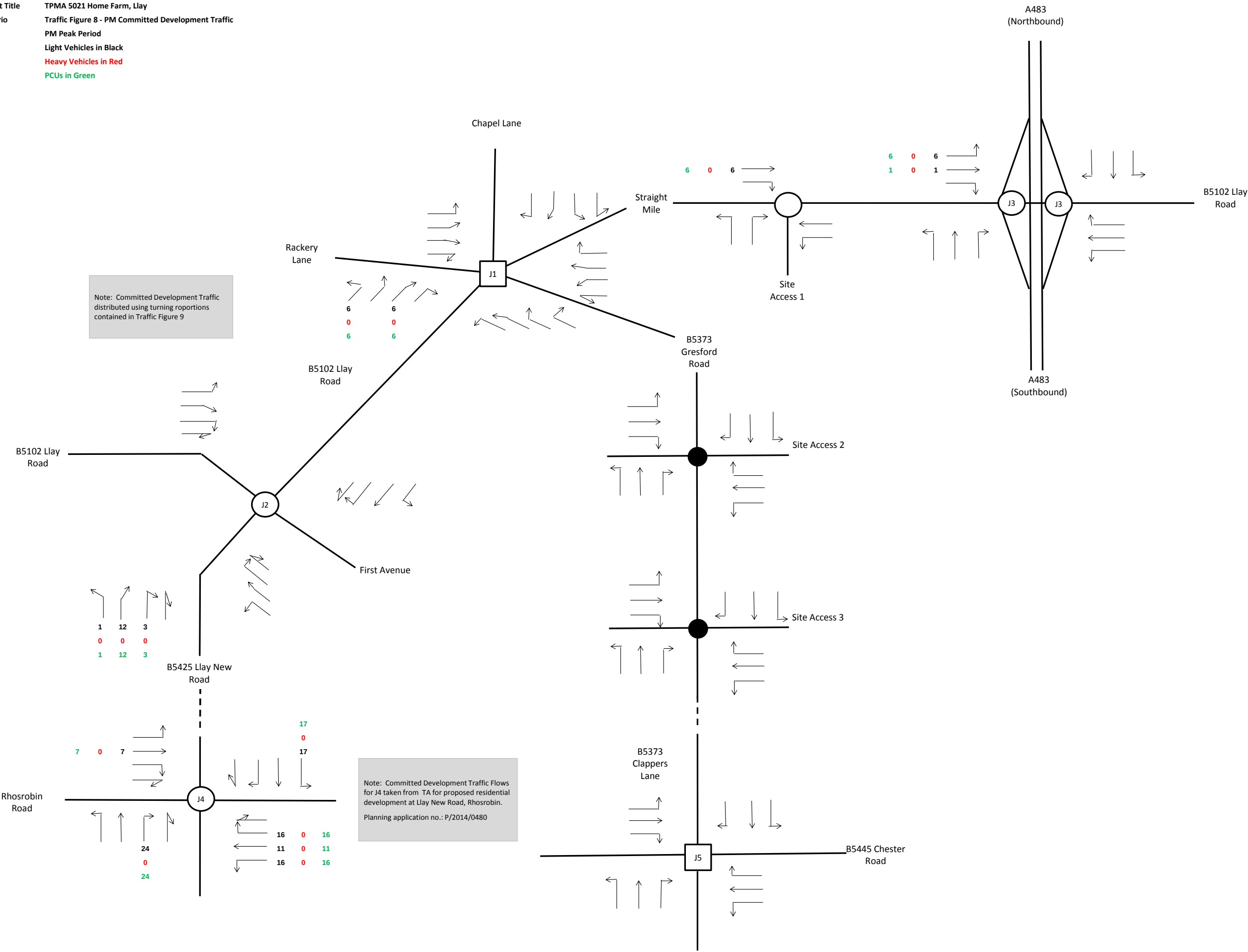
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 6 - PM 2024 Base
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



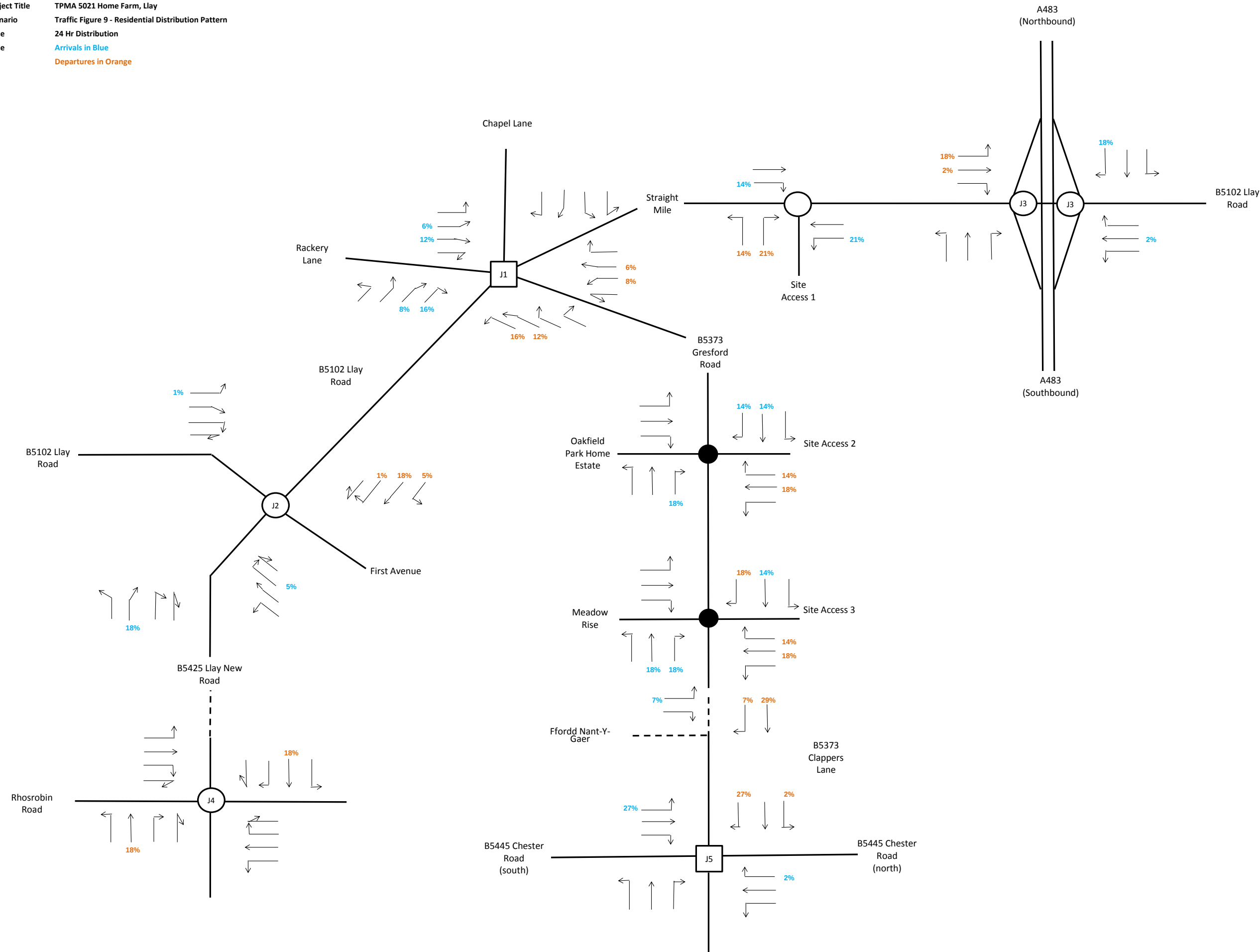
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 7 - AM Committed Development Traffic
Time AM Peak Period
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



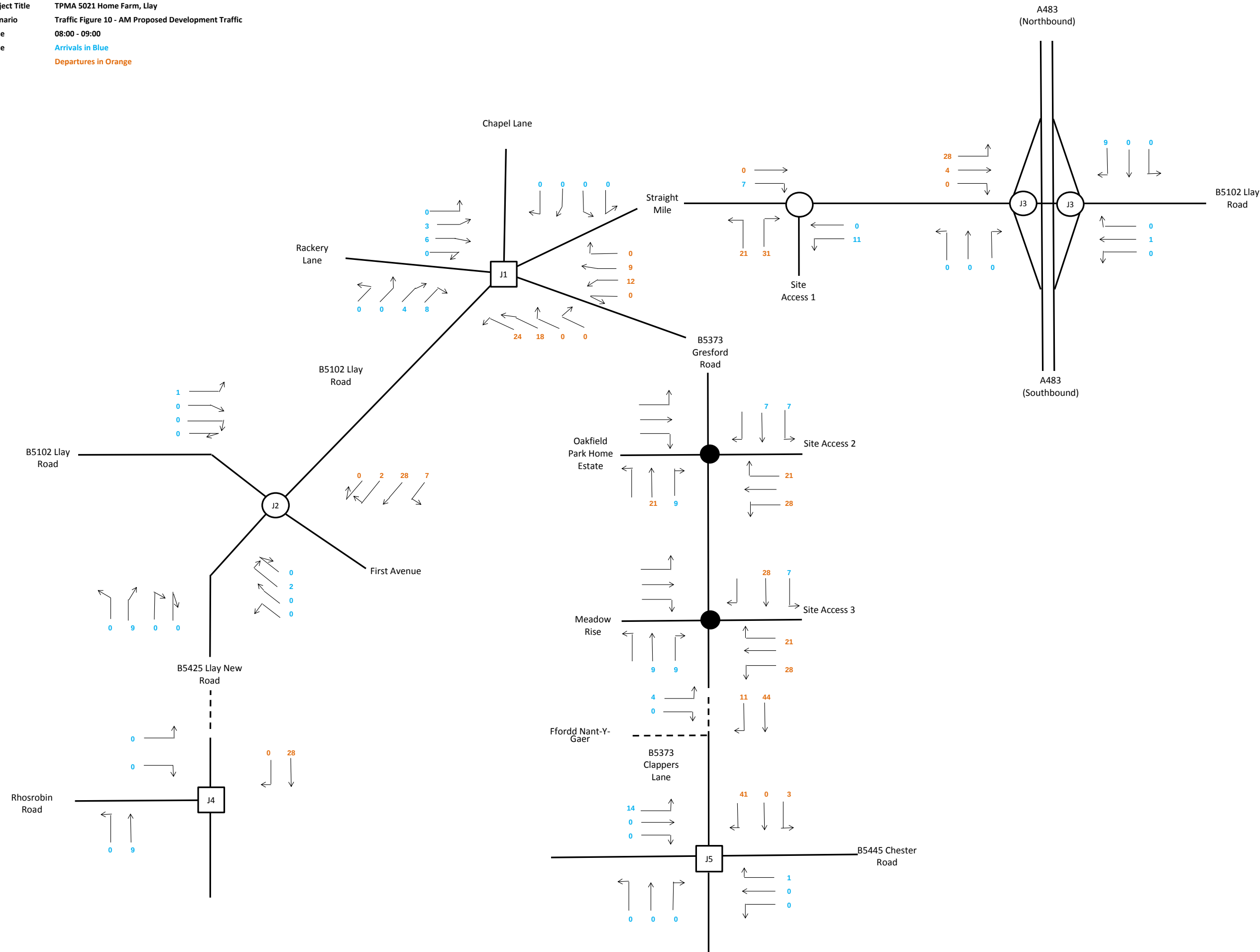
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 8 - PM Committed Development Traffic
Time PM Peak Period
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



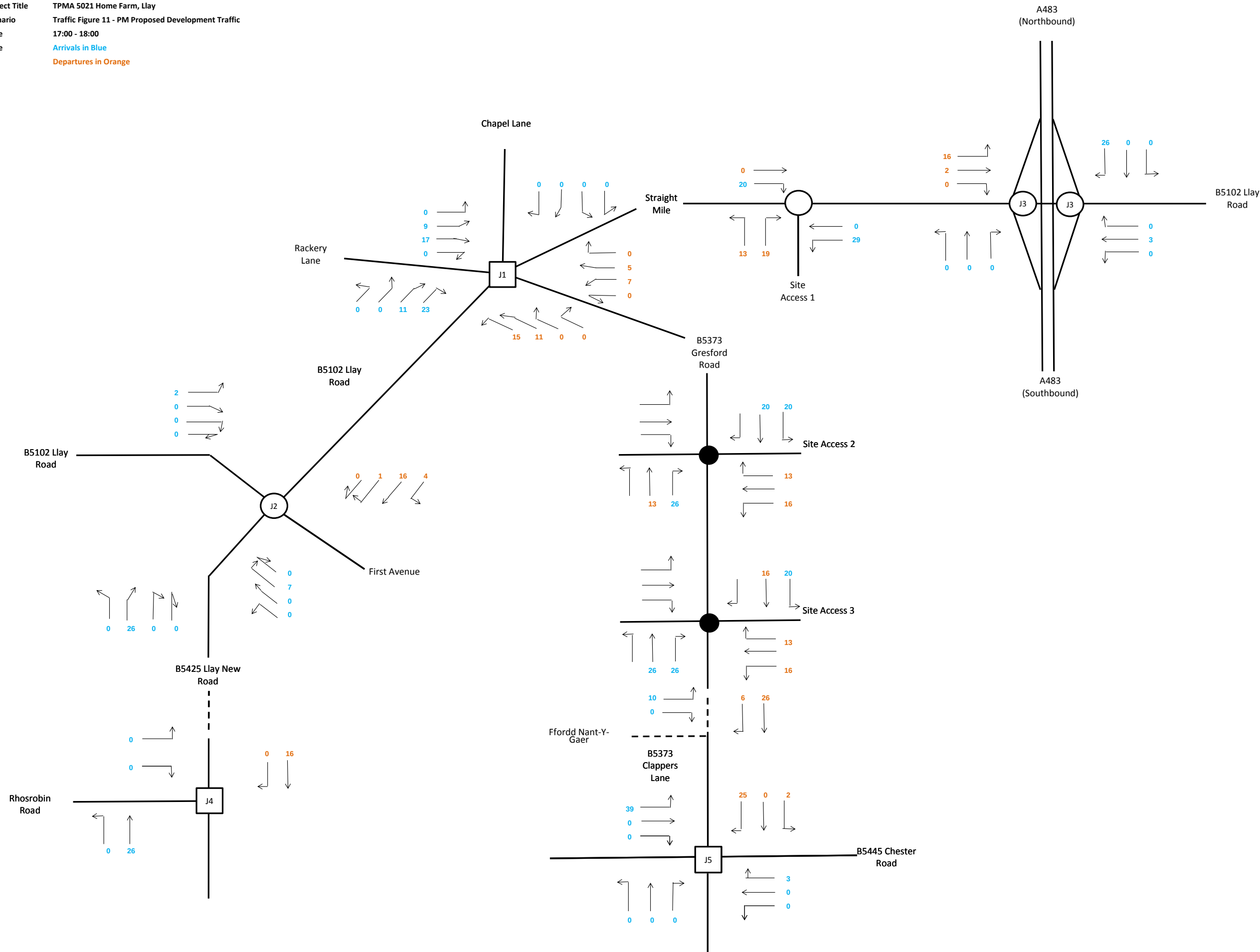
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 9 - Residential Distribution Pattern
Time 24 Hr Distribution
Note Arrivals in Blue
Departures in Orange



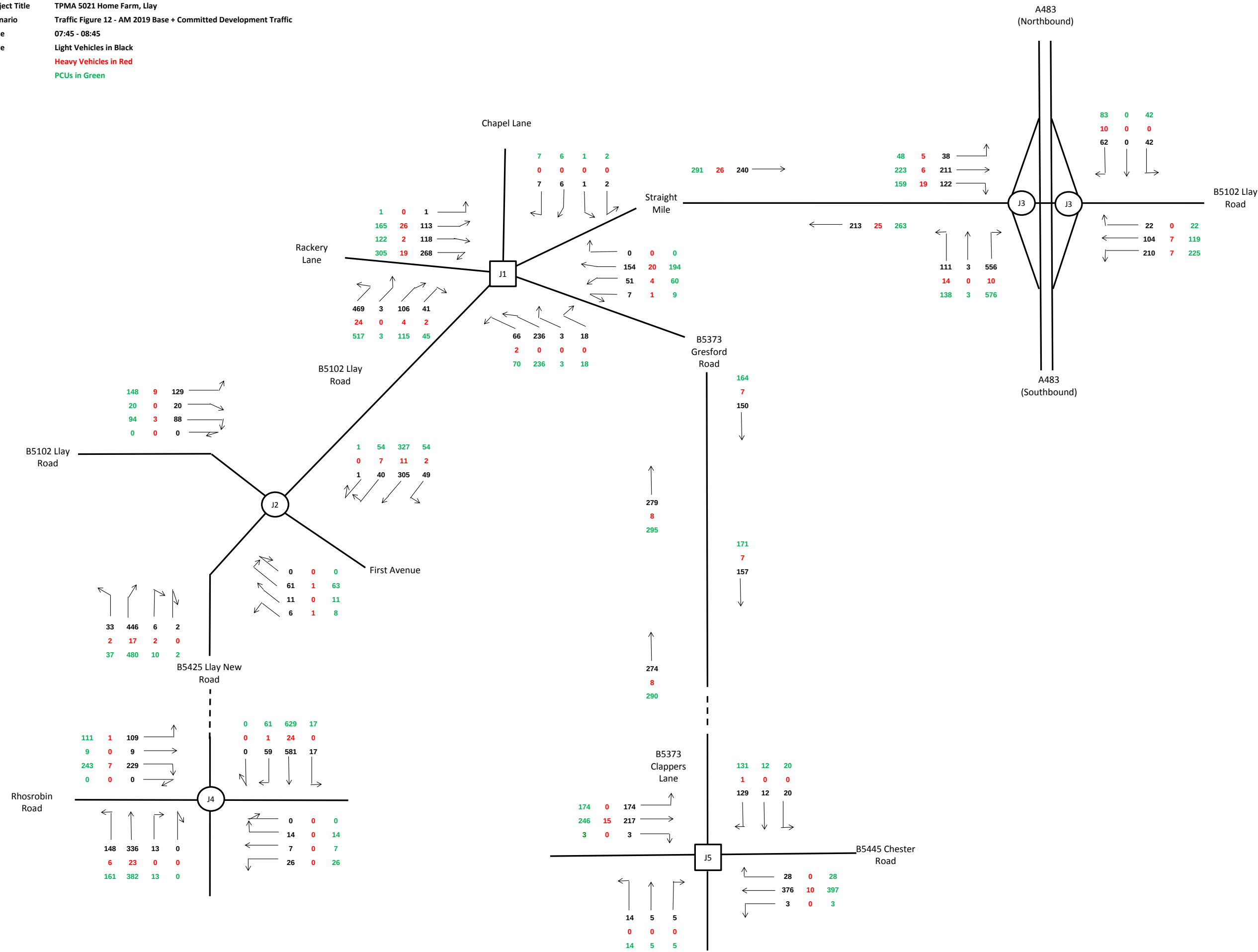
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 10 - AM Proposed Development Traffic
Time 08:00 - 09:00
Note Arrivals in Blue
Departures in Orange



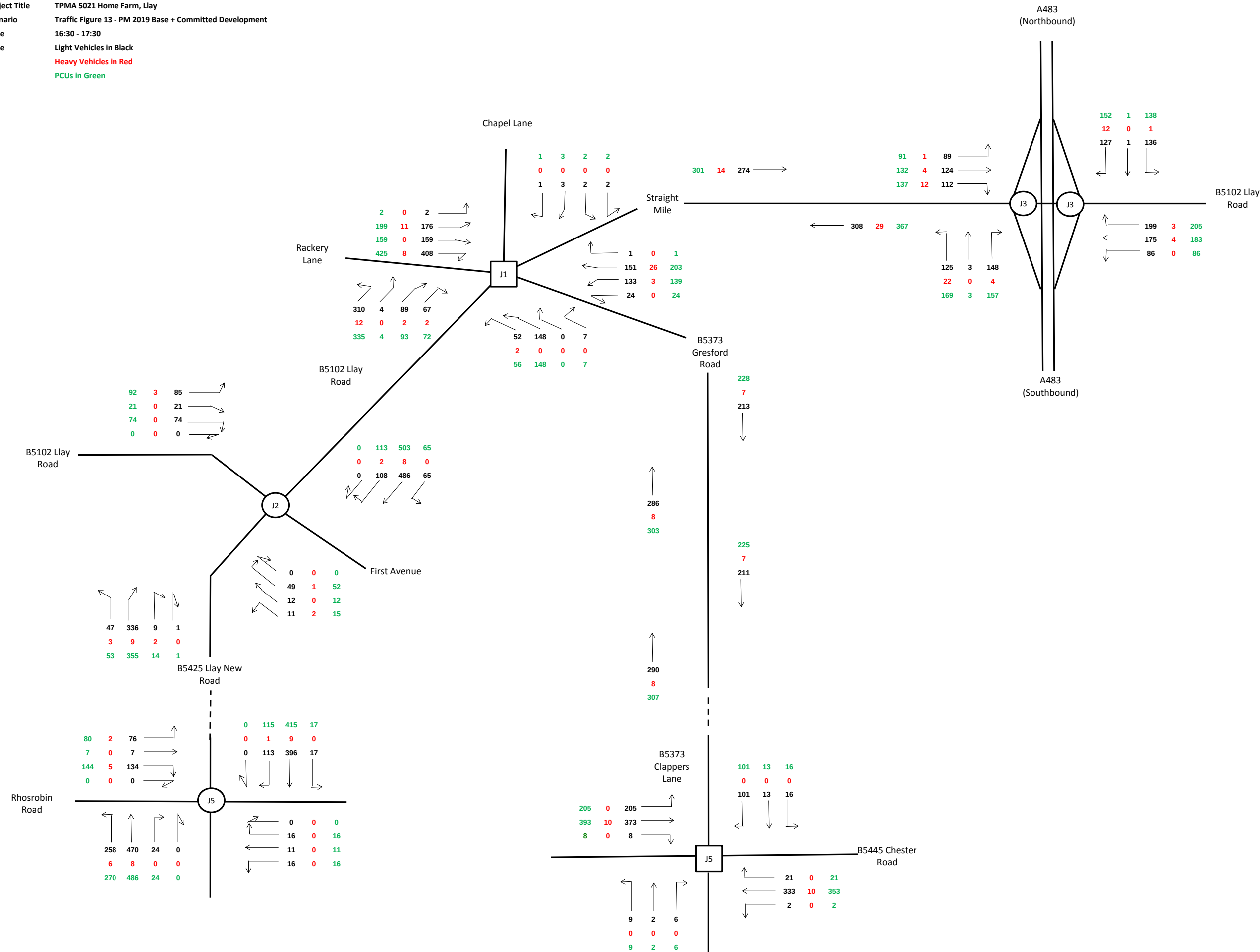
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 11 - PM Proposed Development Traffic
Time 17:00 - 18:00
Note Arrivals in Blue
Departures in Orange



Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 12 - AM 2019 Base + Committed Development Traffic
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

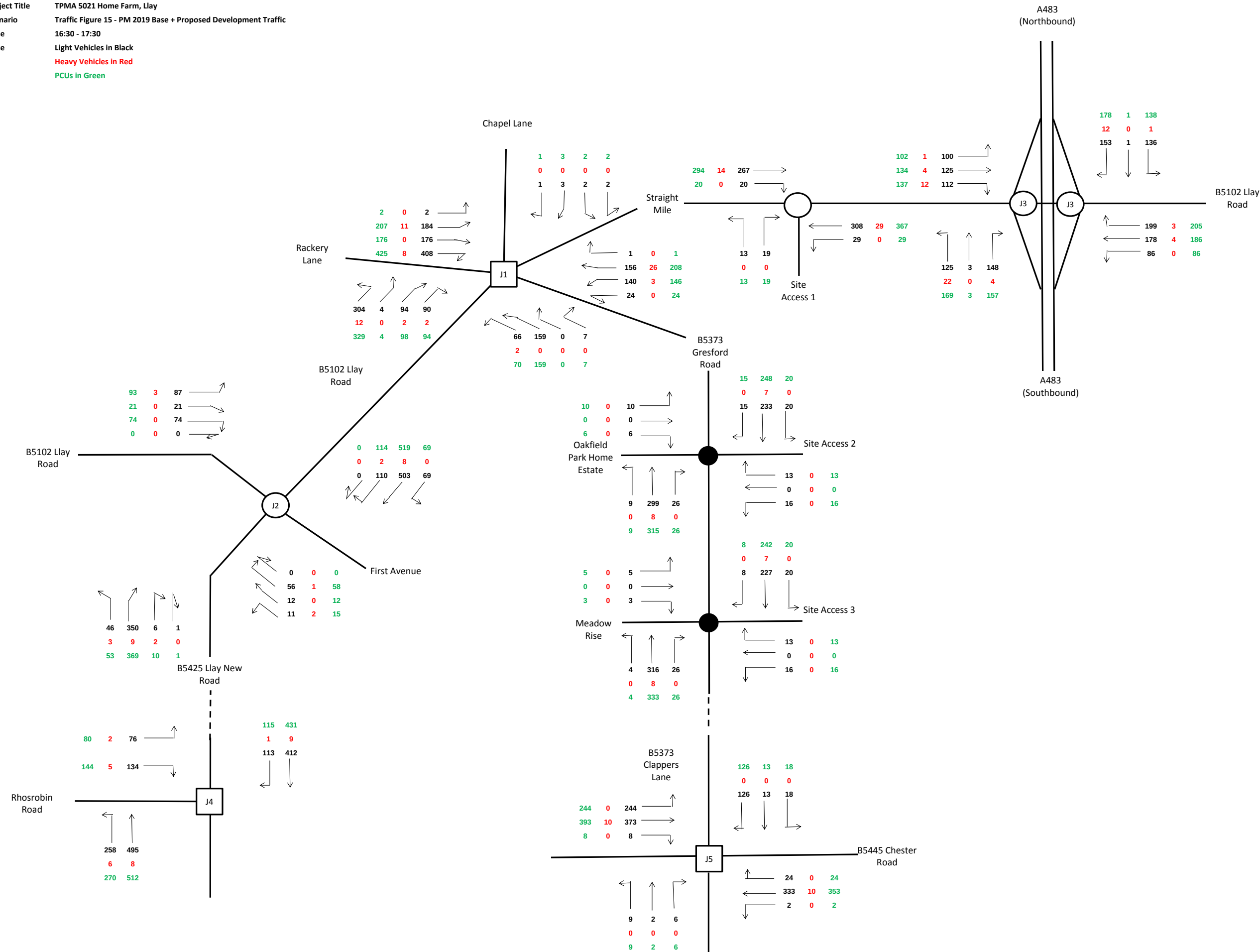


Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 13 - PM 2019 Base + Committed Development
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

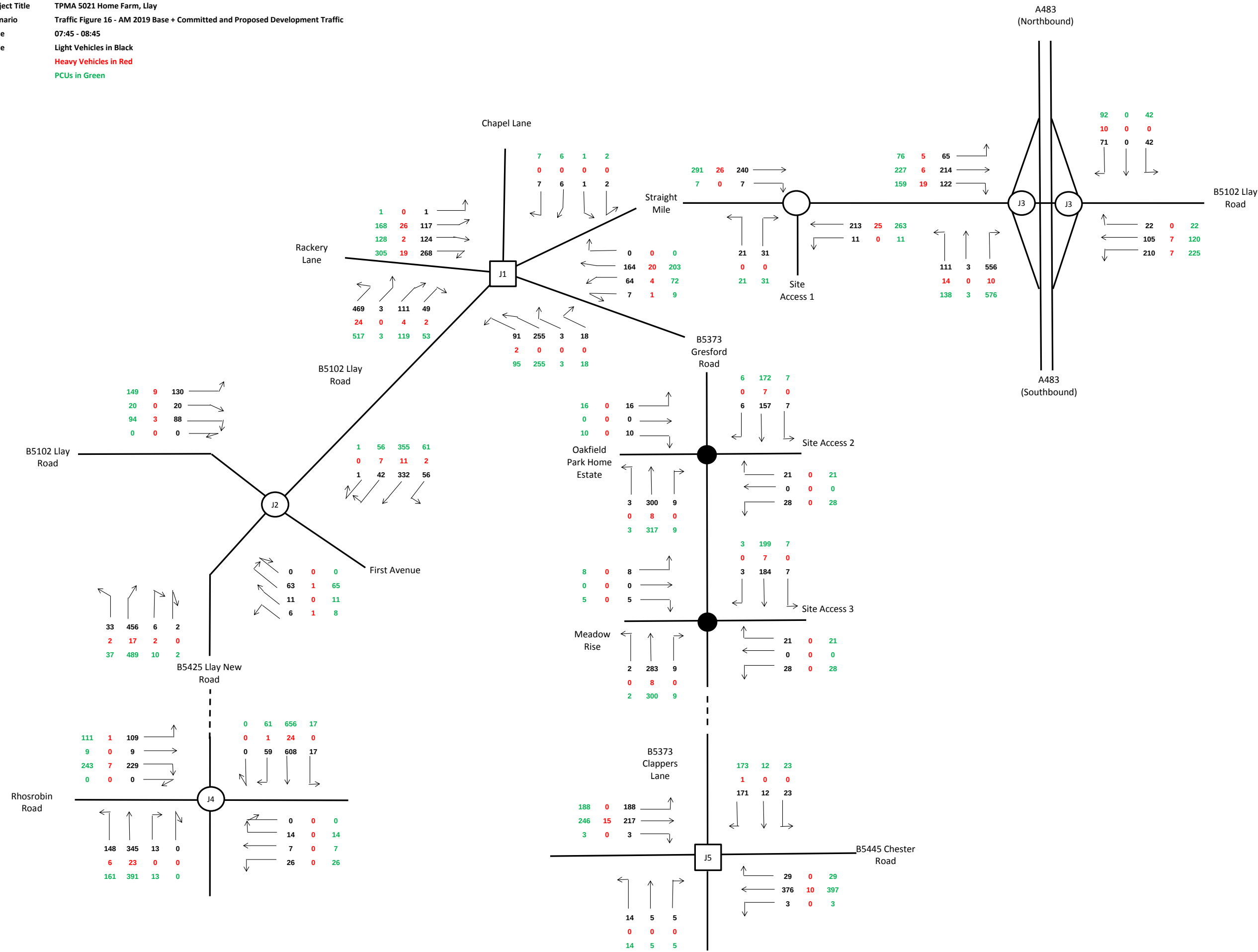


Project Title	TPMA 5021 Home Farm, Llay
Scenario	Traffic Figure 14 - AM 2019 Base + Proposed Development Traffic
Time	07:45 - 08:45
Note	Light Vehicles in Black Heavy Vehicles in Red PCUs in Green

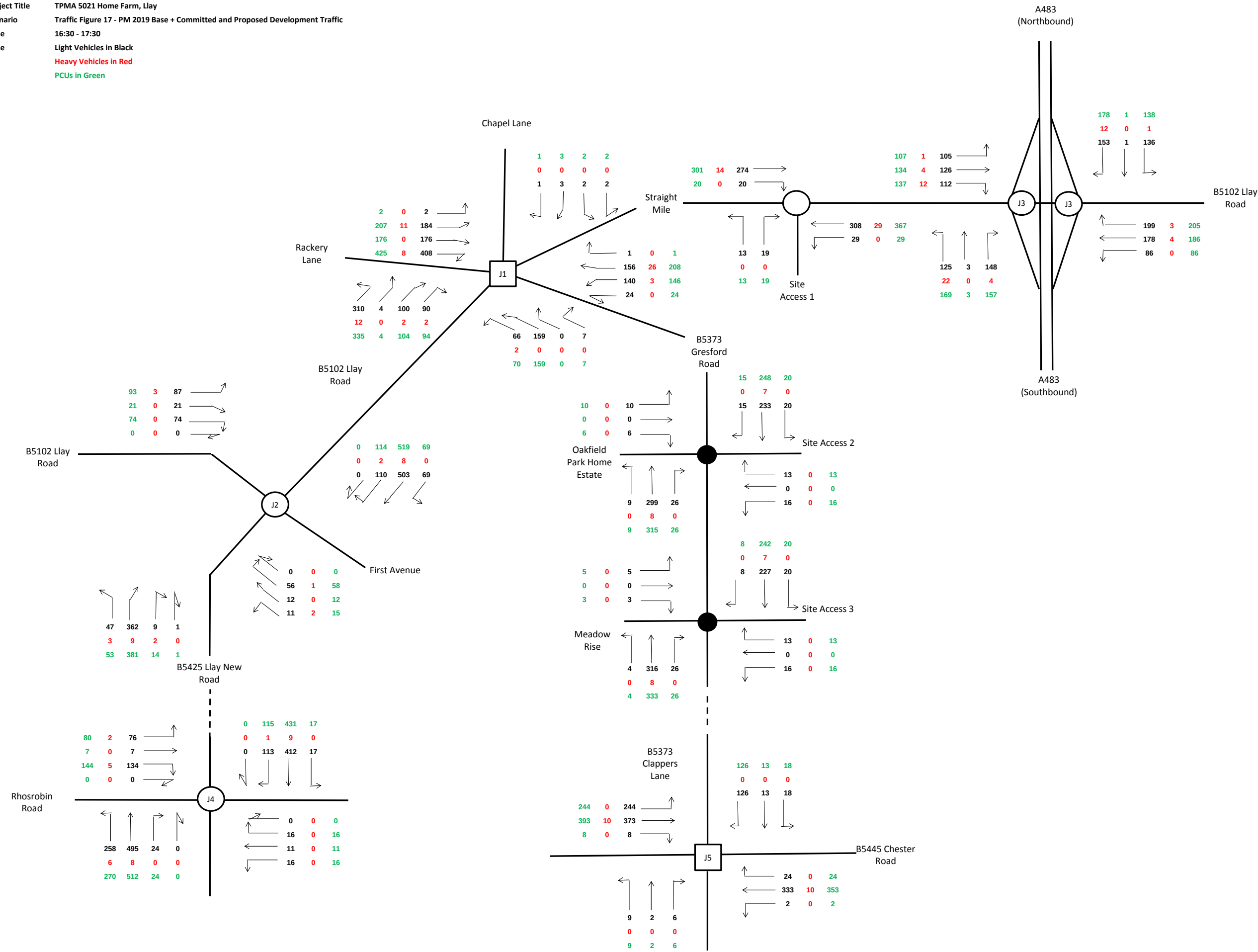
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 15 - PM 2019 Base + Proposed Development Traffic
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



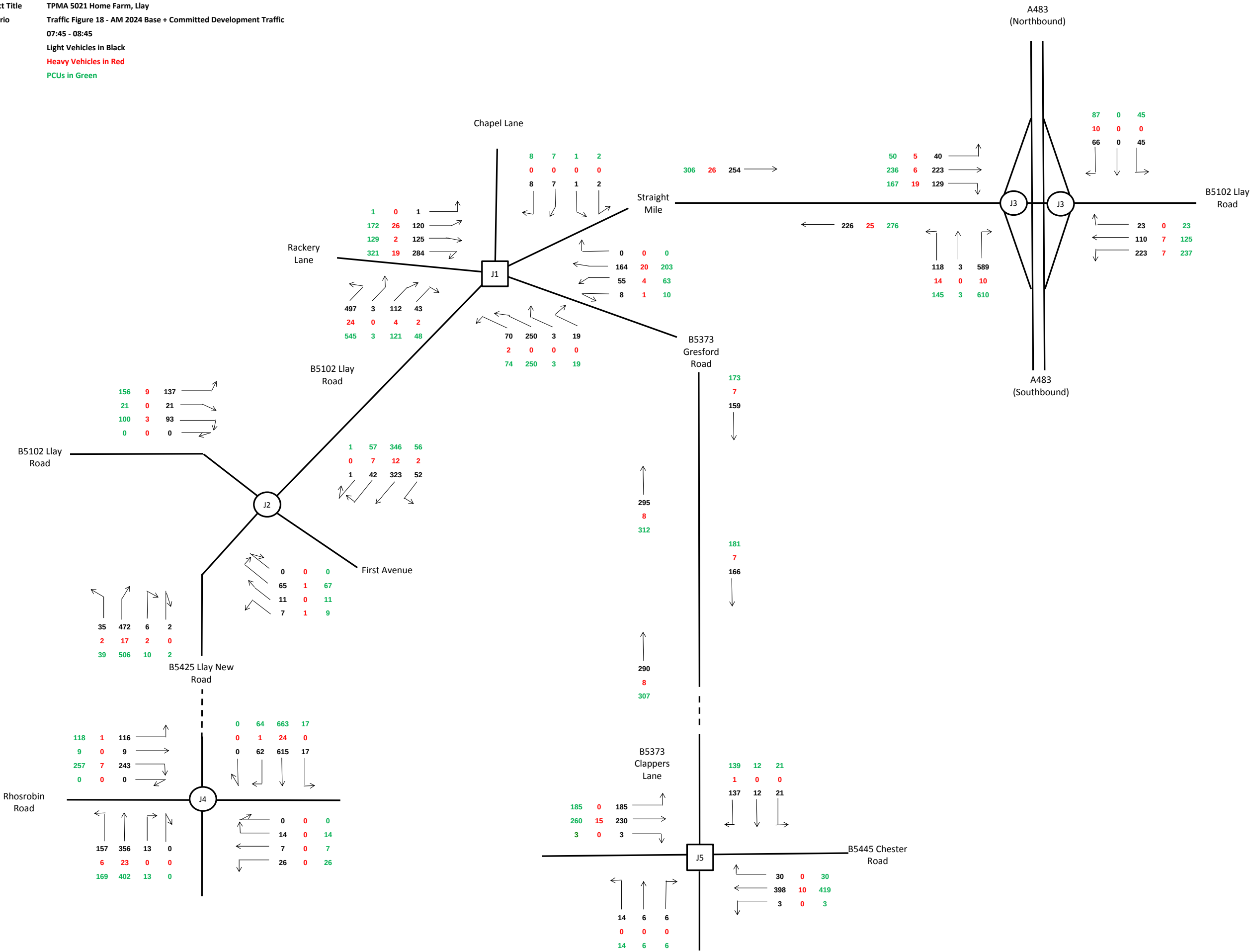
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 16 - AM 2019 Base + Committed and Proposed Development Traffic
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



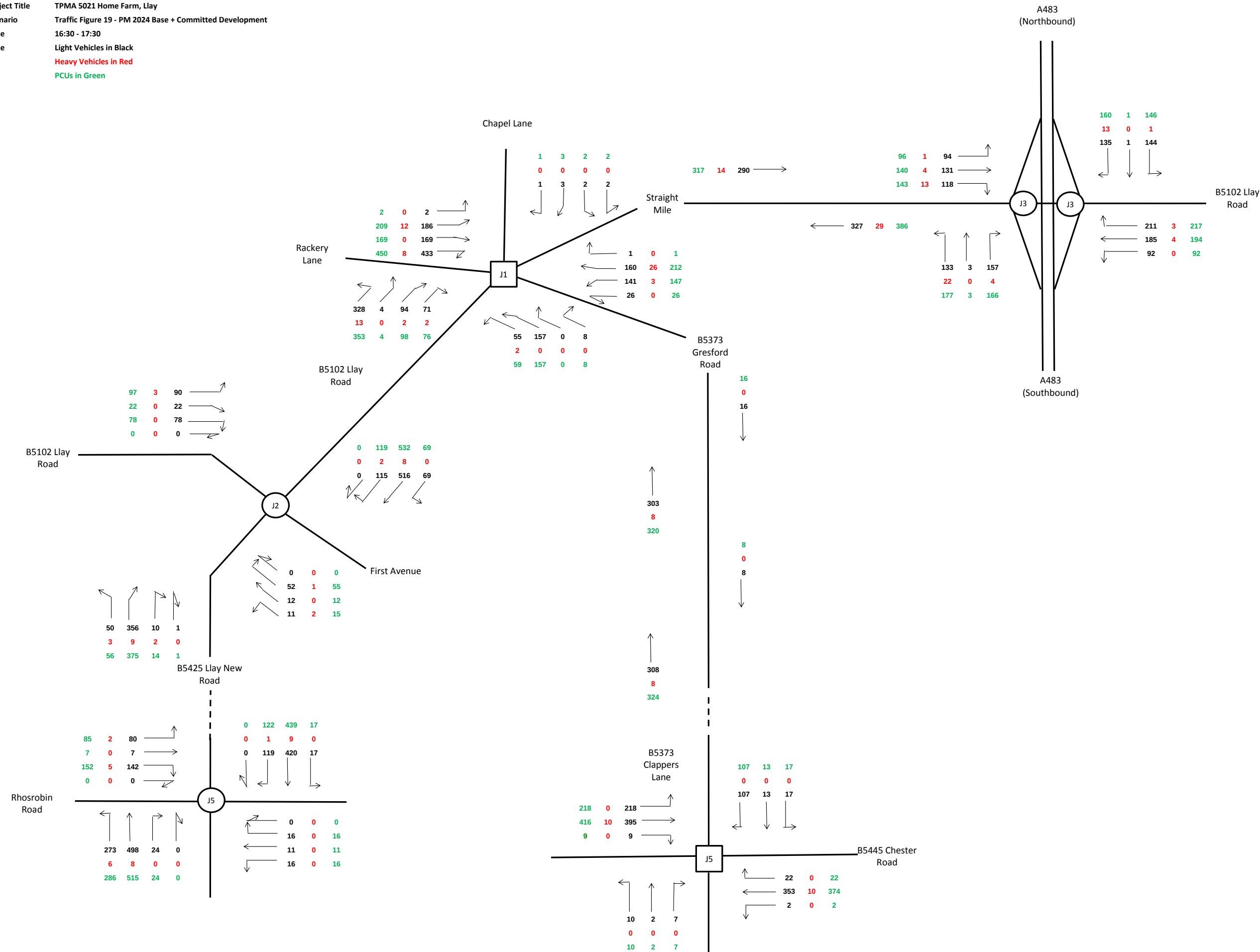
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 17 - PM 2019 Base + Committed and Proposed Development Traffic
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 18 - AM 2024 Base + Committed Development Traffic
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

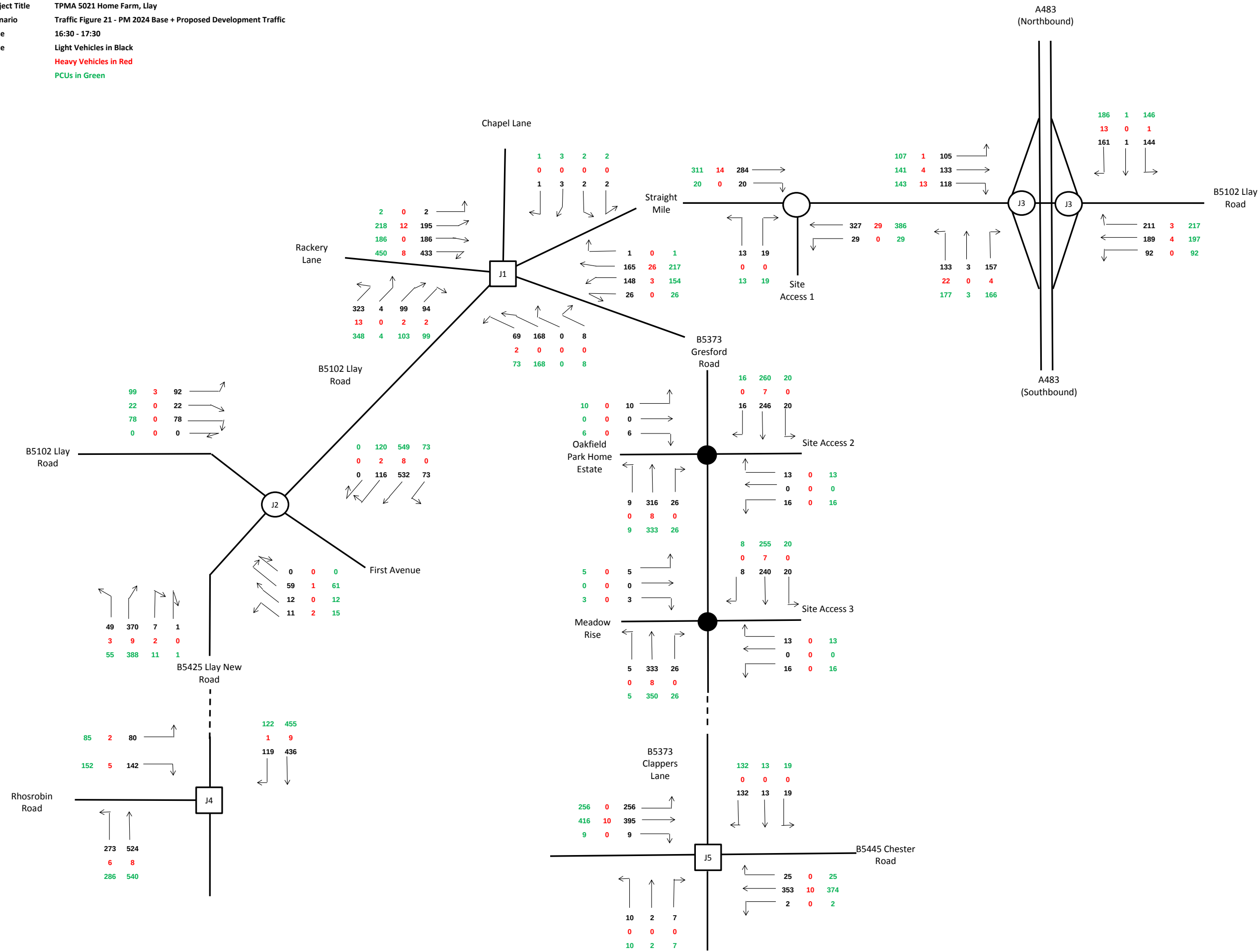


Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 19 - PM 2024 Base + Committed Development
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green

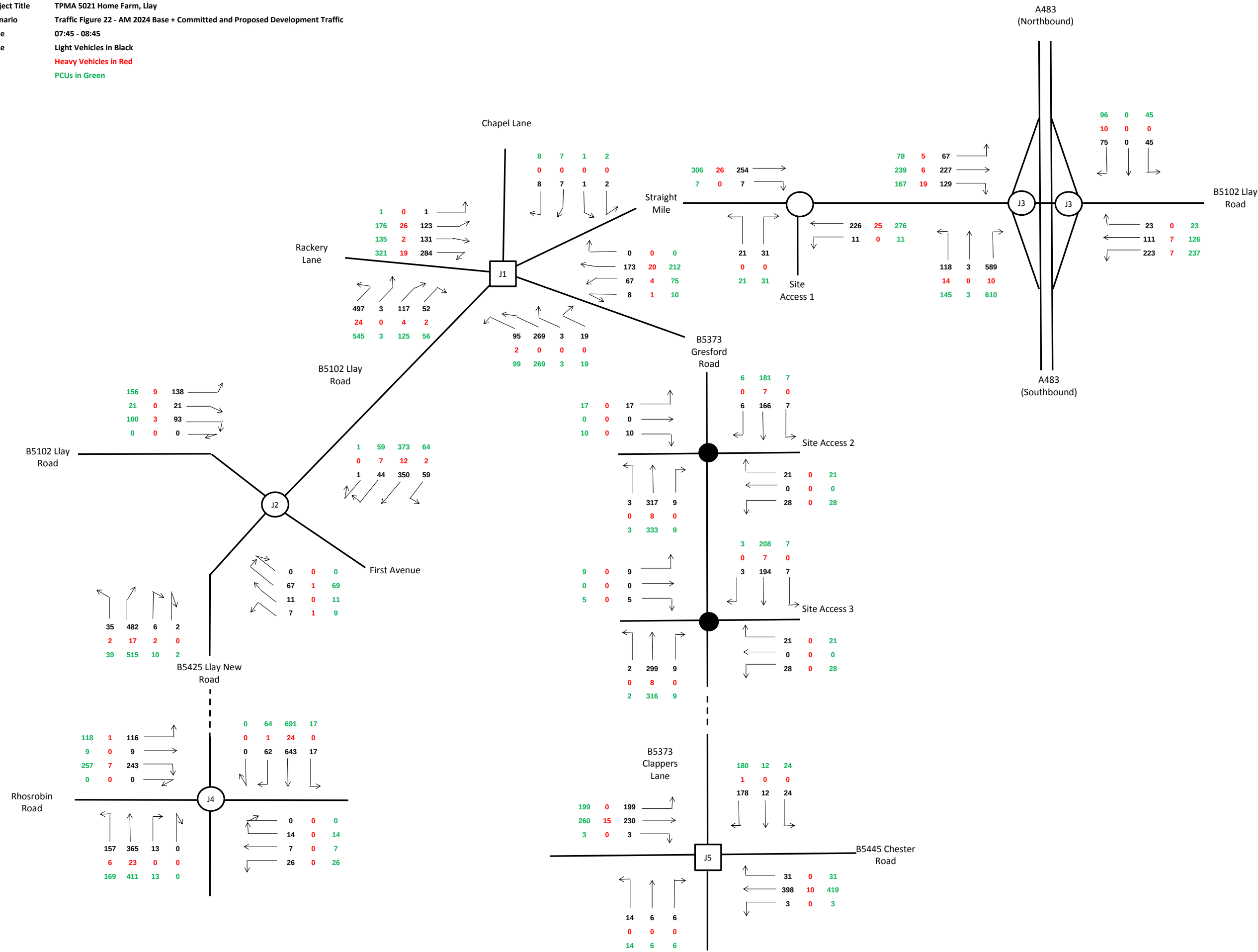


Project Title	TPMA 5021 Home Farm, Llay
Scenario	Traffic Figure 20 - AM 2024 Base + Proposed Development Traffic
Time	07:45 - 08:45
Note	Light Vehicles in Black Heavy Vehicles in Red PCUs in Green

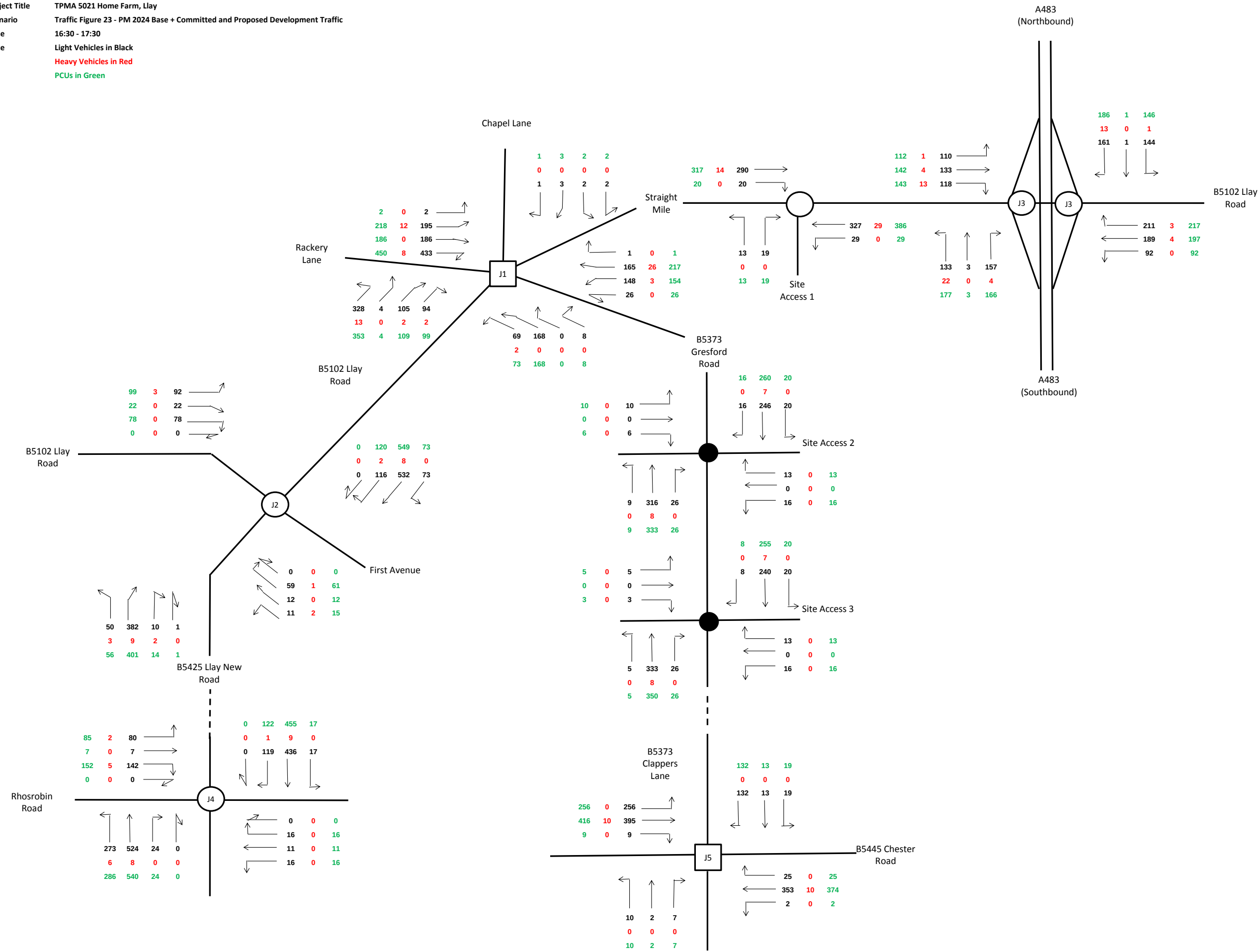
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 21 - PM 2024 Base + Proposed Development Traffic
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



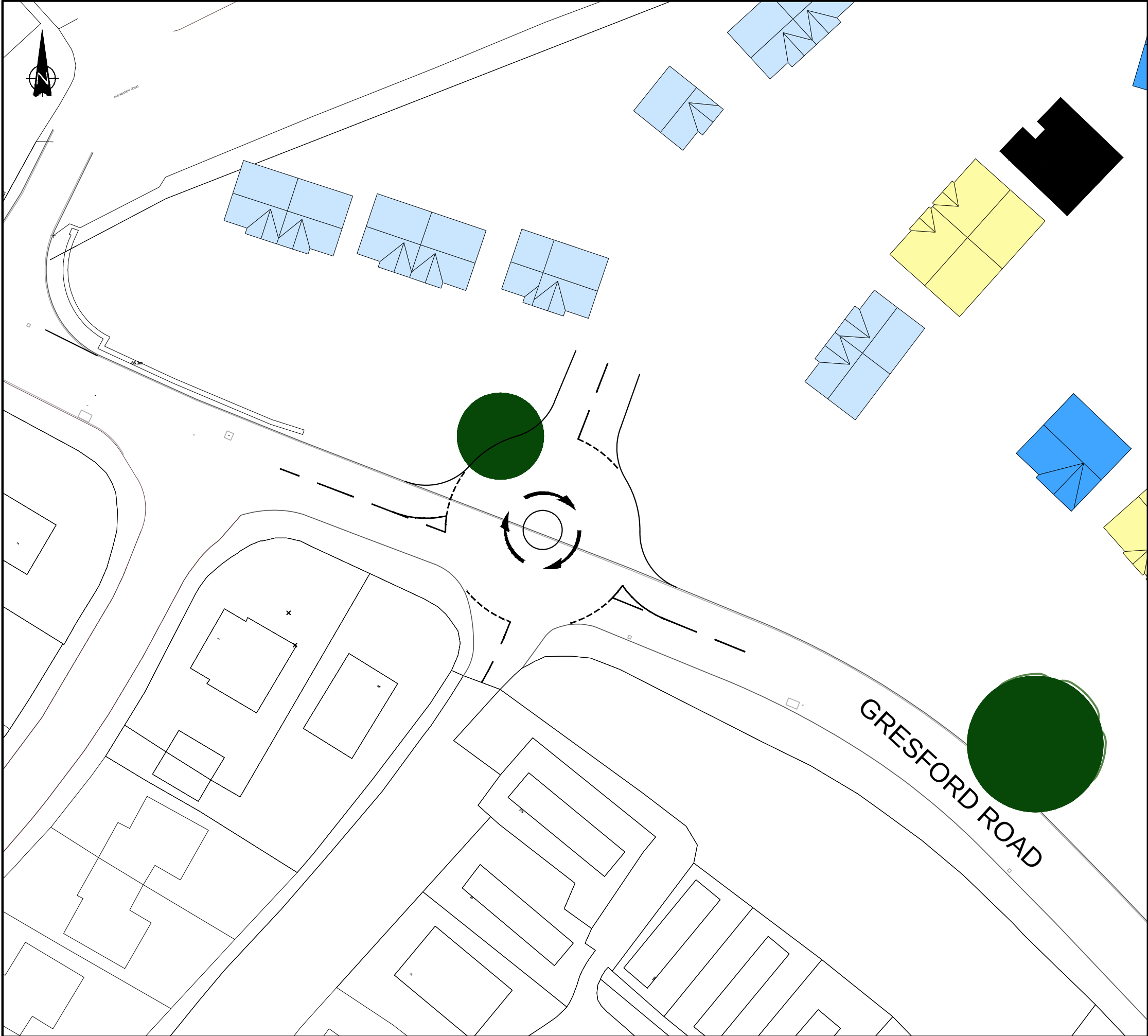
Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 22 - AM 2024 Base + Committed and Proposed Development Traffic
Time 07:45 - 08:45
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



Project Title TPMA 5021 Home Farm, Llay
Scenario Traffic Figure 23 - PM 2024 Base + Committed and Proposed Development Traffic
Time 16:30 - 17:30
Note Light Vehicles in Black
Heavy Vehicles in Red
PCUs in Green



Drawings



- KEY:
- 4.5m x 40m Visibility Splay
 - 4.5m x 25m Visibility Splay
 - 4.5m x 15.5m Visibility Splay

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

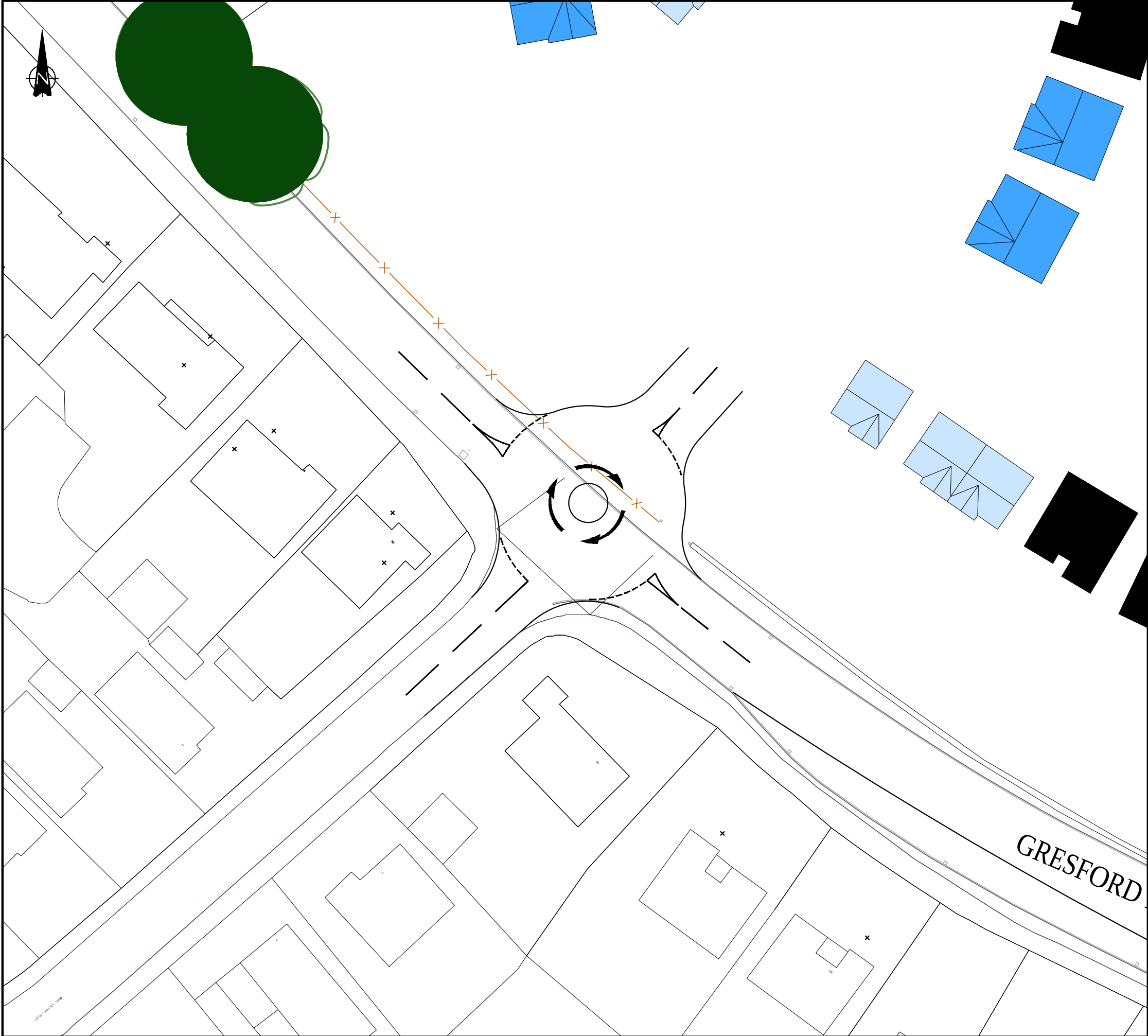
Status: PRELIMINARY

Project: HOME FARM RESIDENTIAL DEVELOPMENT, LLAY

Drg Title: PROPOSED SITE ACCESS 2

Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	10.10.2014	MF	KY

Drg No:	Rev:
TPMA5021_002	/



KEY:

- 4.5m x 40m Visibility Splay
- 4.5m x 25m Visibility Splay
- 4.5m x 17m Visibility Splay

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:	PRELIMINARY			
Project:	HOME FARM RESIDENTIAL DEVELOPMENT, LLAY			
Drg Title:	PROPOSED SITE ACCESS 3			
Scale:	Size:	First Issue:	Drawn:	Checked:
NTS	A3	10.10.2014	MF	KY
Drg No: TPMA5021_003				Rev: /

© This drawing is the copyright of Curtins Consulting Ltd



KEY:

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

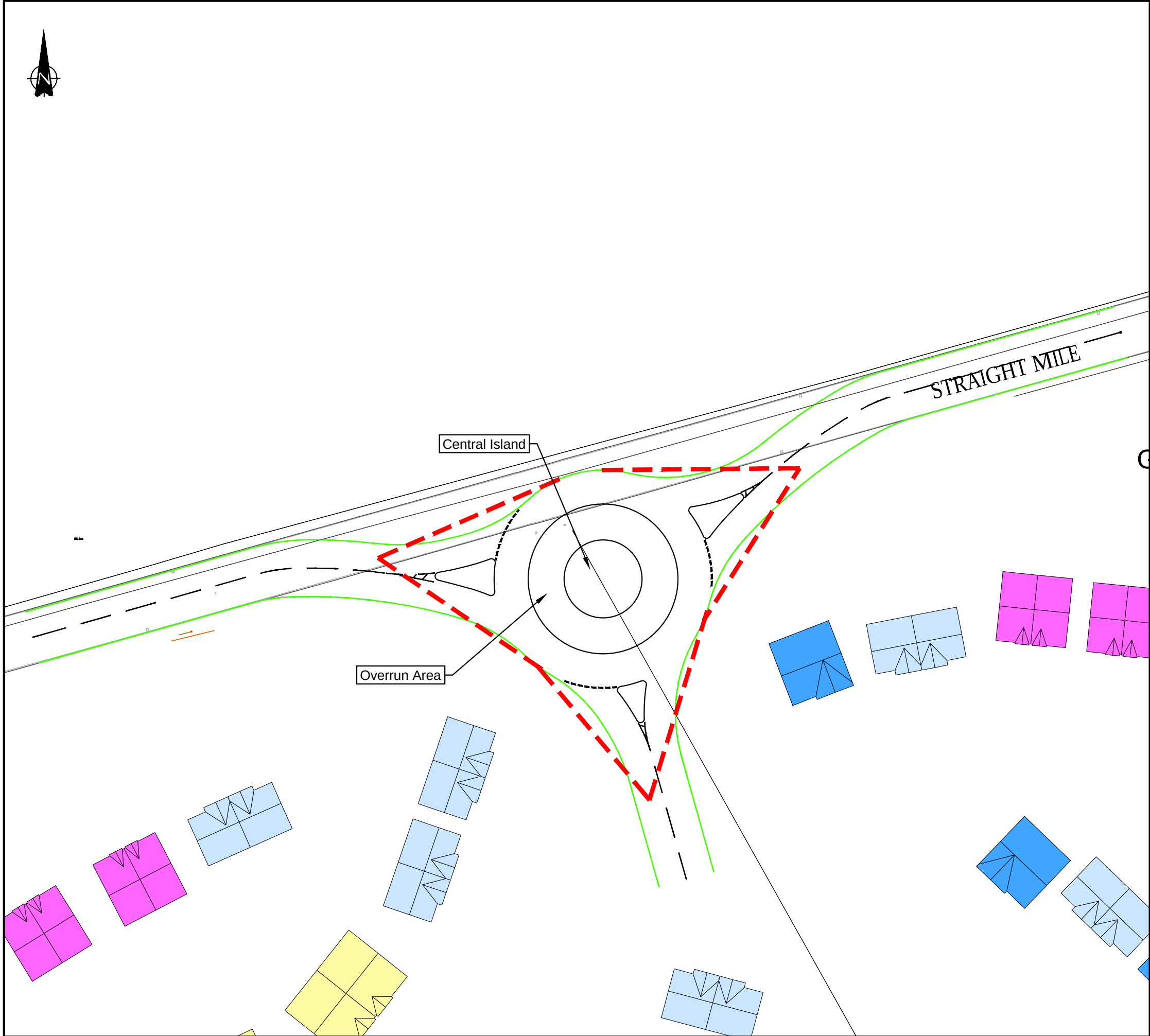
PROPOSED SITE
ACCESS OVERVIEW

Scale:	Size:	First Issue:	Drawn:	Checked:
--------	-------	--------------	--------	----------

1:2000	A3	10.10.2014	MF	KY
--------	----	------------	----	----

Drg No:	Rev:
---------	------

TPMA5021_004	/
--------------	---



Key:

15m to tangent point visibility splay

Notes:

1. All drawing details subject to detailed design.

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

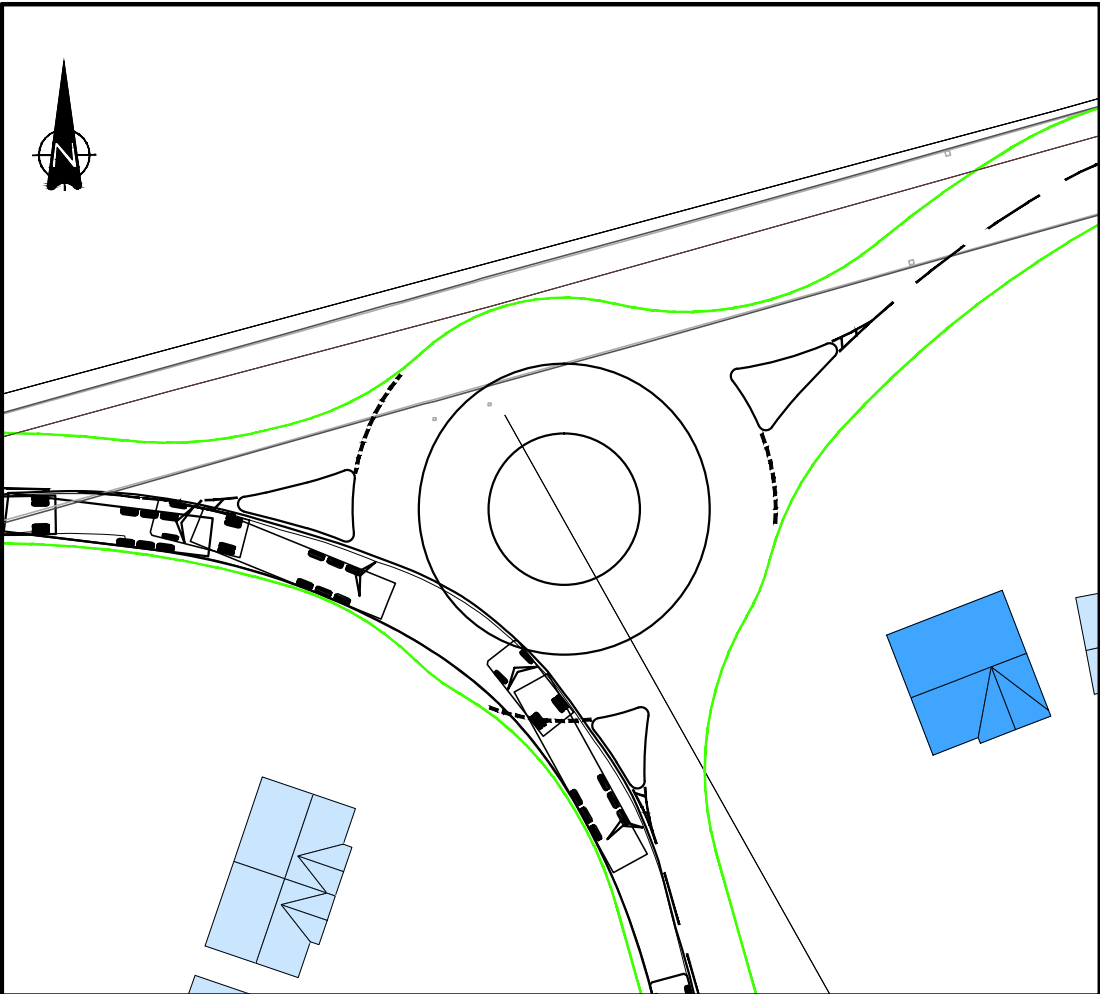
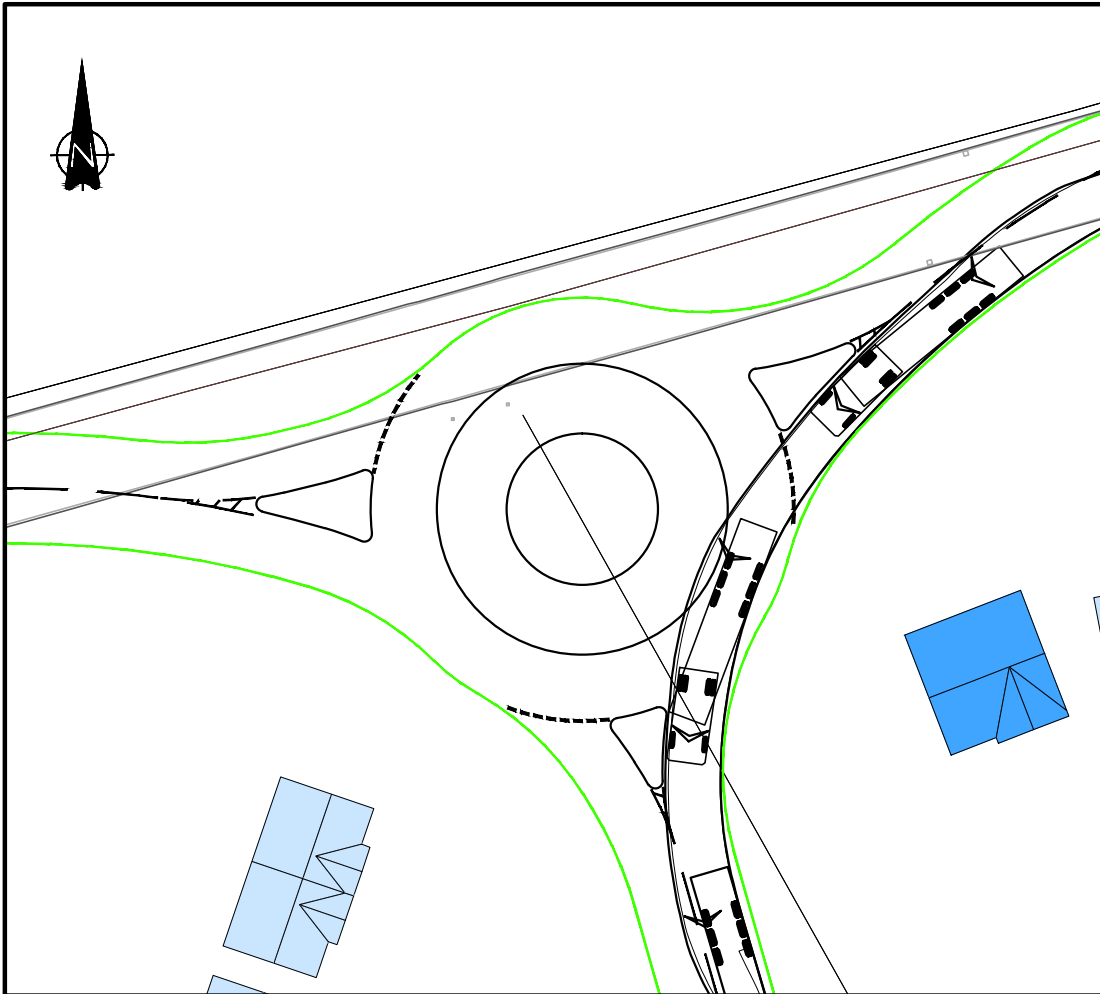
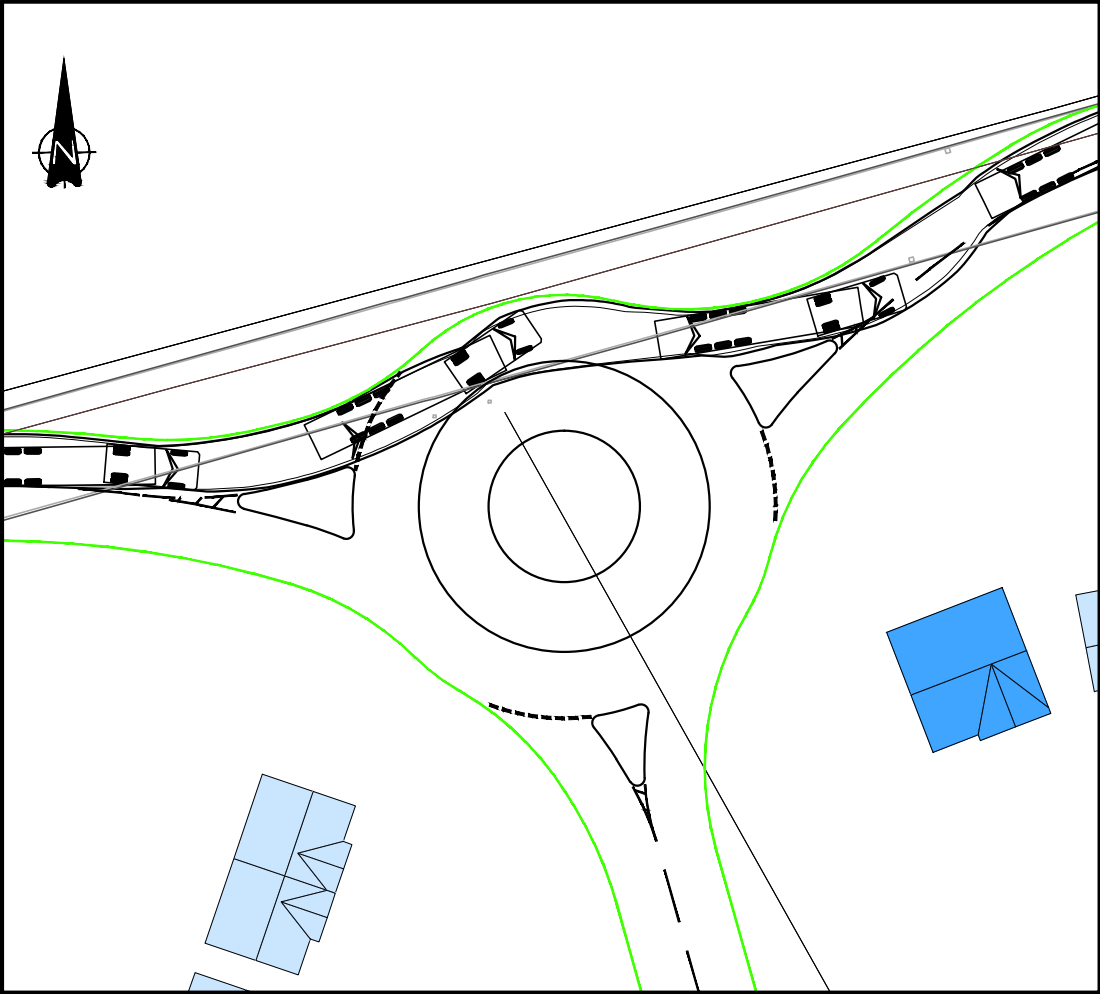
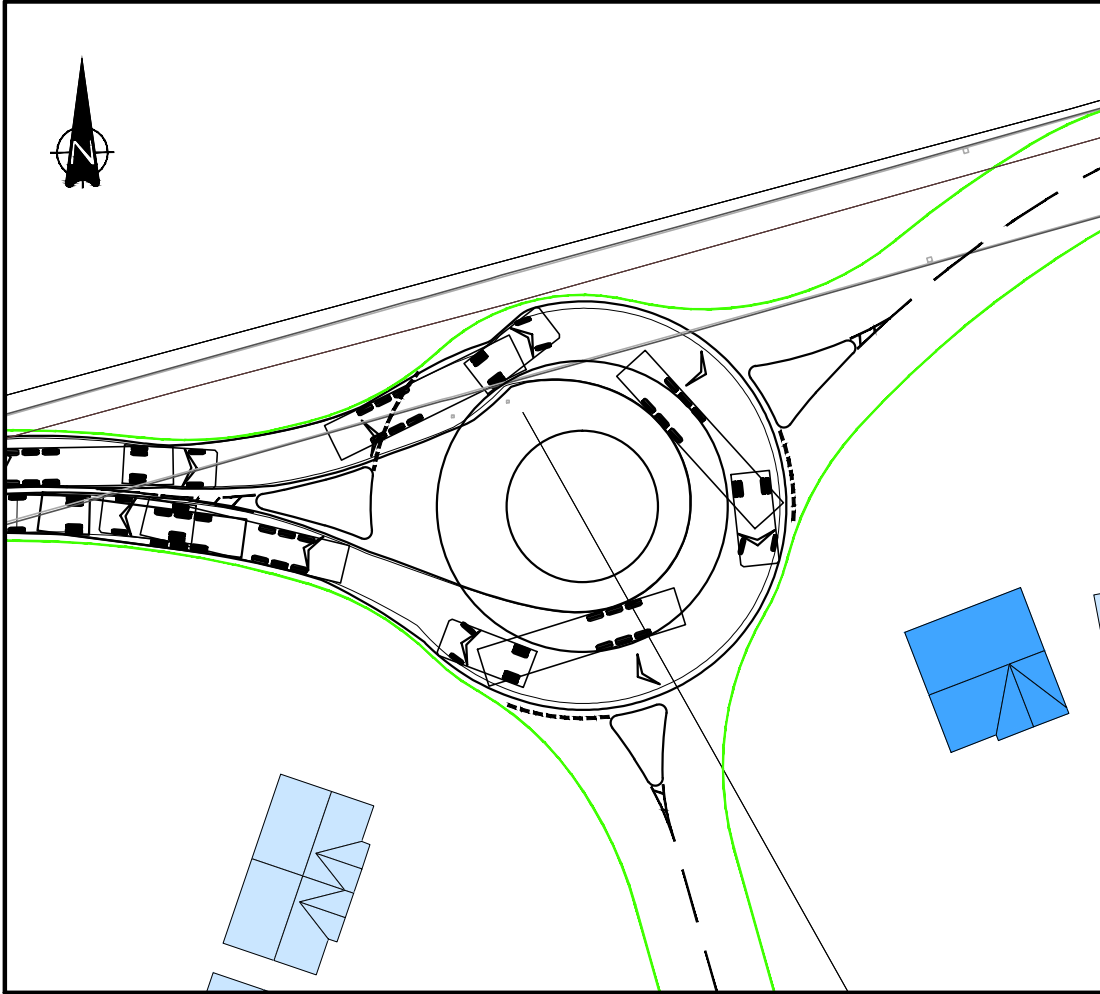
Status: PRELIMINARY

Project: HOME FARM RESIDENTIAL DEVELOPMENT, LLAY

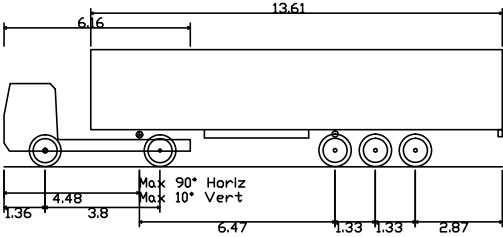
Drg Title: PROPOSED SITE ACCESS 1

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	21.11.2014	MF	KY

Drg No:	Rev:
TPMA5021_005	/



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

Notes:

1. All drawing details subject to detailed design.

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

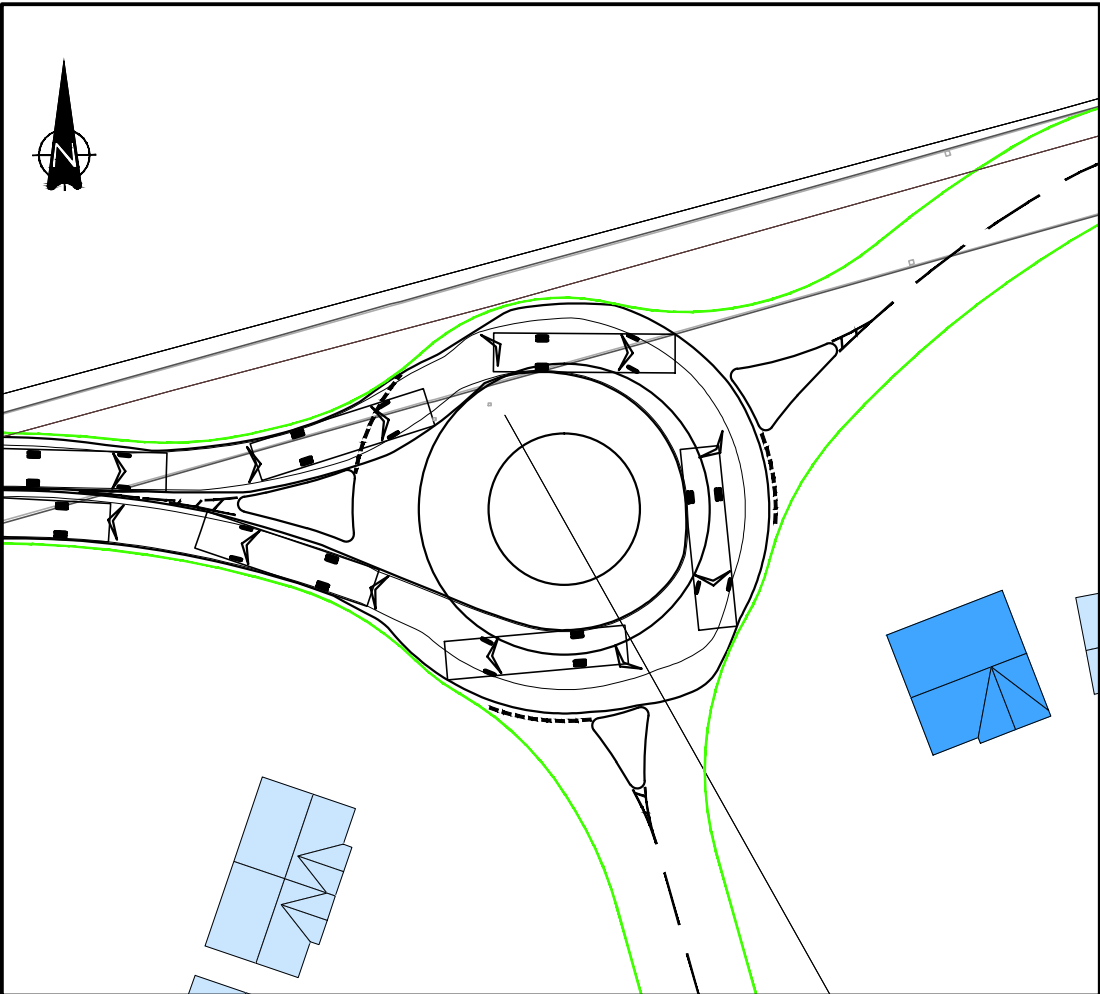
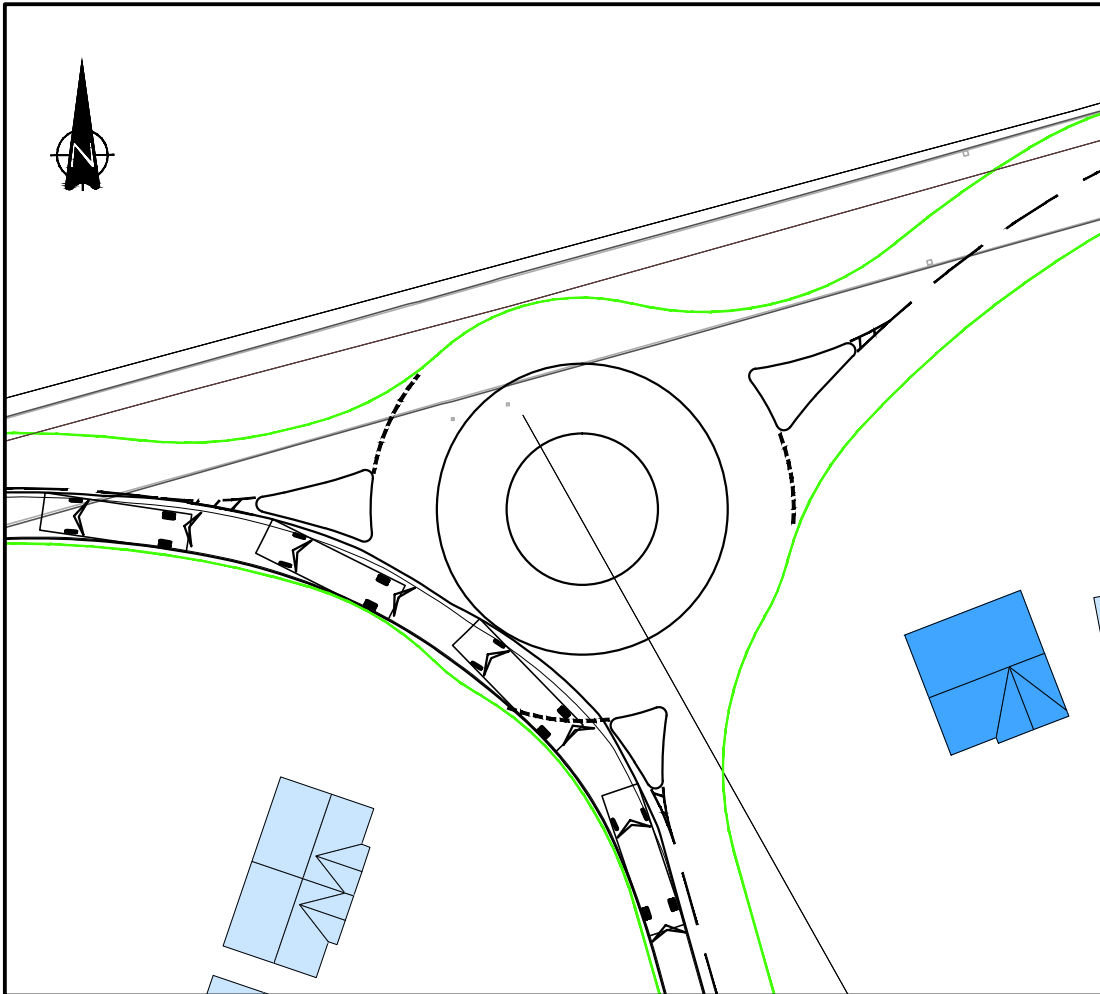
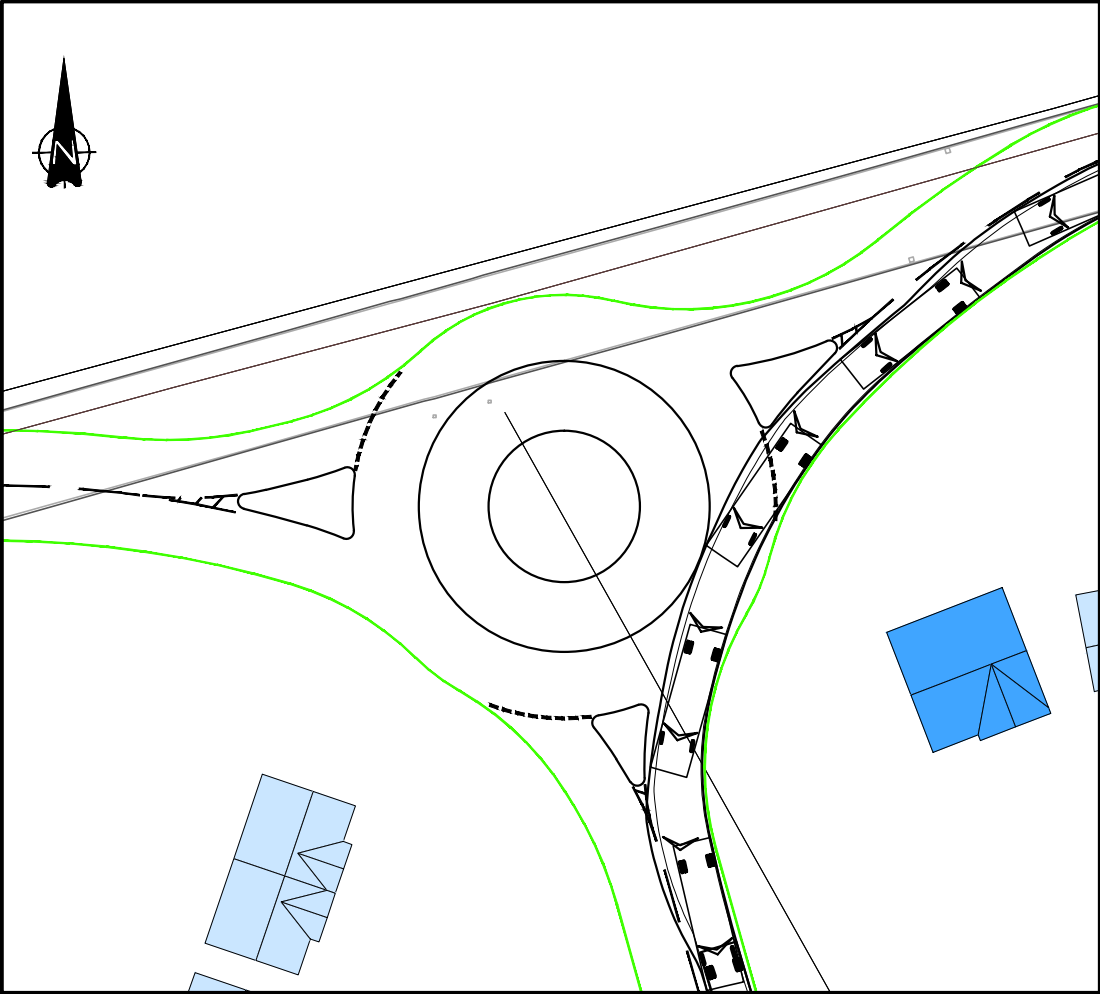
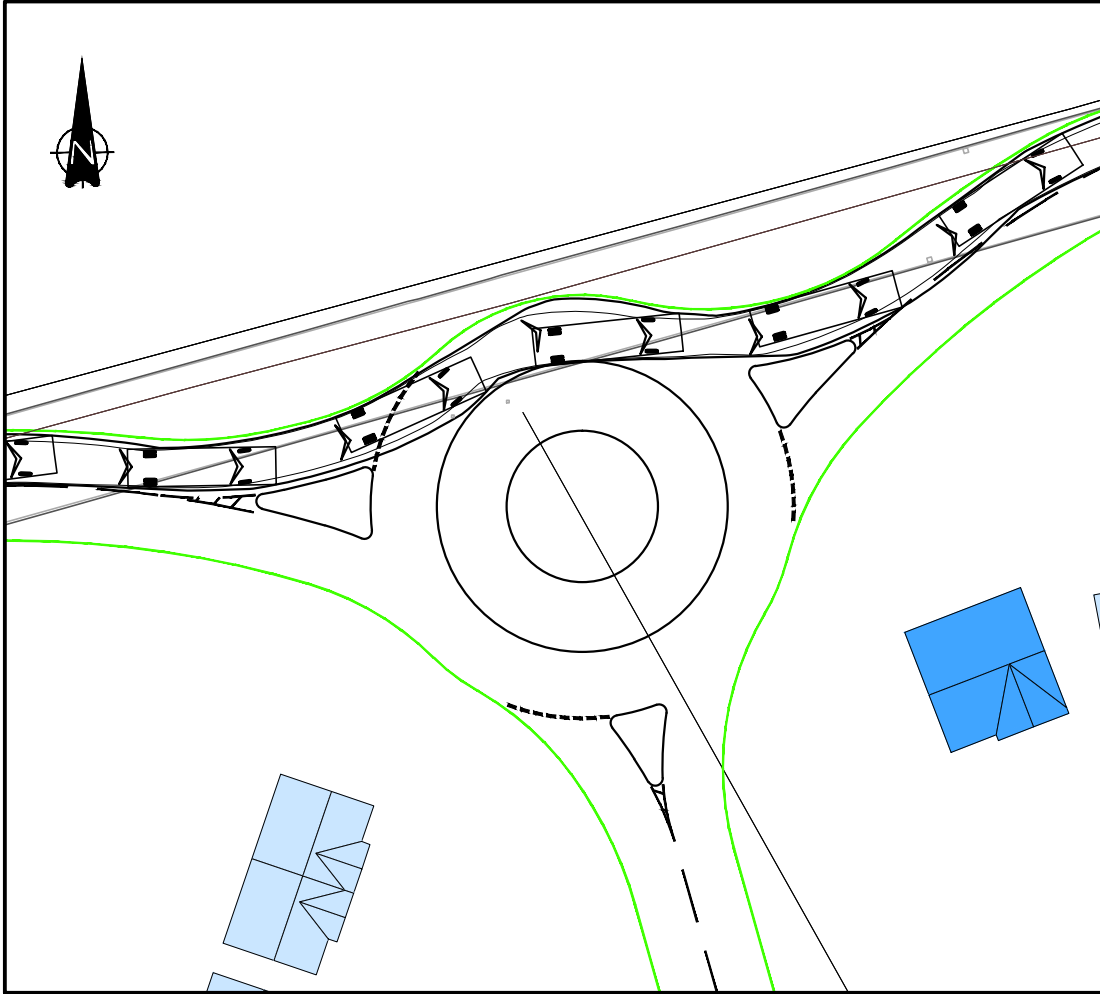
HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

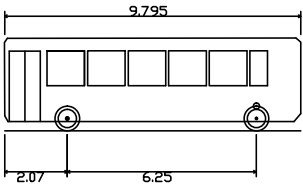
PROPOSED SITE ACCESS 1
16m ARTICULATED VEHICLE SWEEP PATH ANALYSIS

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	21.11.2014	MF	KY

Drg No:	Rev:
TPMA5021_006	/



Vehicle Profile:



Single Deck Bus	9.795m
Overall Length	2.500m
Overall Width	3.070m
Overall Body Height	0.306m
Min Body Ground Clearance	2.322m
Track Width	6.005
Lock to Lock Time	10.111m
Kerb to Kerb Turning Radius	

Notes:

1. All drawing details subject to detailed design.

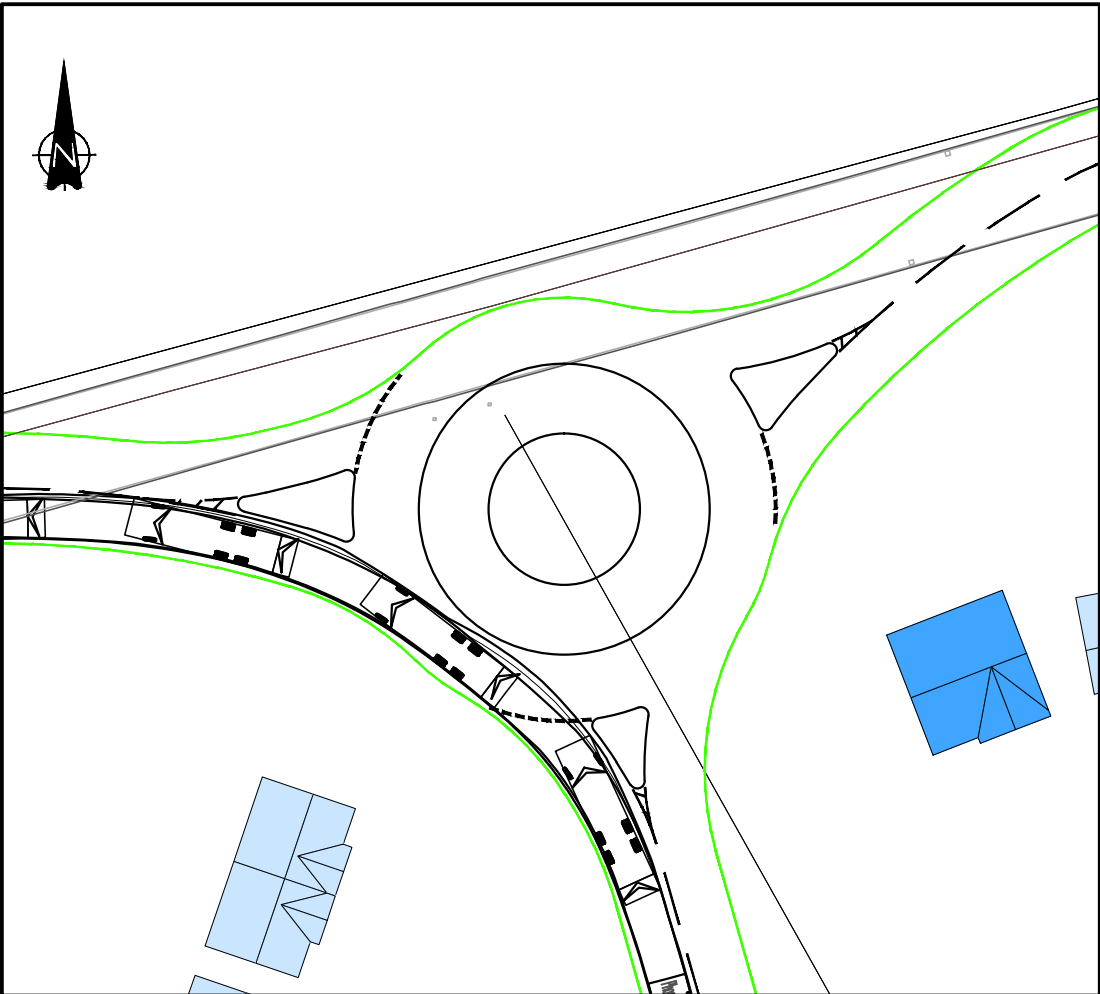
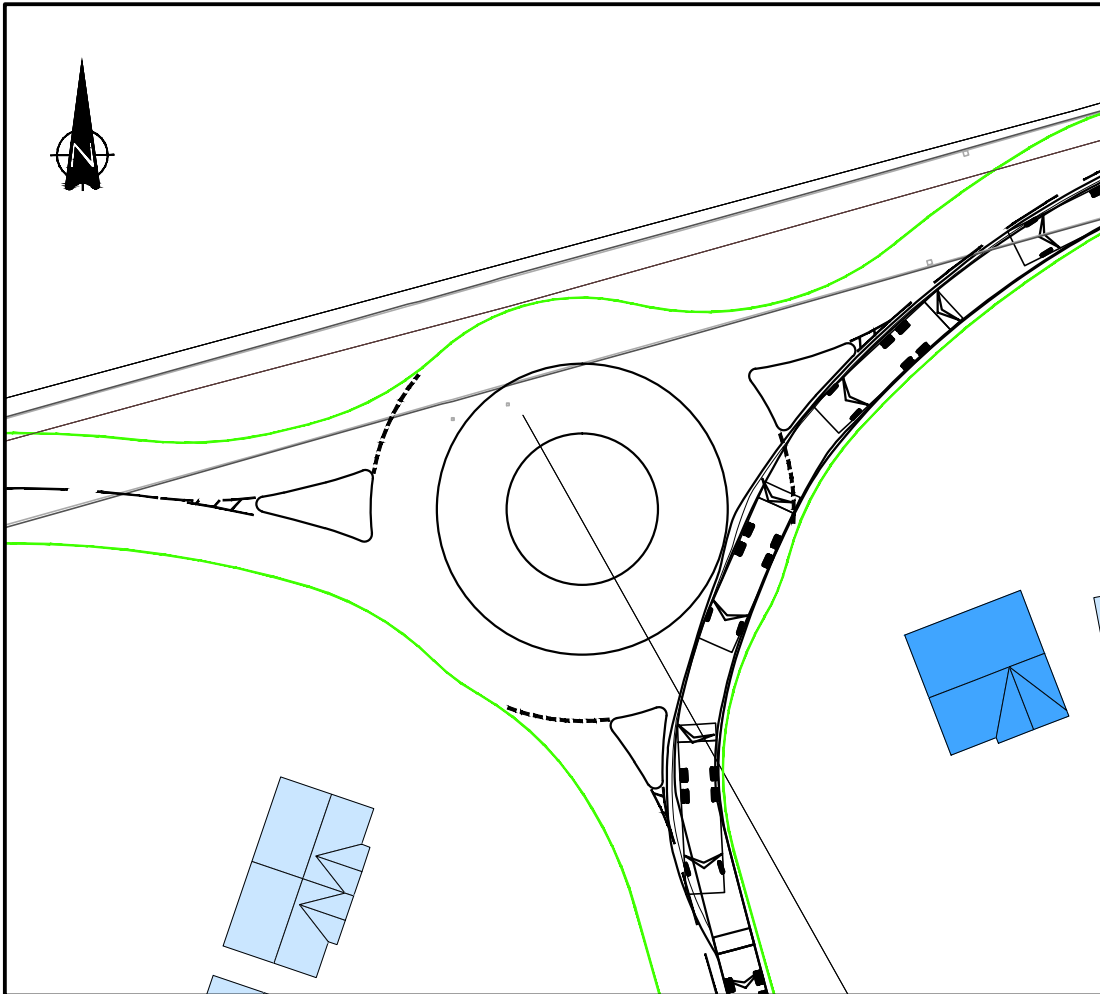
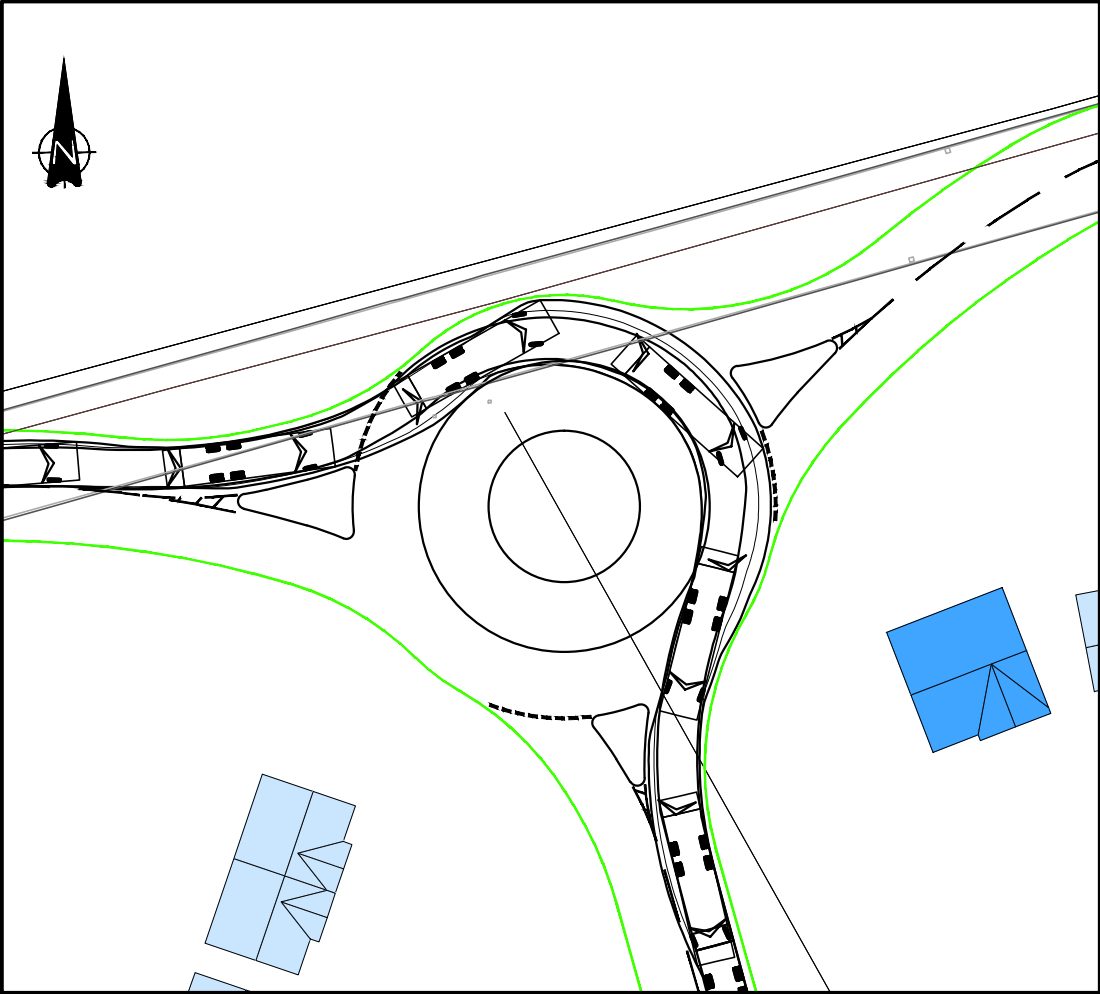
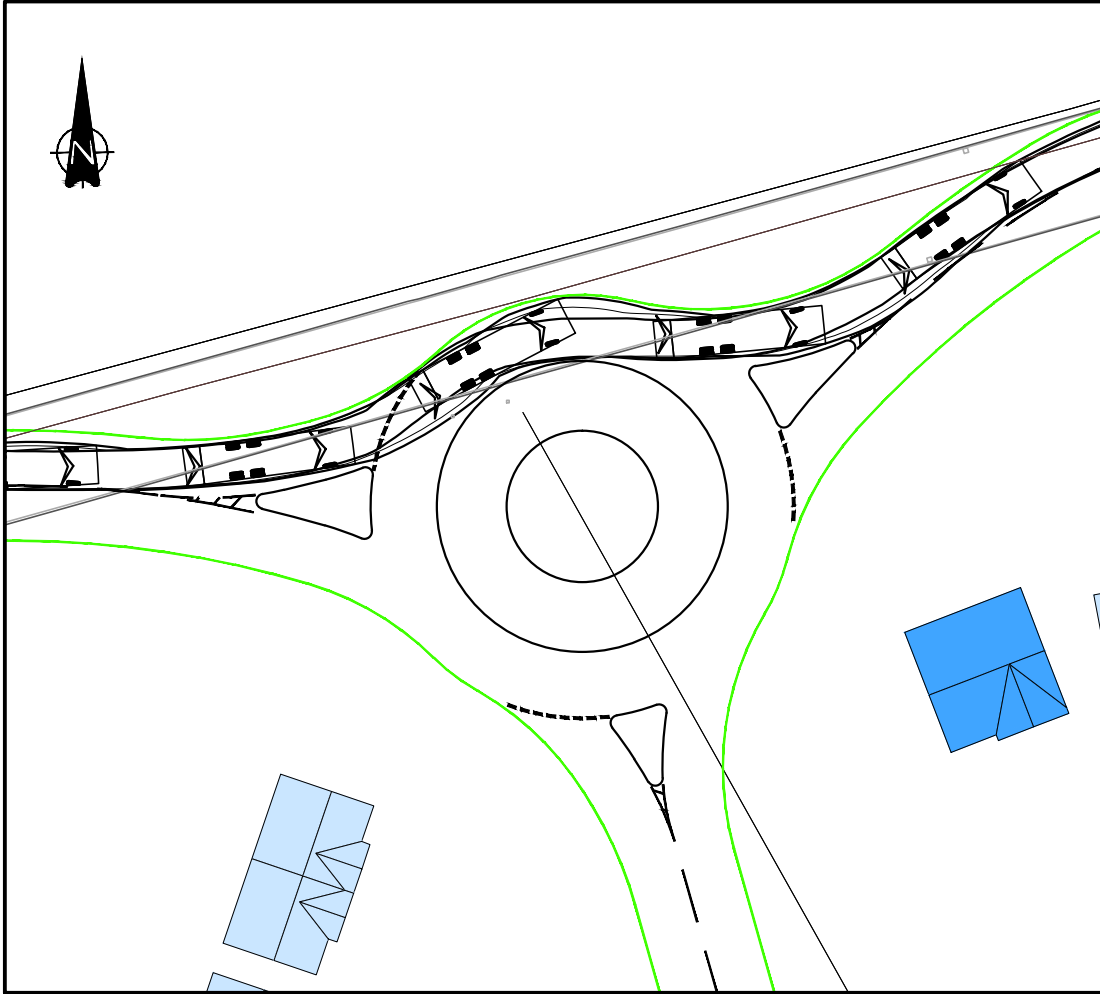
Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



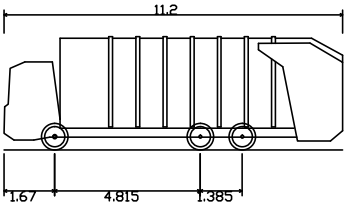
Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:	PRELIMINARY			
Project:	HOME FARM RESIDENTIAL DEVELOPMENT, LLAY			
Drg Title:	PROPOSED SITE ACCESS 1 SINGLE DECK BUS SWEPT PATH ANALYSIS			
Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	21.11.2014	MF	KY
Drg No:	TPMA5021_007			Rev:
			/	



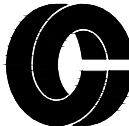
Vehicle Profile:

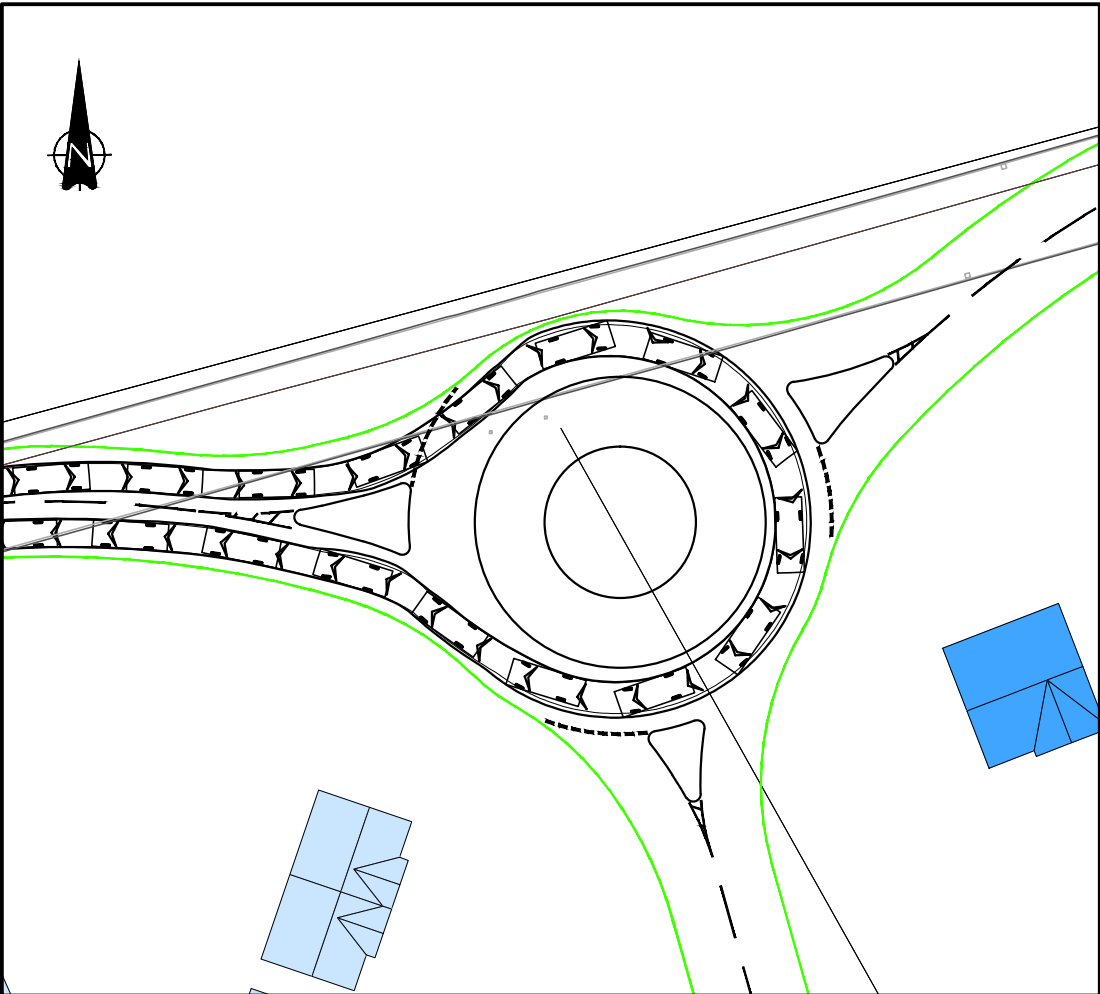
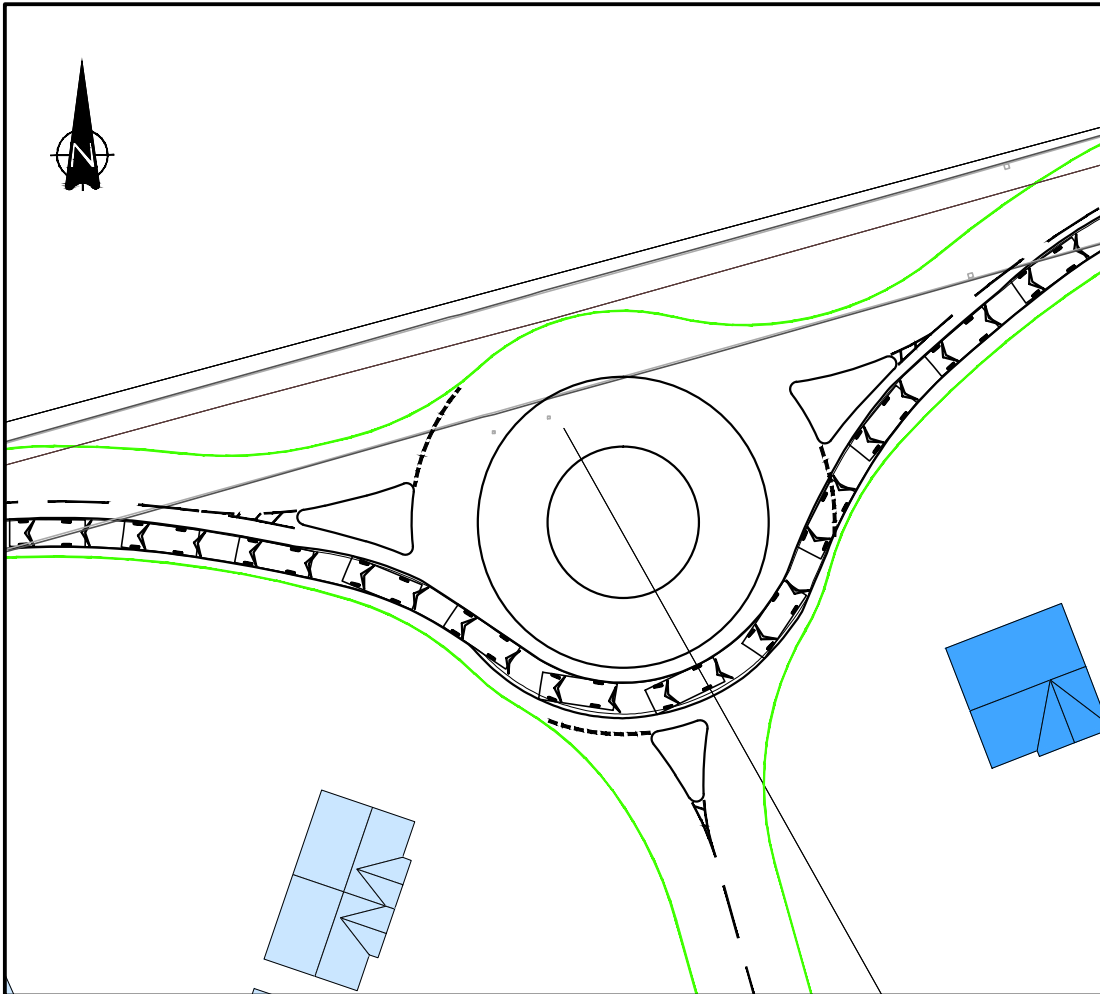
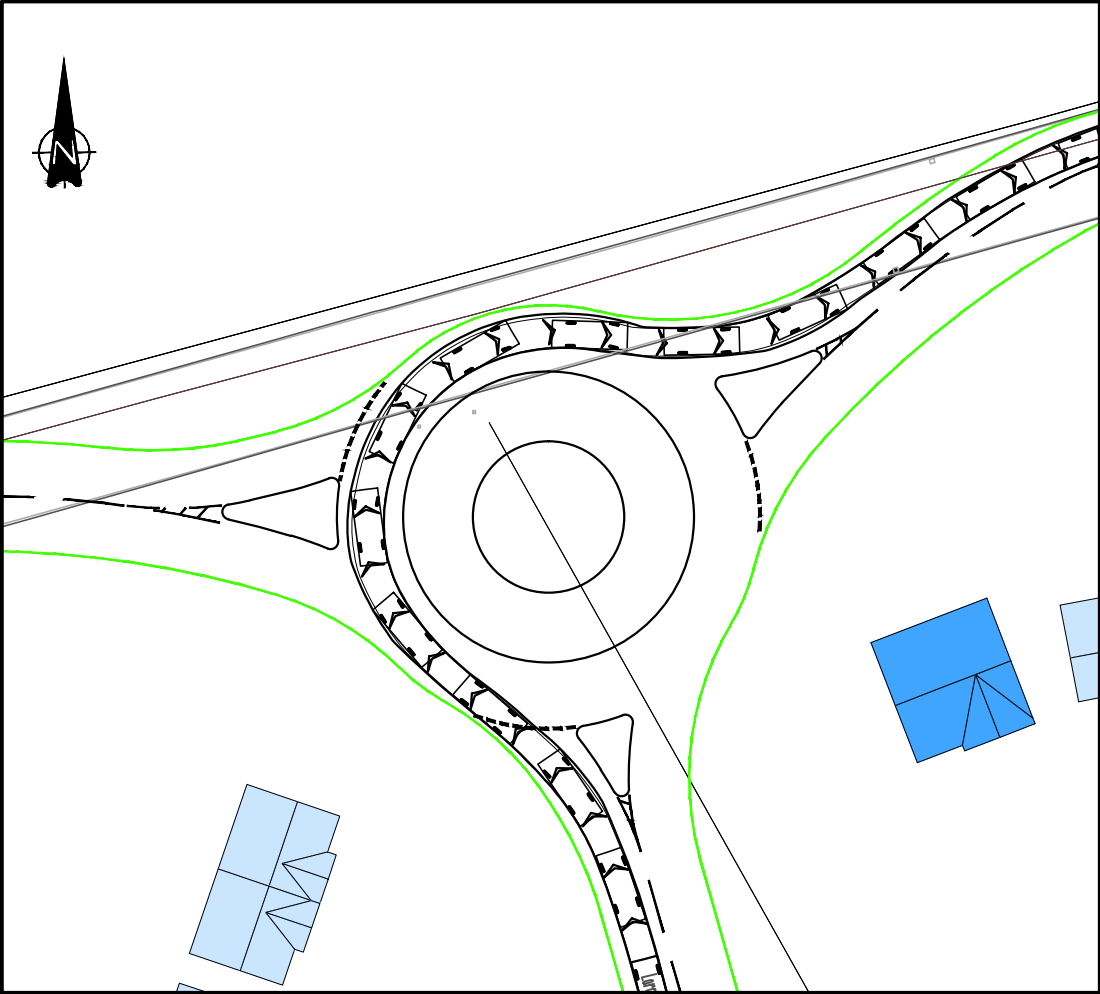
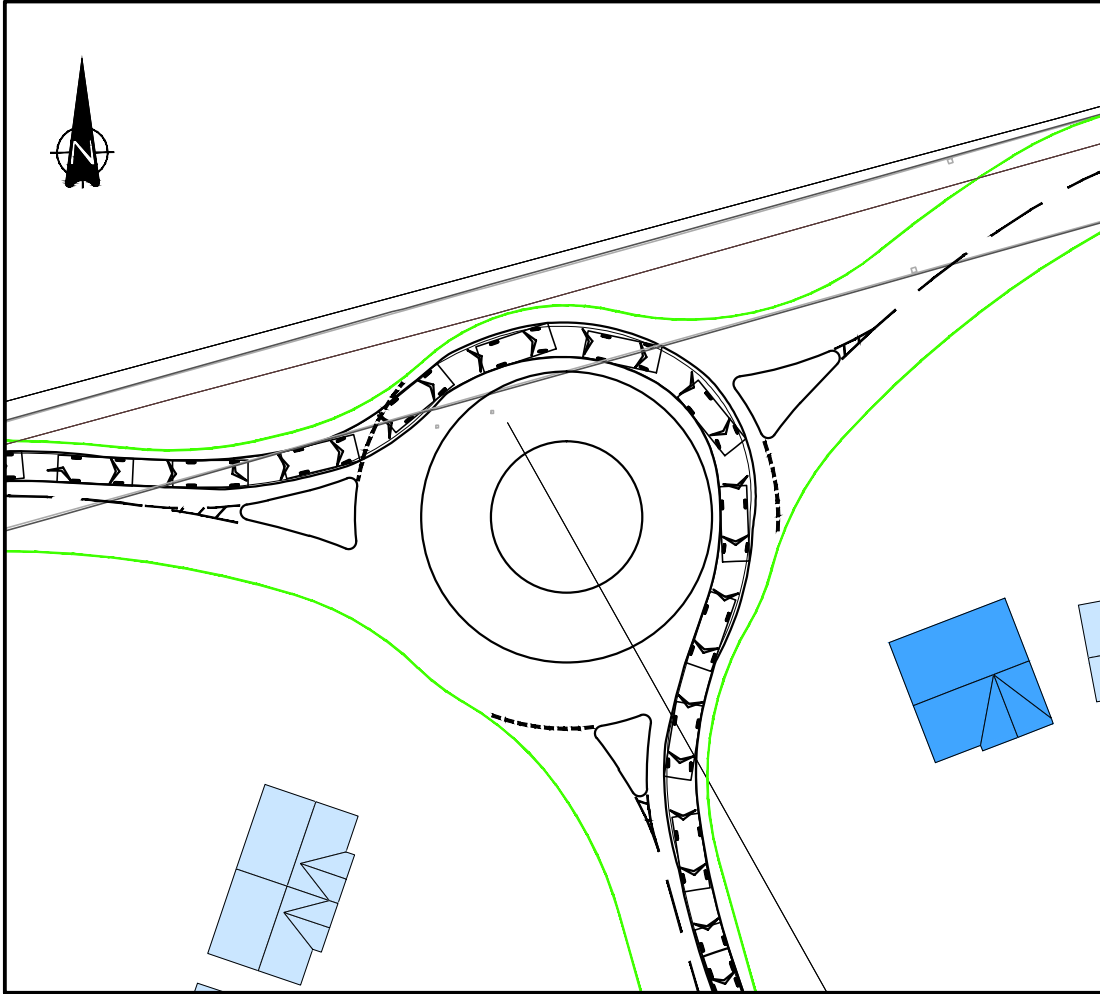


Phoenix 2 Duo (P2-15W with Elite 6x4 chassis)	
Overall Length	11.200m
Overall Width	2.530m
Overall Body Height	3.751m
Min Body Ground Clearance	0.304m
Track Width	2.500m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	9.500m

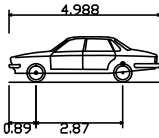
Notes:

1. All drawing details subject to detailed design.

Rev:	Description:	Date:	By:	Chkd:
 Curtins Consulting Ltd, 10 Oxford Court, Bishopgate, Manchester, M2 3WQ t: 0161 236 2394 e: manchester@curtins.com www.curtins.com Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham				
Status:				
PRELIMINARY				
Project:				
HOME FARM RESIDENTIAL DEVELOPMENT, LLAY				
Drg Title:				
PROPOSED SITE ACCESS 1 LARGE REFUSE VEHICLE SWEPT PATH ANALYSIS				
Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	21.11.2014	MF	KY
Drg No:				Rev:
TPMA5021_008				/
© This drawing is the copyright of Curtins Consulting Ltd				



Vehicle Profile:



Large Car	
Overall Length	4.988m
Overall Width	1.793m
Overall Body Height	1.502m
Min Body Ground Clearance	0.287m
Track Width	1.700m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	6.200m

Notes:

1. All drawing details subject to detailed design.

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

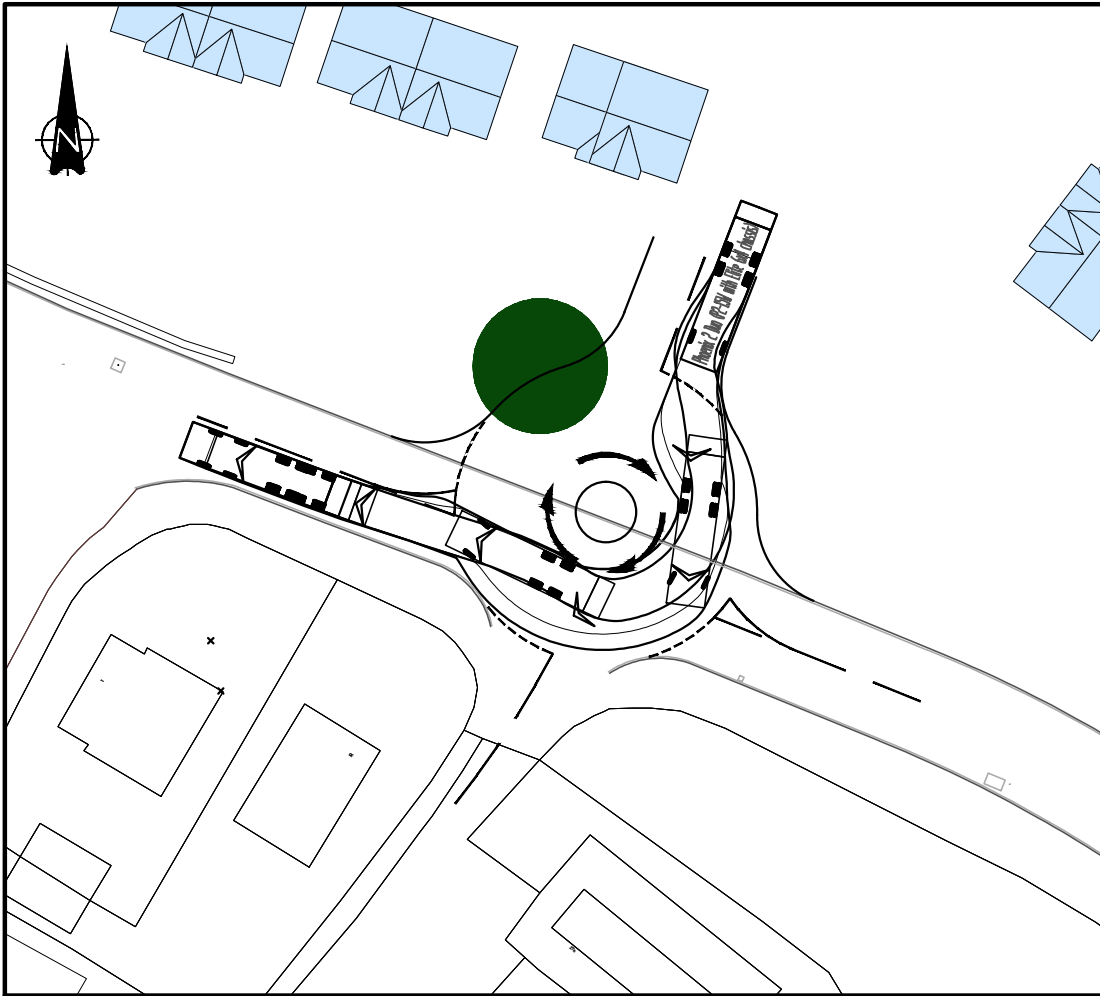
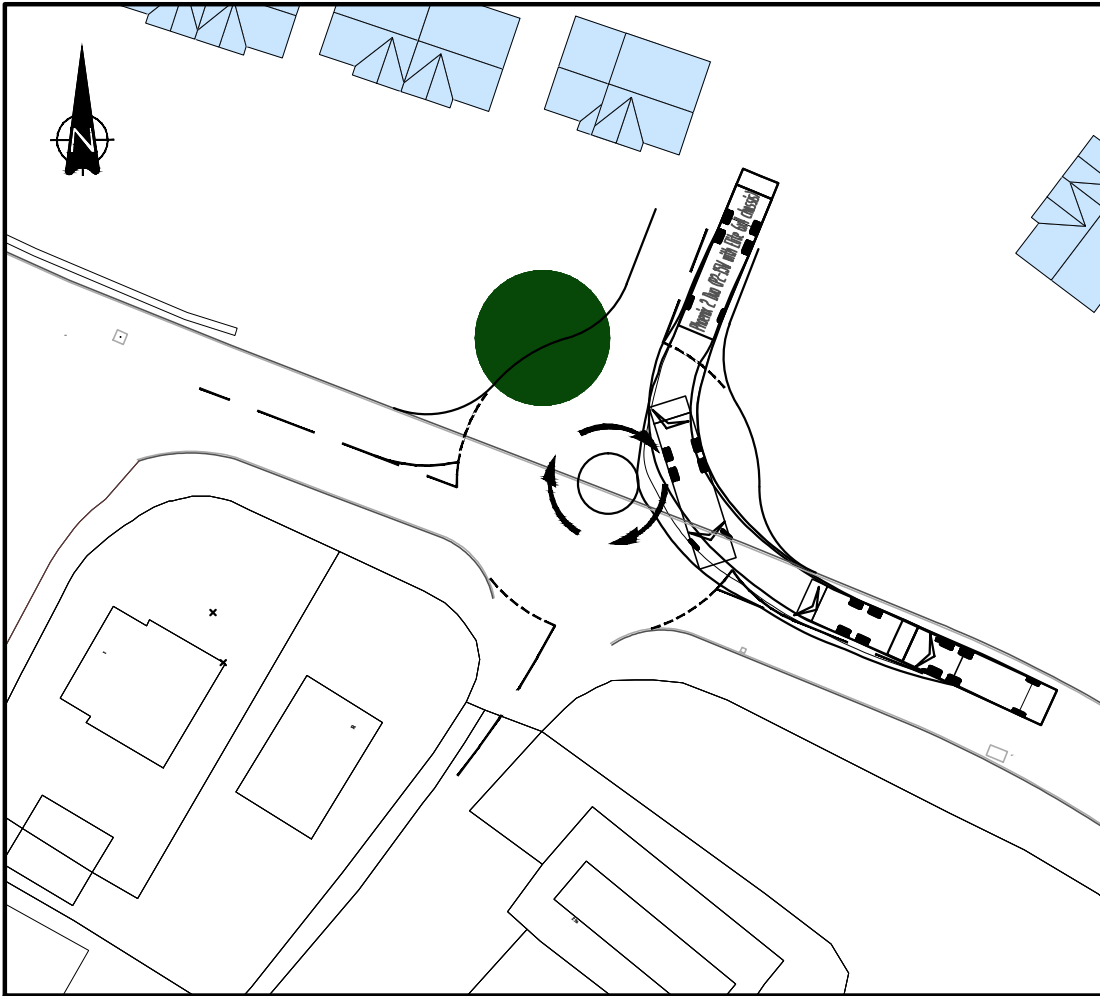
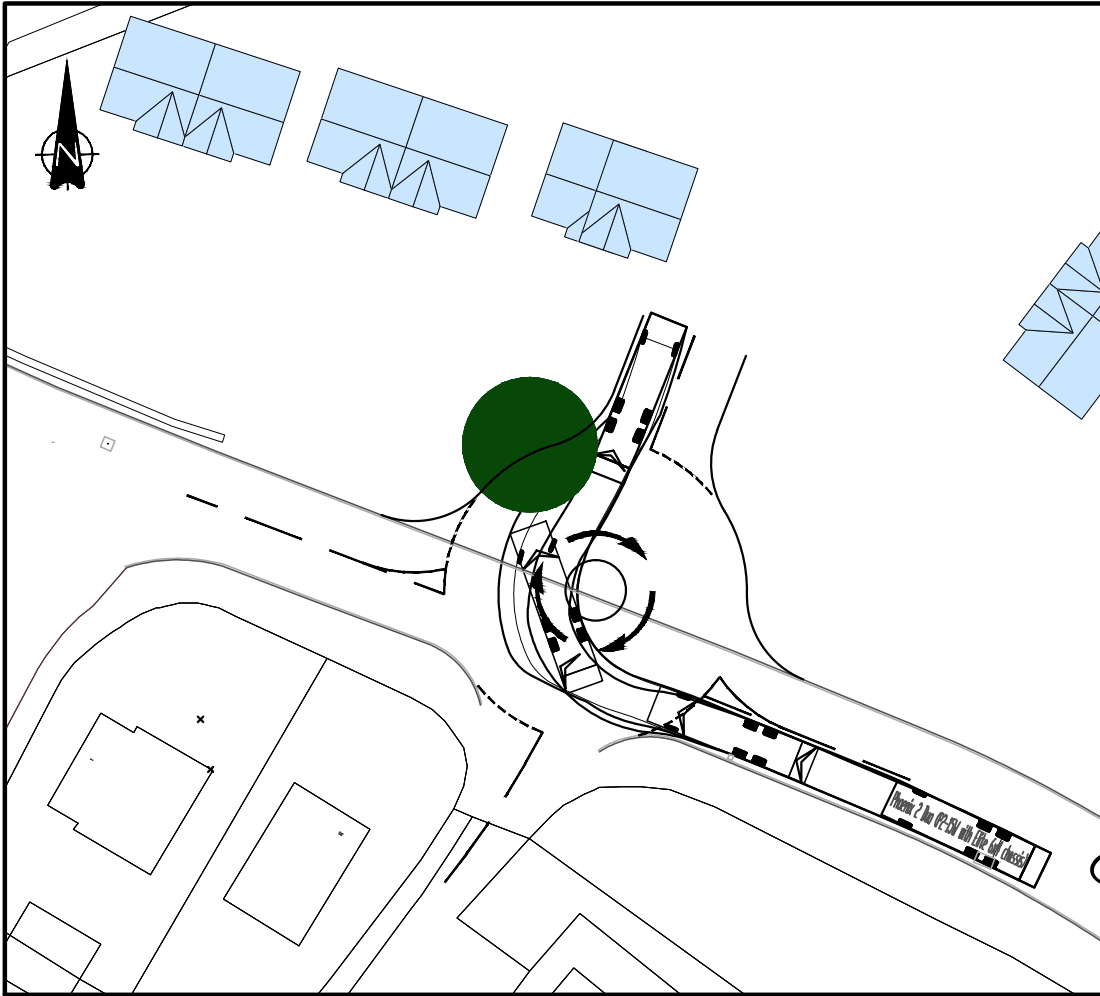
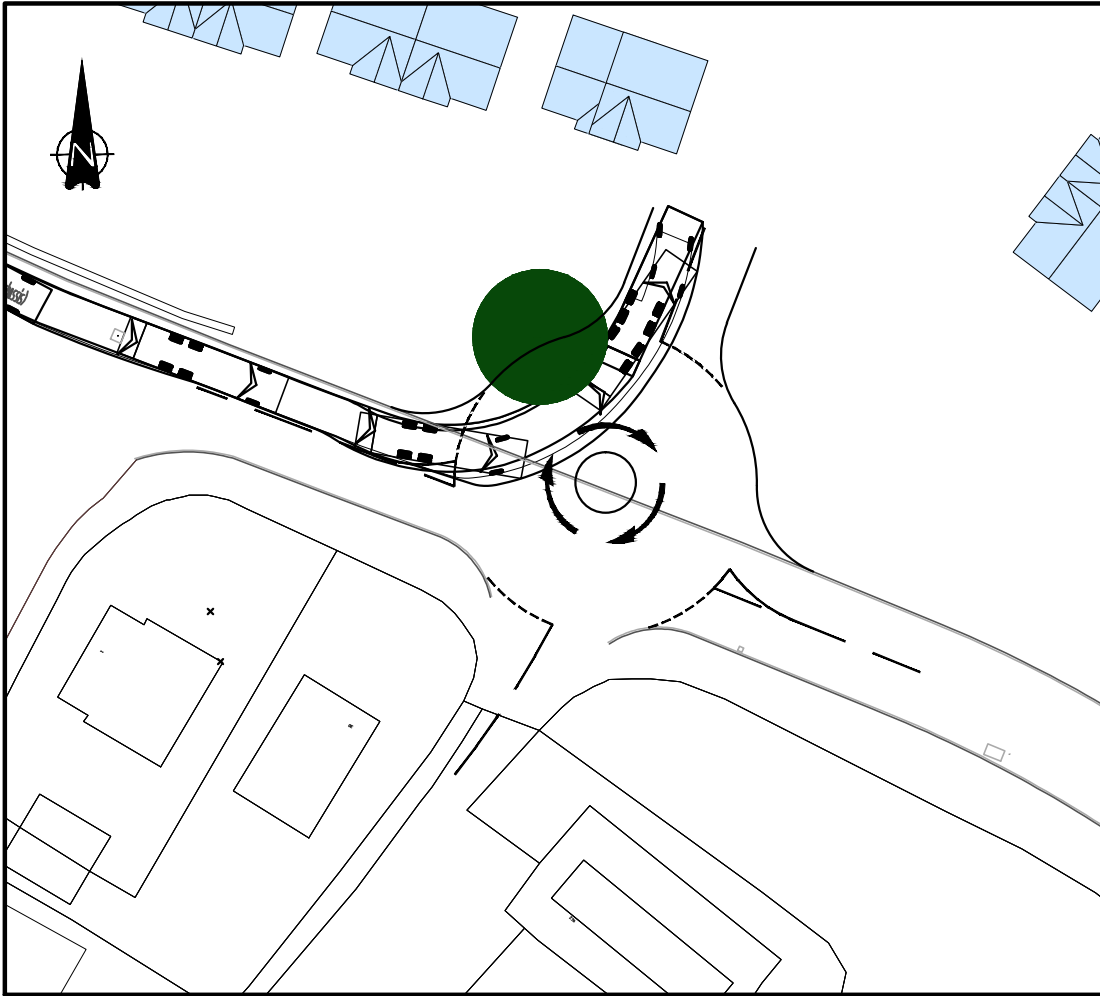
Status:	PRELIMINARY
---------	-------------

Project:	HOME FARM RESIDENTIAL DEVELOPMENT, LLAY
----------	--

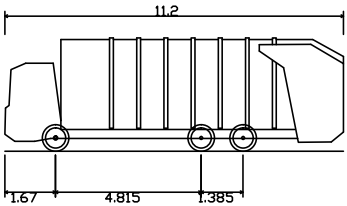
Drg Title:	PROPOSED SITE ACCESS 1 LARGE CAR SWEPth PATH ANALYSIS
------------	--

Scale:	Size:	First Issue:	Drawn:	Checked:
1:500	A3	21.11.2014	MF	KY

Drg No:	TPMA5021_009	Rev:	/
---------	--------------	------	---



VEHICLE PROFILE:



Phoenix 2 Duo (P2-15W with Elite 6x4 chassis)
Overall Length 11.200m
Overall Width 2.530m
Overall Body Height 3.751m
Min Body Ground Clearance 0.304m
Track Width 2.500m
Lock to Lock Time 4.00s
Kerb to Kerb Turning Radius 9.500m

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

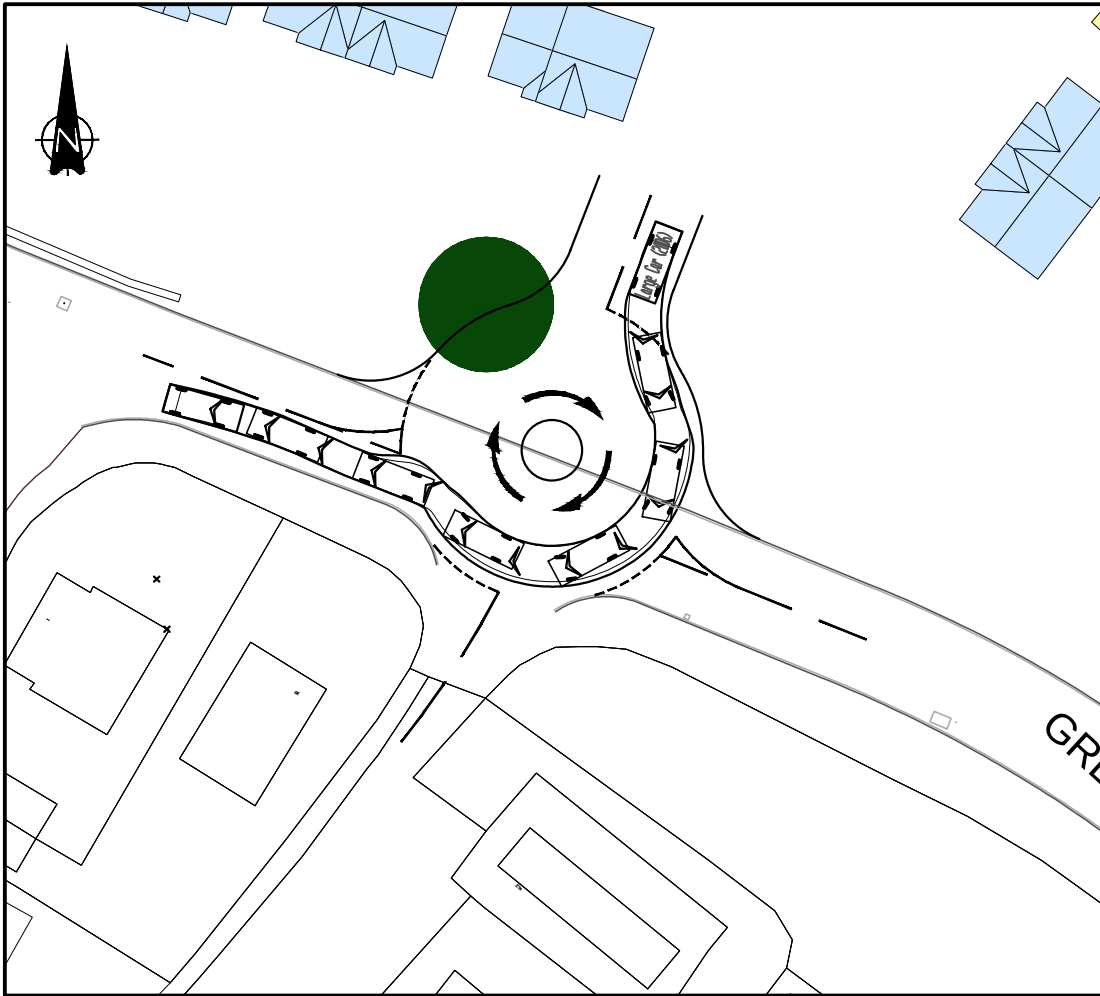
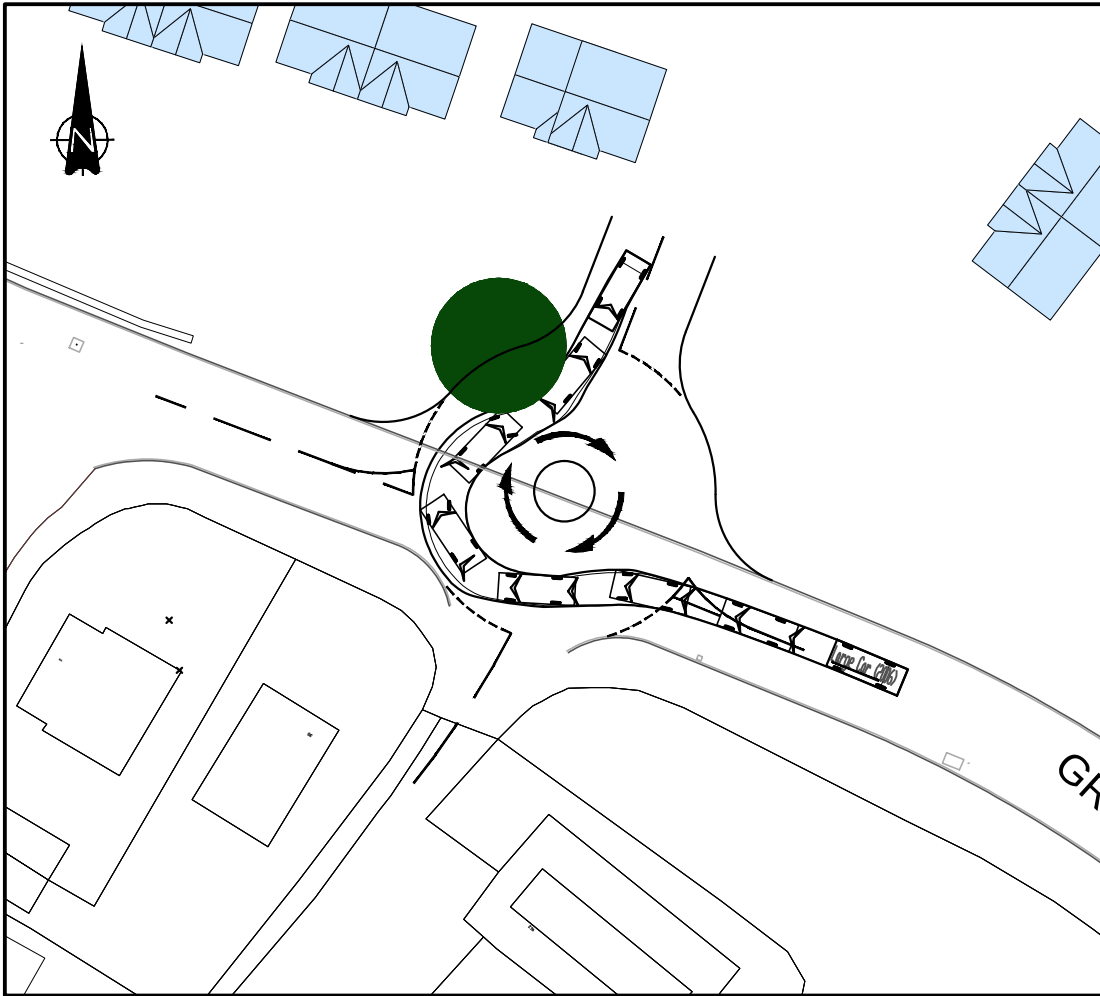
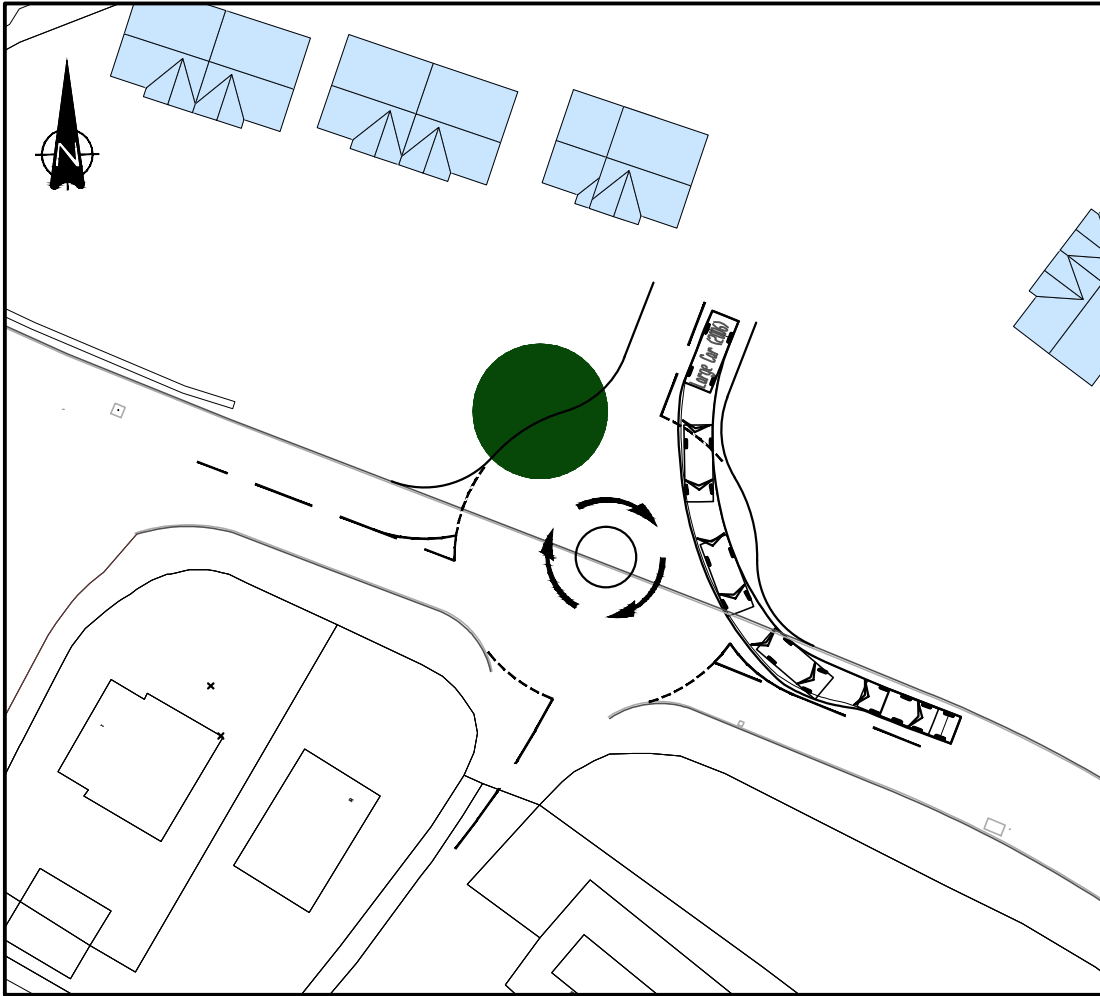
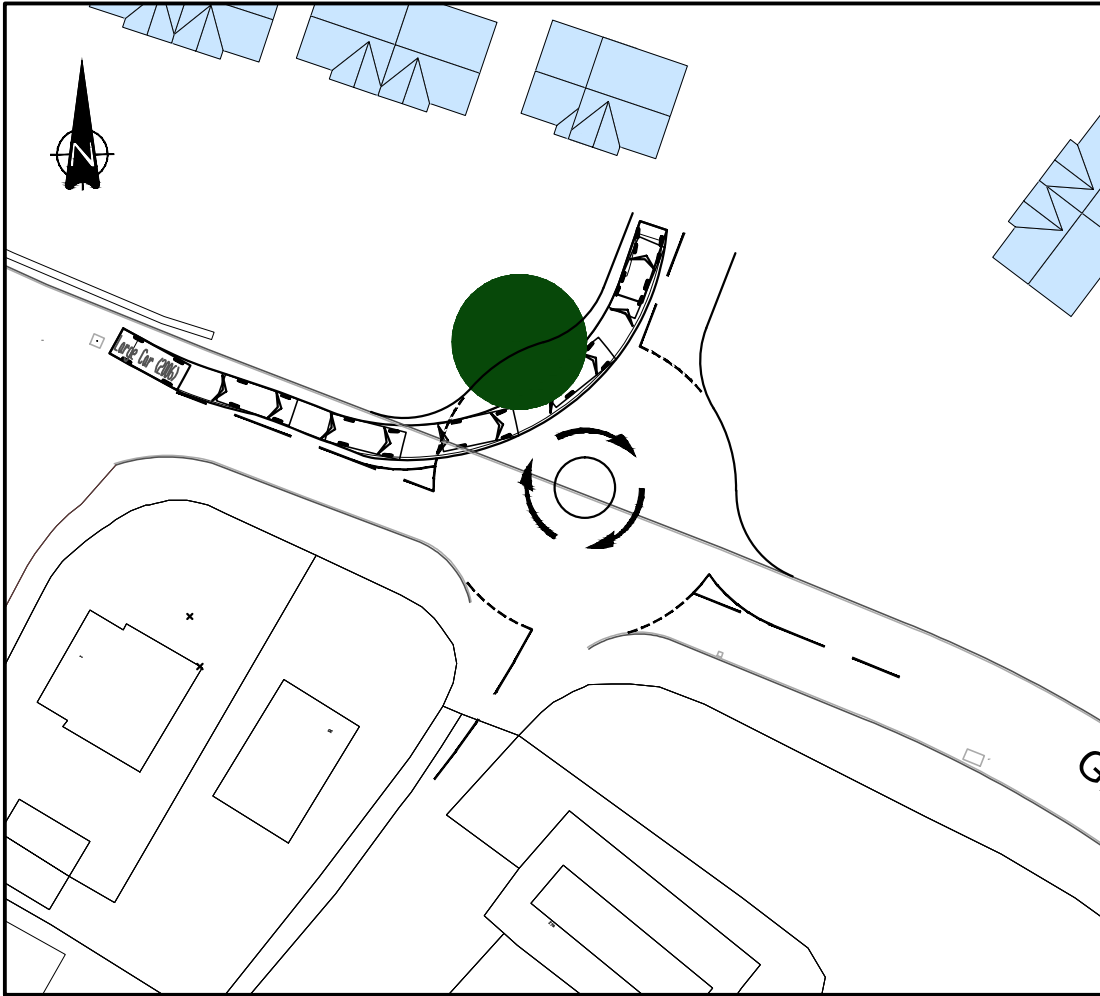
PROPOSED SITE ACCESS 2
LARGE REFUSE VEHICLE SWEPT PATH ANALYSIS

Scale:	Size:	First Issue:	Drawn:	Checked:
--------	-------	--------------	--------	----------

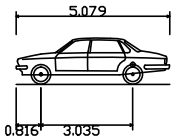
1:250	A3	21.11.2014	MF	KY
-------	----	------------	----	----

Drg No:	Rev:
---------	------

TPMA5021_010	/
--------------	---



VEHICLE PROFILE:



Large Car (2006)	5.079m
Overall Length	1.872m
Overall Width	1.525m
Overall Body Height	0.310m
Min Body Ground Clearance	1.831m
Max Track Width	4.00s
Lock to Lock Time	5.900m
Kerb to Kerb Turning Radius	

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

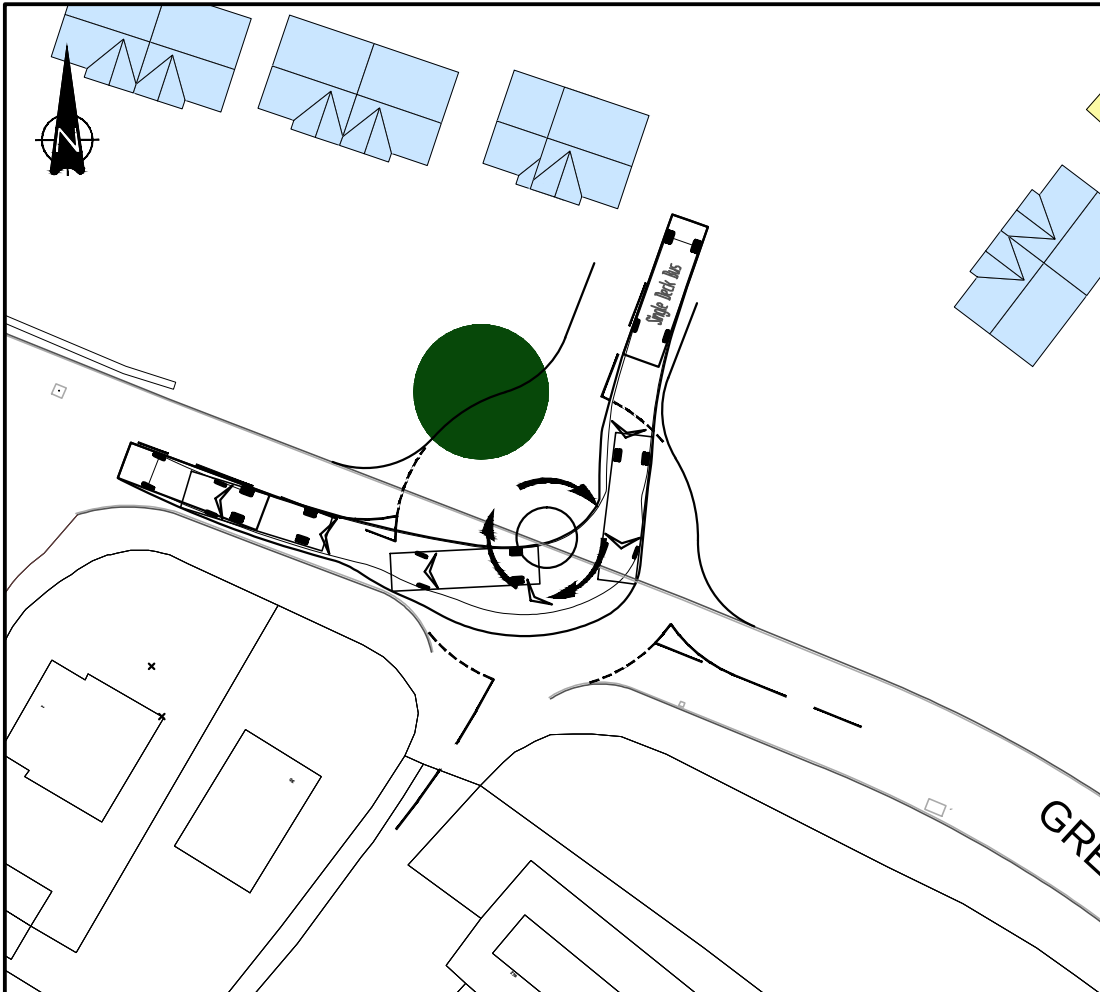
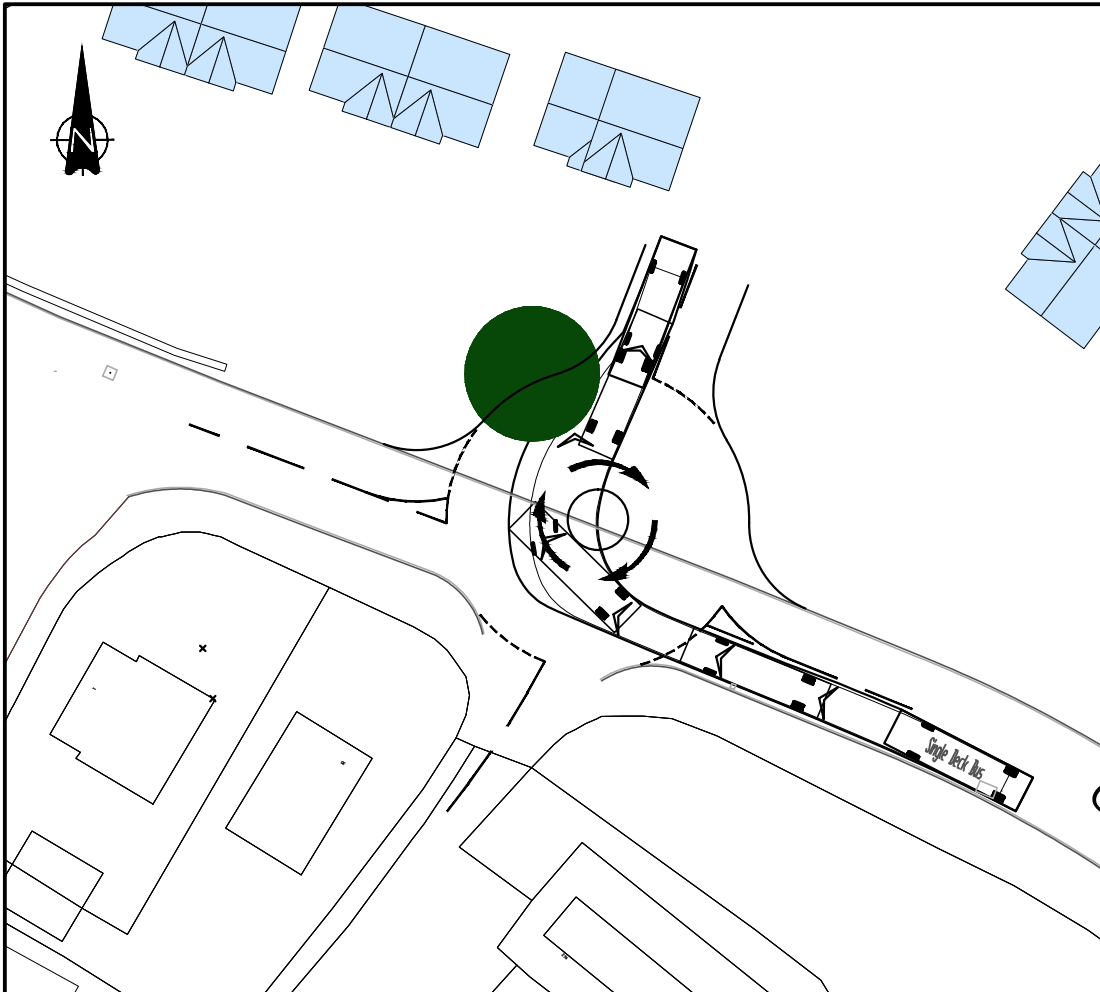
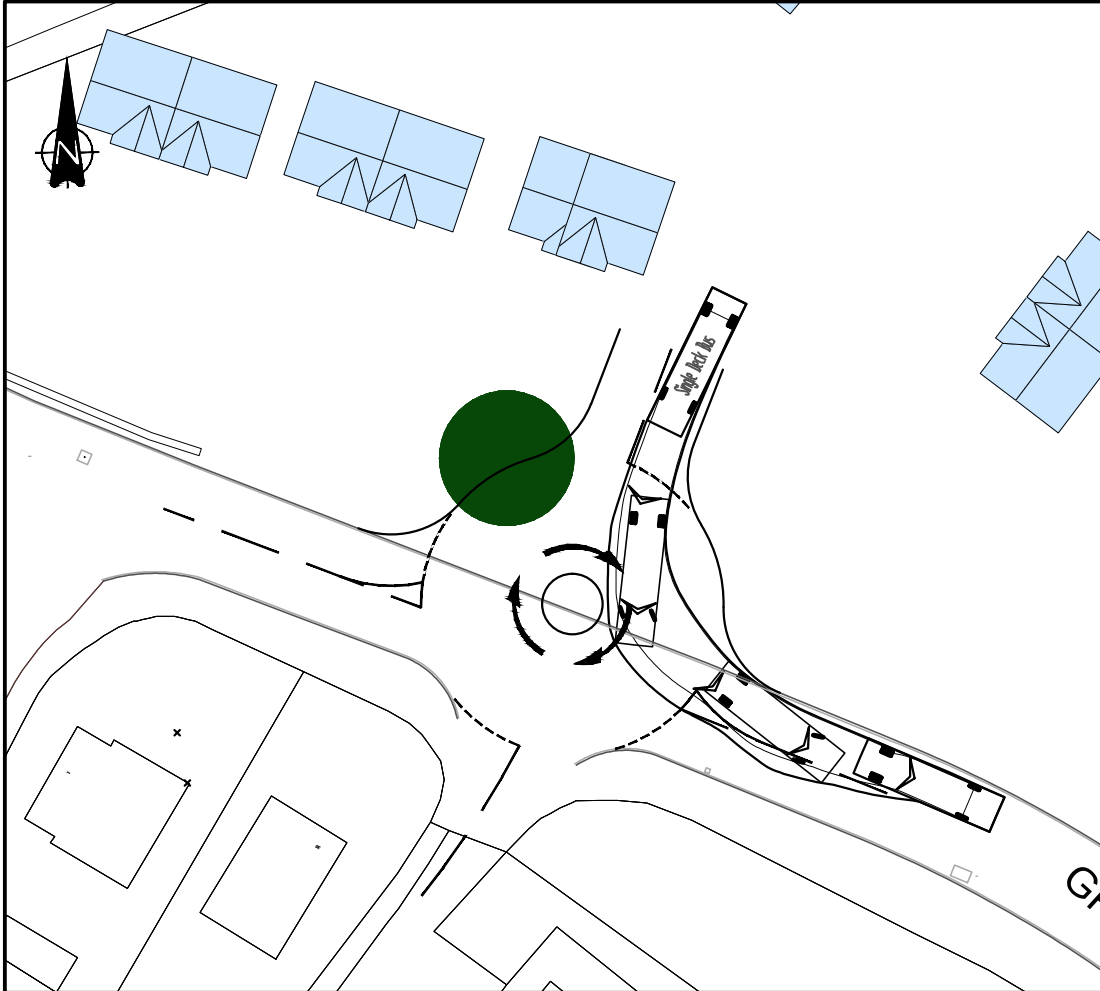
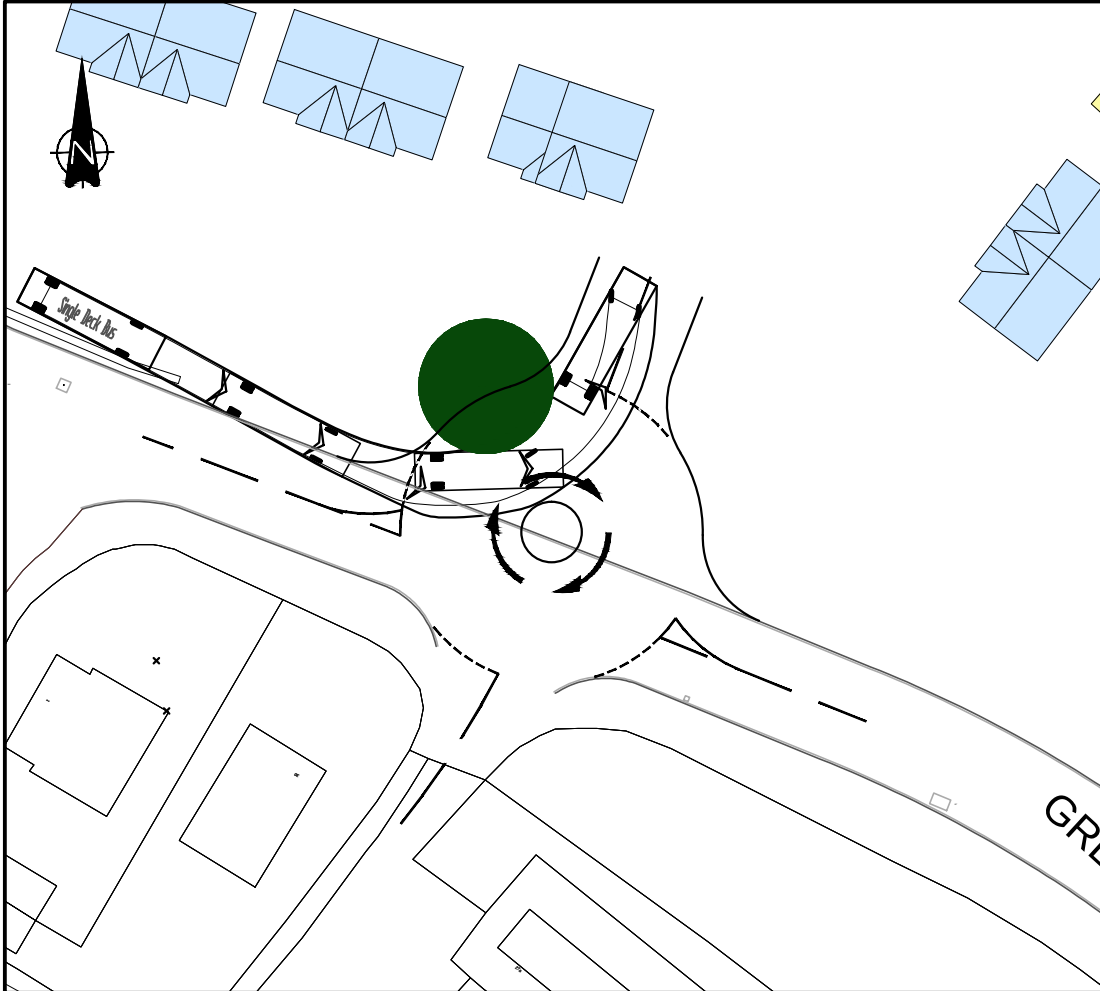
PROPOSED SITE ACCESS 2
LARGE CAR SWEEP PATH ANALYSIS

Scale: Size: First Issue: Drawn: Checked:

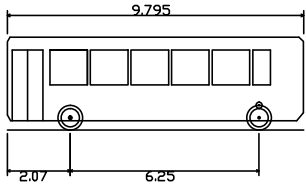
1:250 A3 21.11.2014 MF KY

Drg No: Rev:

TPMA5021_011 /



VEHICLE PROFILE:



Single Deck Bus	9.795m
Overall Length	2.500m
Overall Width	3.070m
Overall Body Height	0.306m
Min Body Ground Clearance	2.322m
Track Width	6.00s
Lock to Lock Time	10.111m
Kerb to Kerb Turning Radius	

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

PROPOSED SITE ACCESS 2
SINGLE DECKER BUS SWEEP PATH ANALYSIS

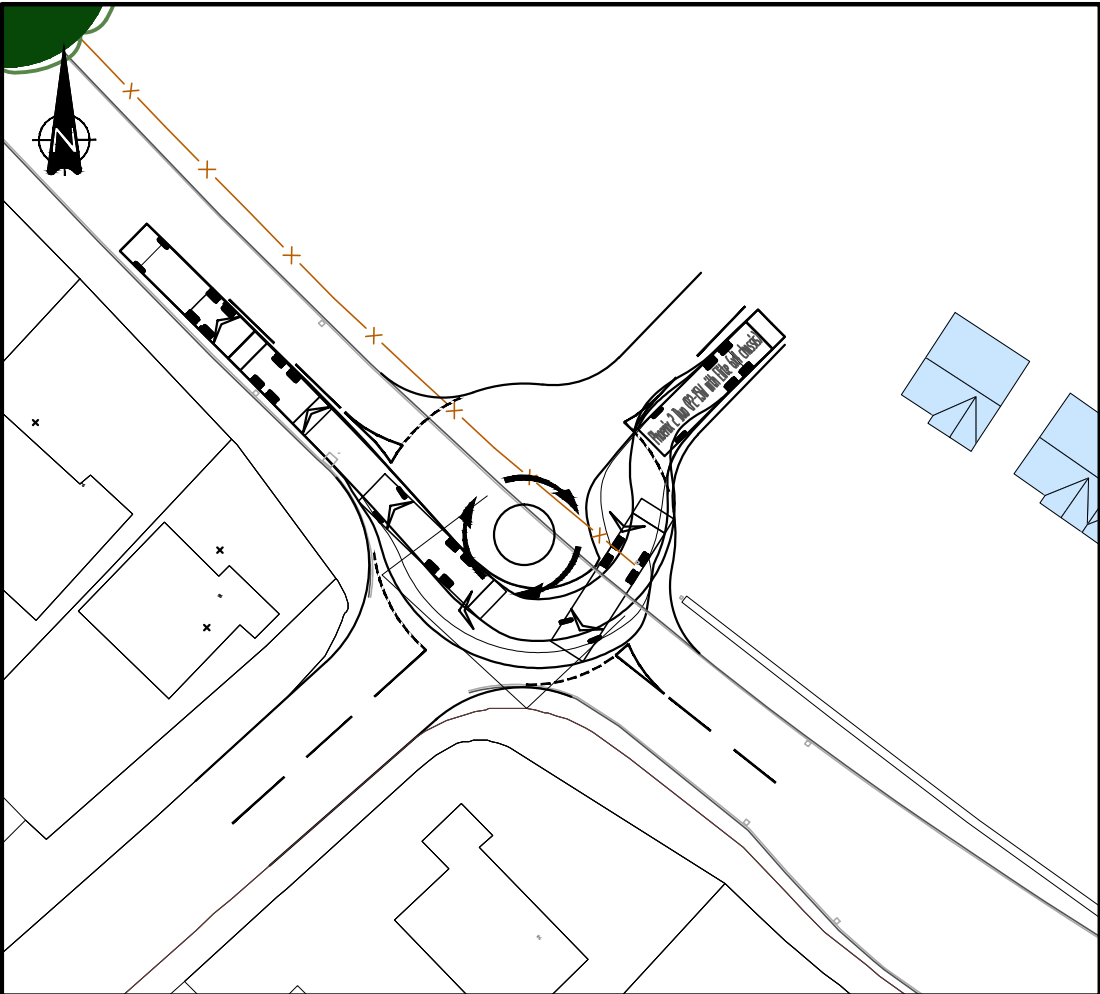
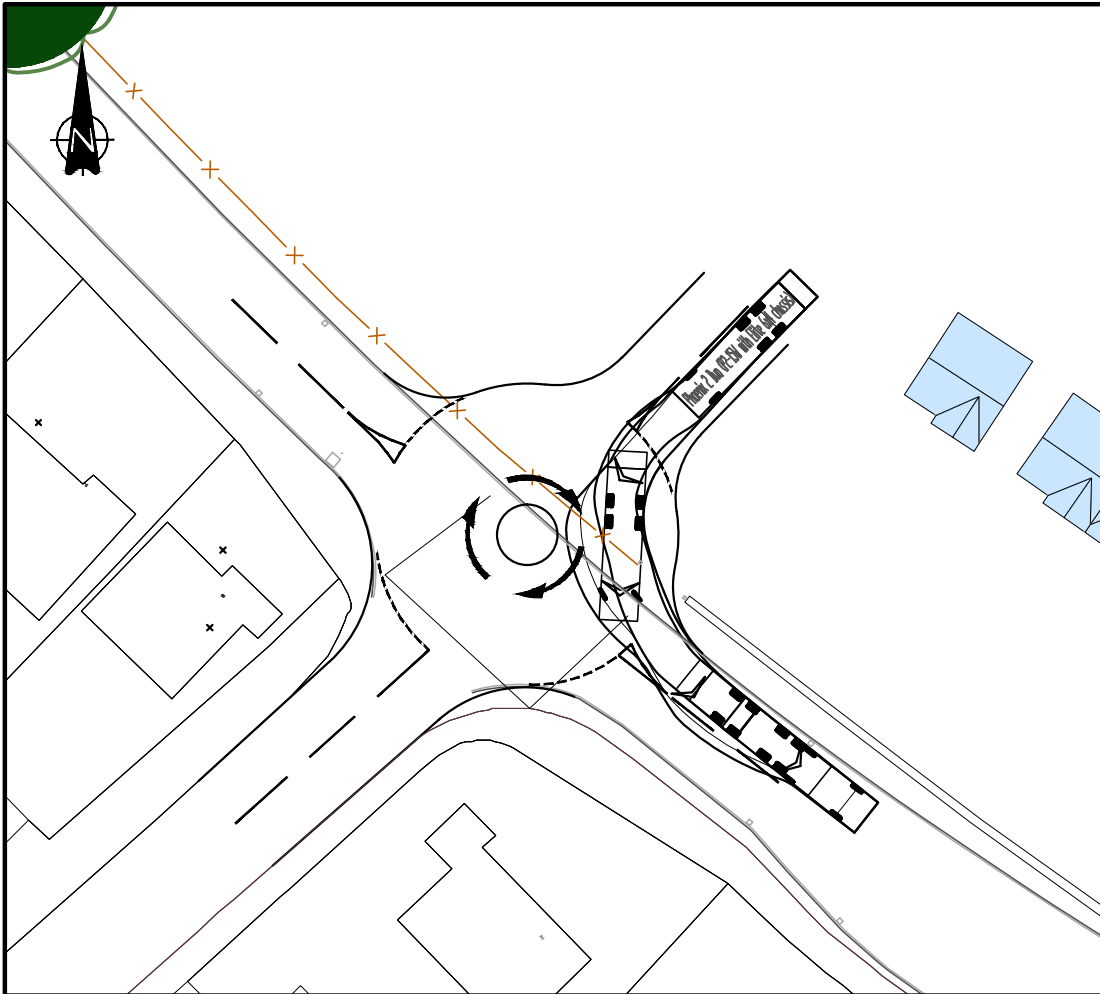
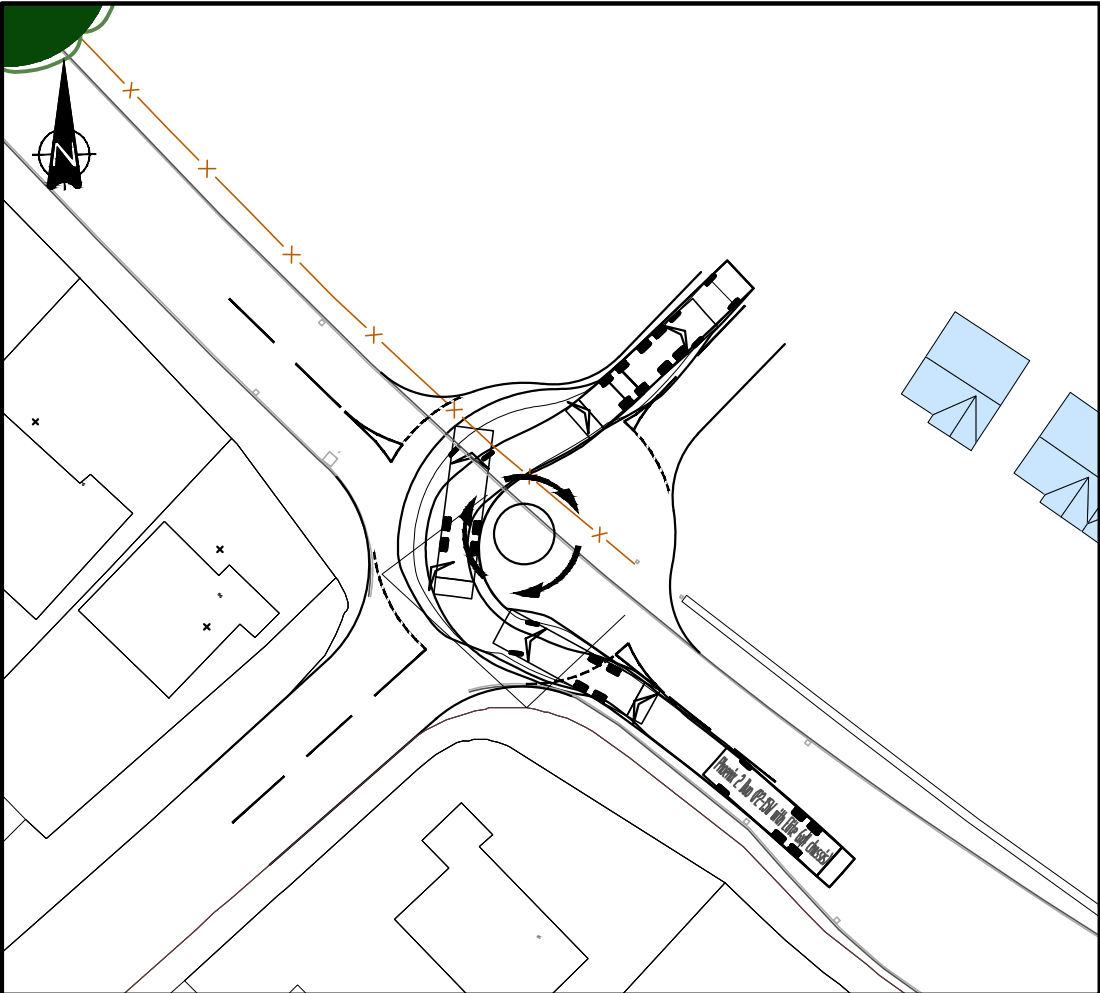
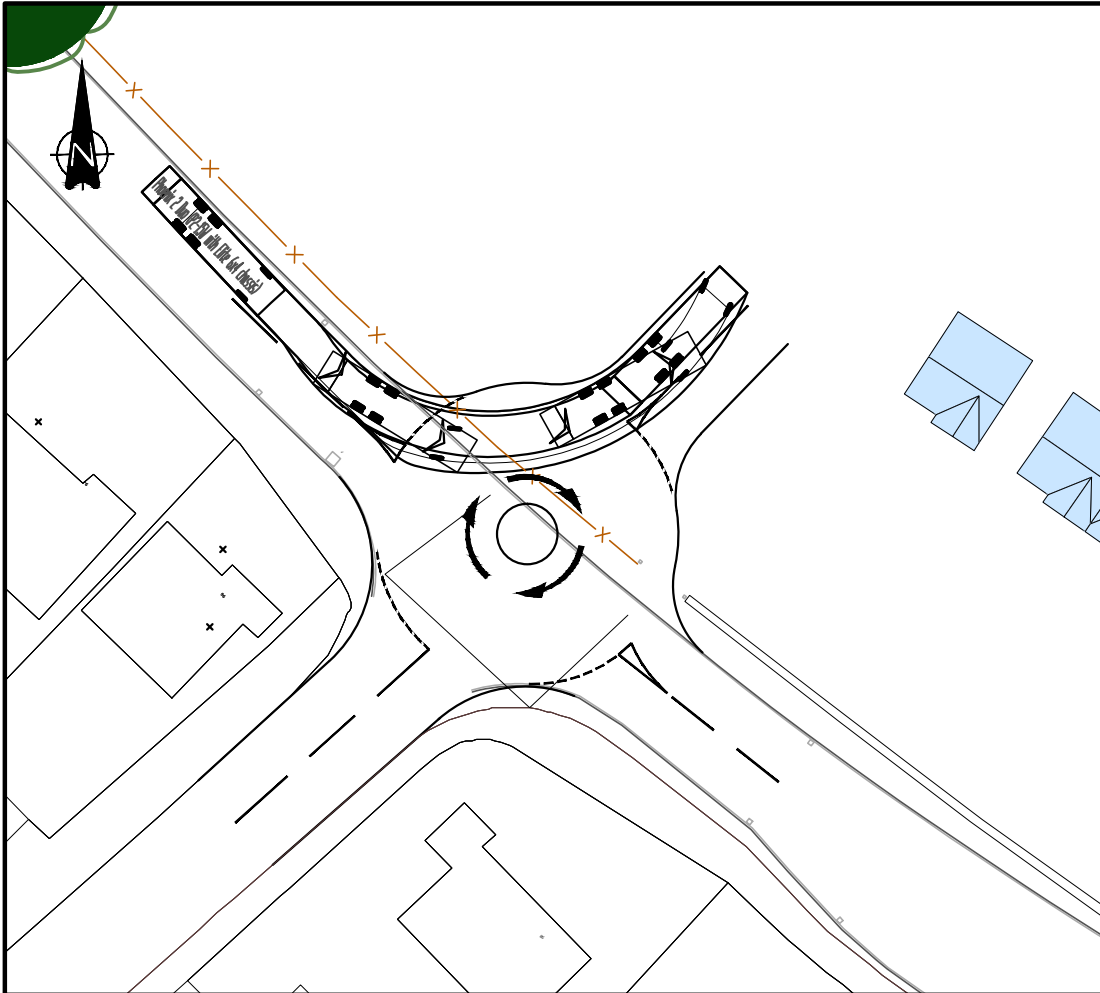
Scale:	Size:	First Issue:	Drawn:	Checked:
1:250	A3	21.11.2014	MF	KY

Drg No:

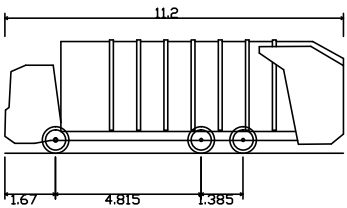
TPMA5021_012

Rev:

/



VEHICLE PROFILE:



Phoenix 2 Duo (P2-15W with Elite 6x4 chassis)
Overall Length 11.200m
Overall Width 2.530m
Overall Body Height 3.751m
Min Body Ground Clearance 0.304m
Track Width 2.500m
Lock to Lock Time 4.00s
Kerb to Kerb Turning Radius 9.500m

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

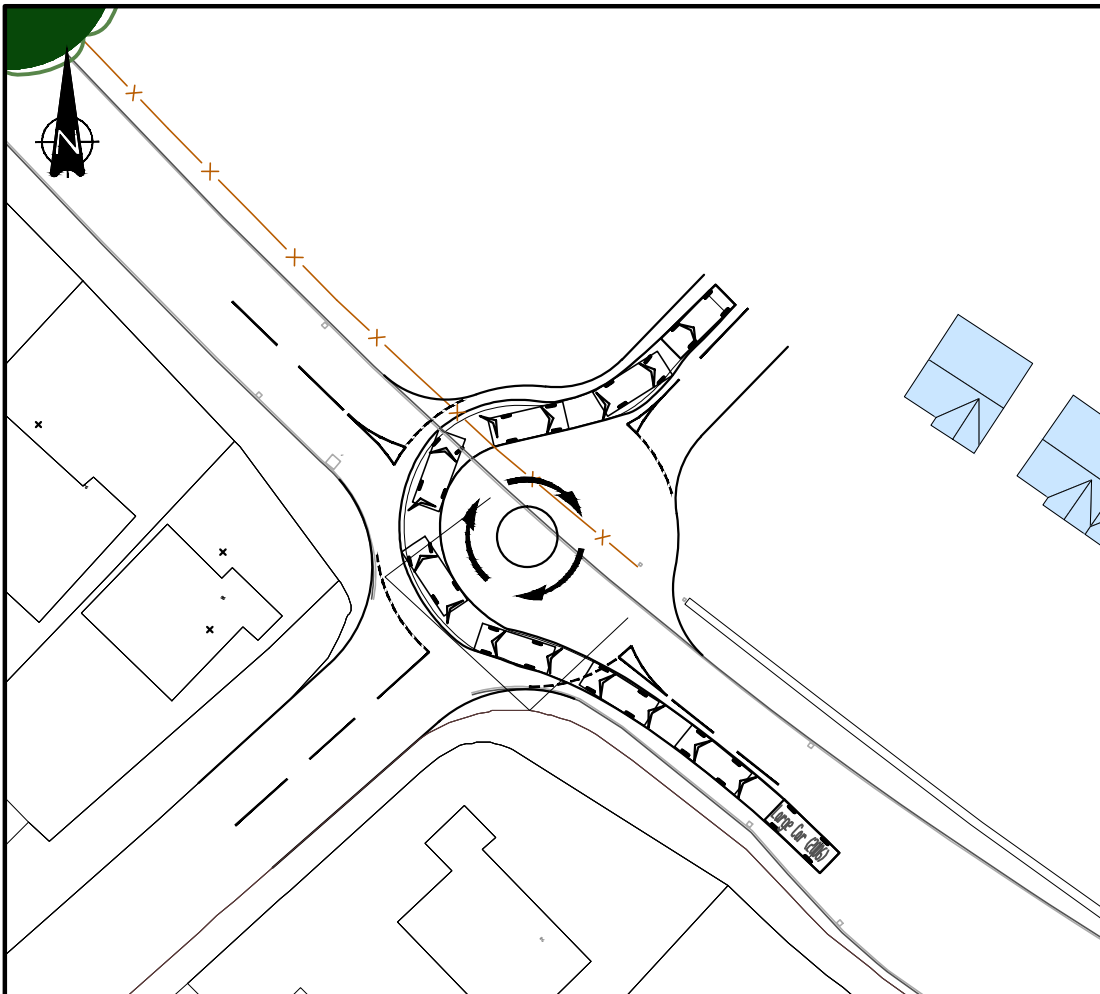
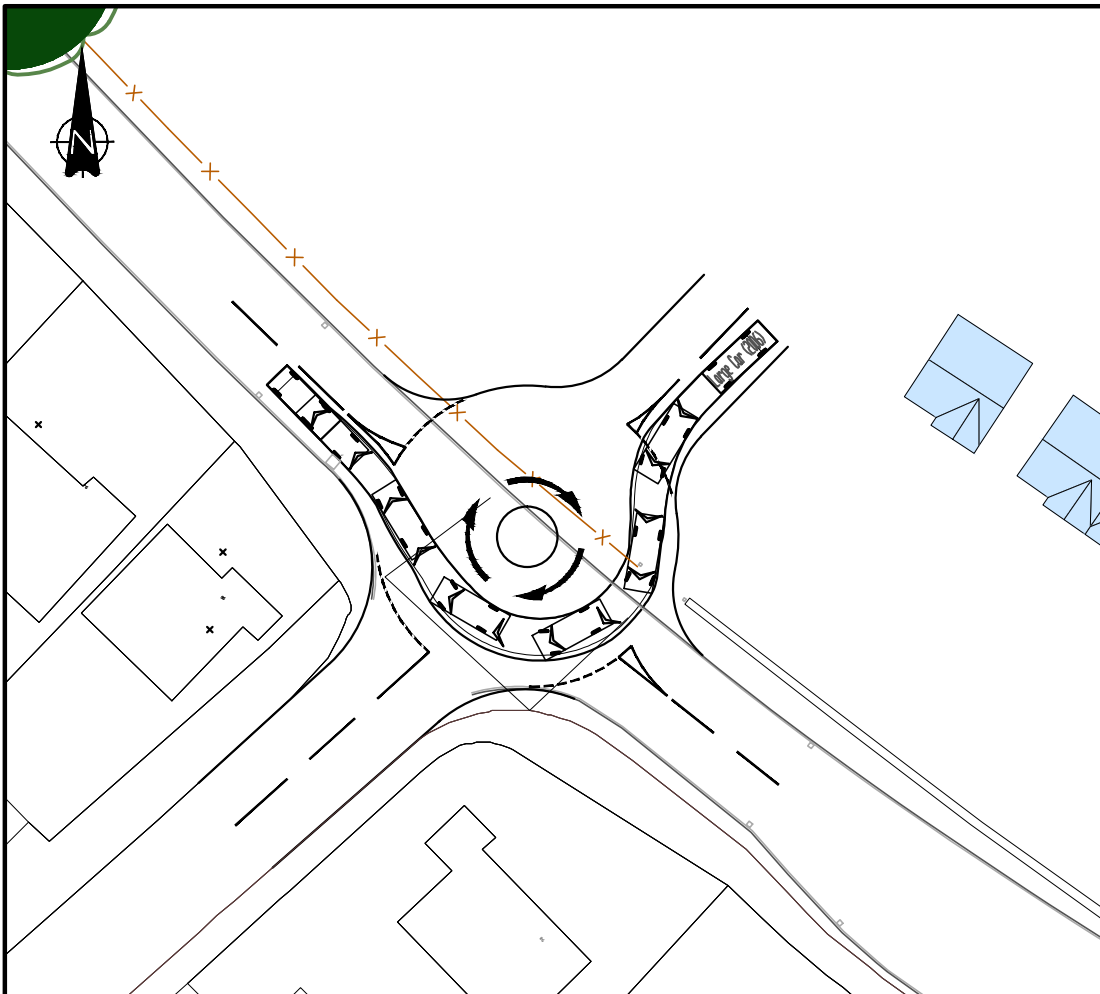
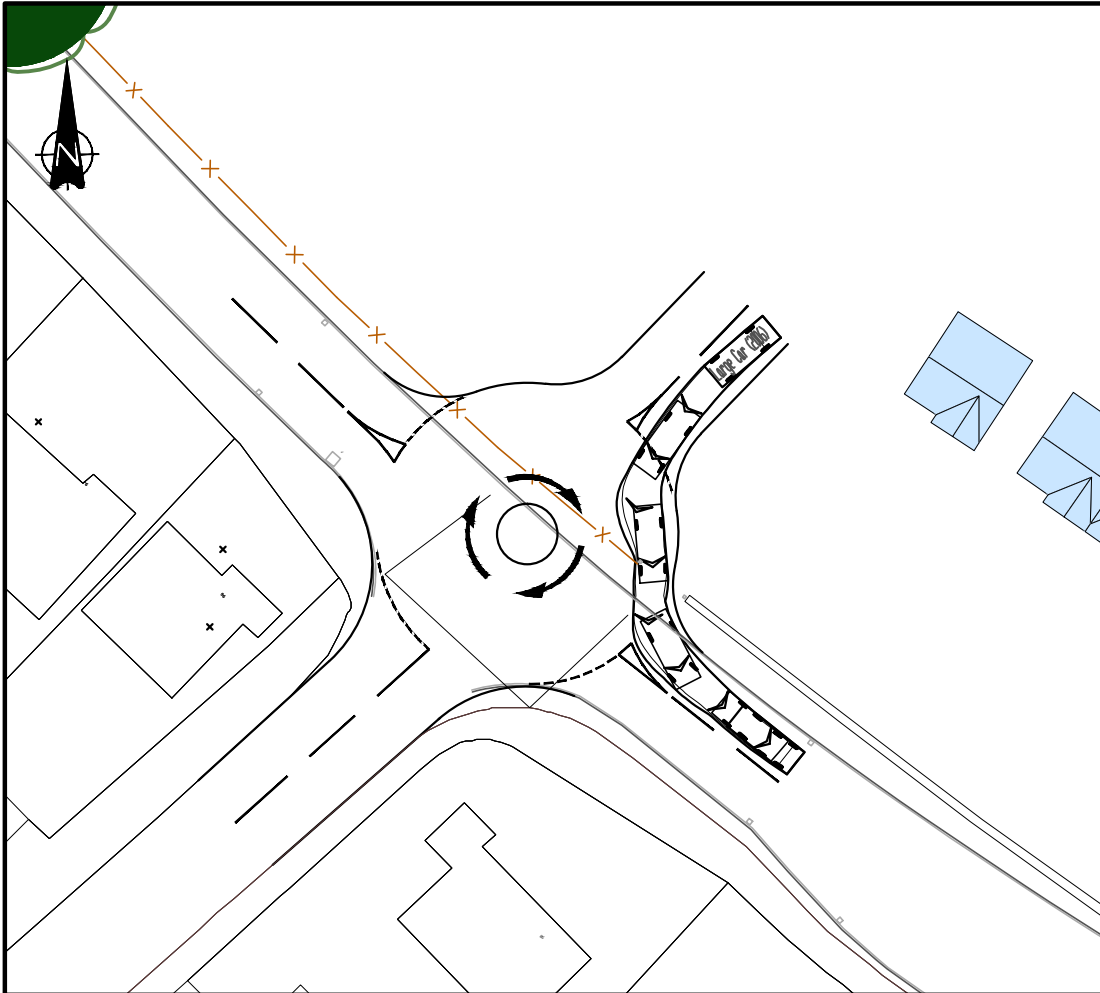
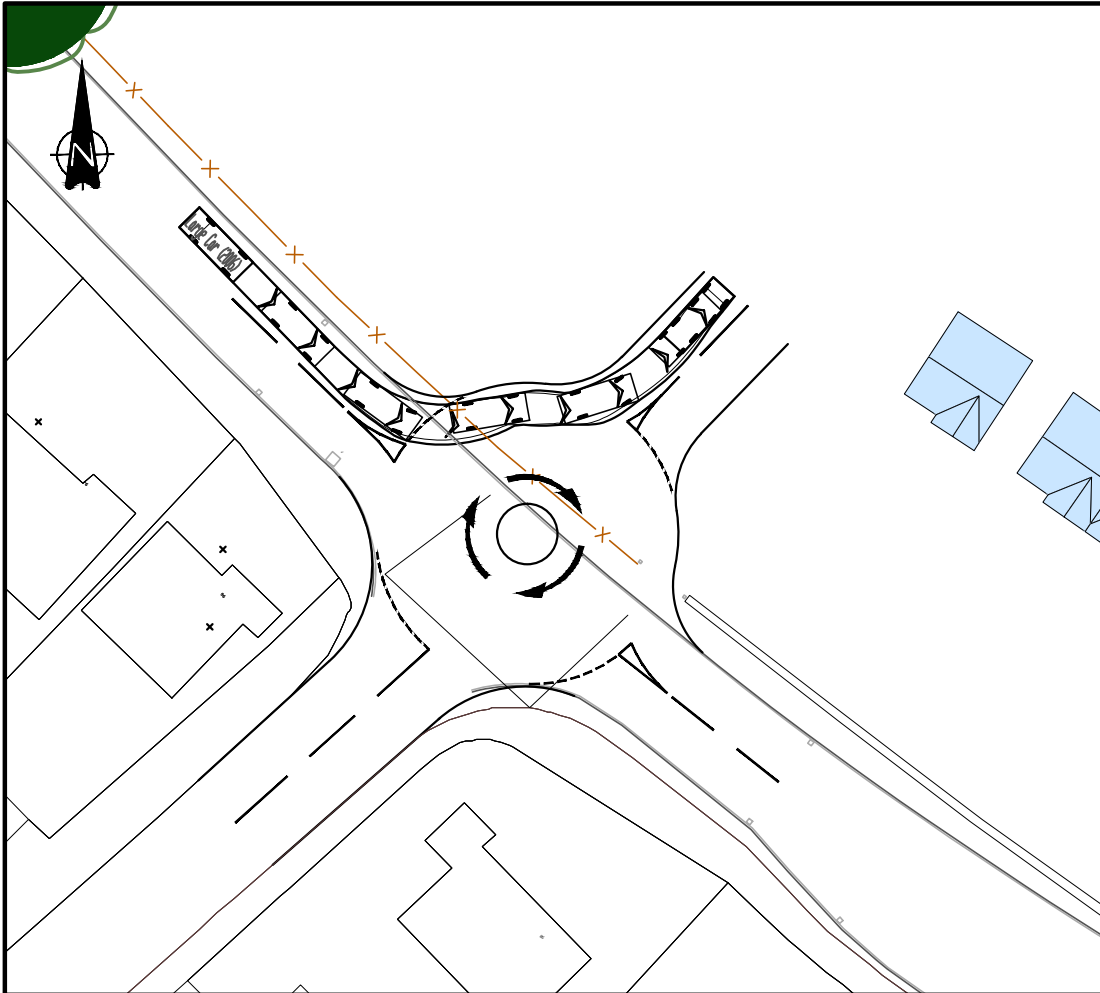
Status: PRELIMINARY

Project: HOME FARM RESIDENTIAL DEVELOPMENT, LLAY

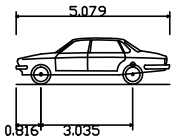
Drg Title: PROPOSED SITE ACCESS 3
LARGE REFUSE VEHICLE SWEPT PATH ANALYSIS

Scale:	Size:	First Issue:	Drawn:	Checked:
1:250	A3	24.11.2014	MF	KY

Drg No:	Rev:
TPMA5021_013	/



VEHICLE PROFILE:



Large Car (2006)	5.079m
Overall Length	1.872m
Overall Width	1.525m
Overall Body Height	0.310m
Min Body Ground Clearance	1.831m
Max Track Width	4.00s
Lock to Lock Time	5.900m
Kerb to Kerb Turning Radius	

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status:

PRELIMINARY

Project:

HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title:

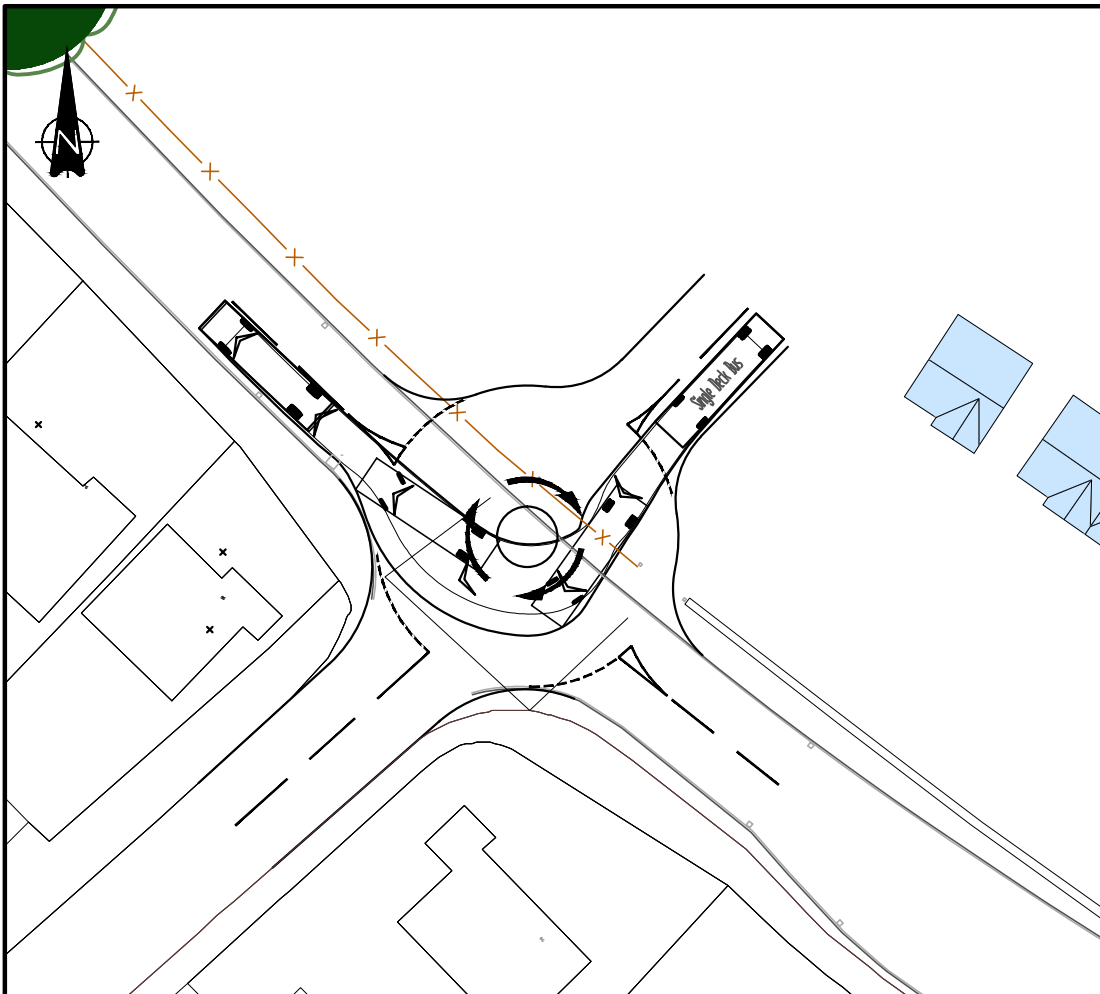
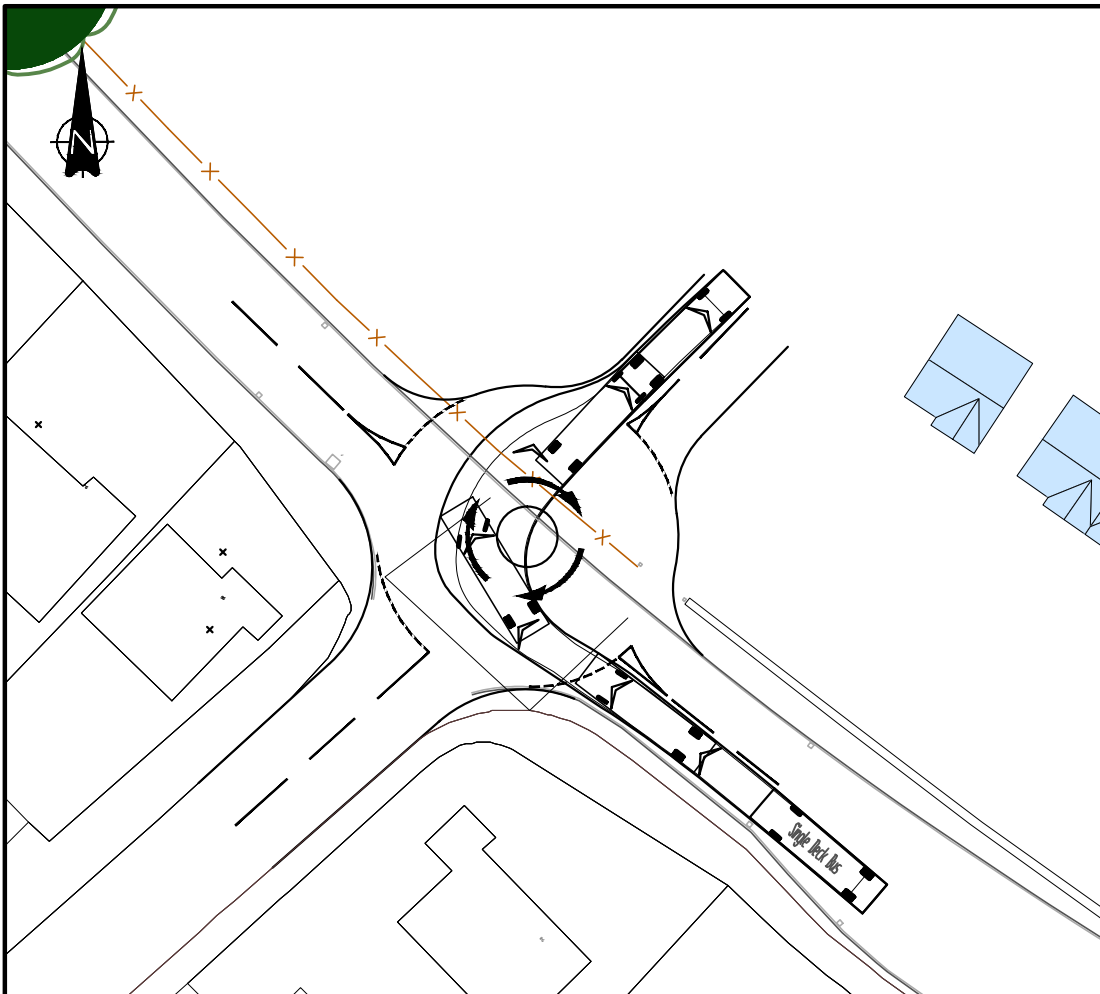
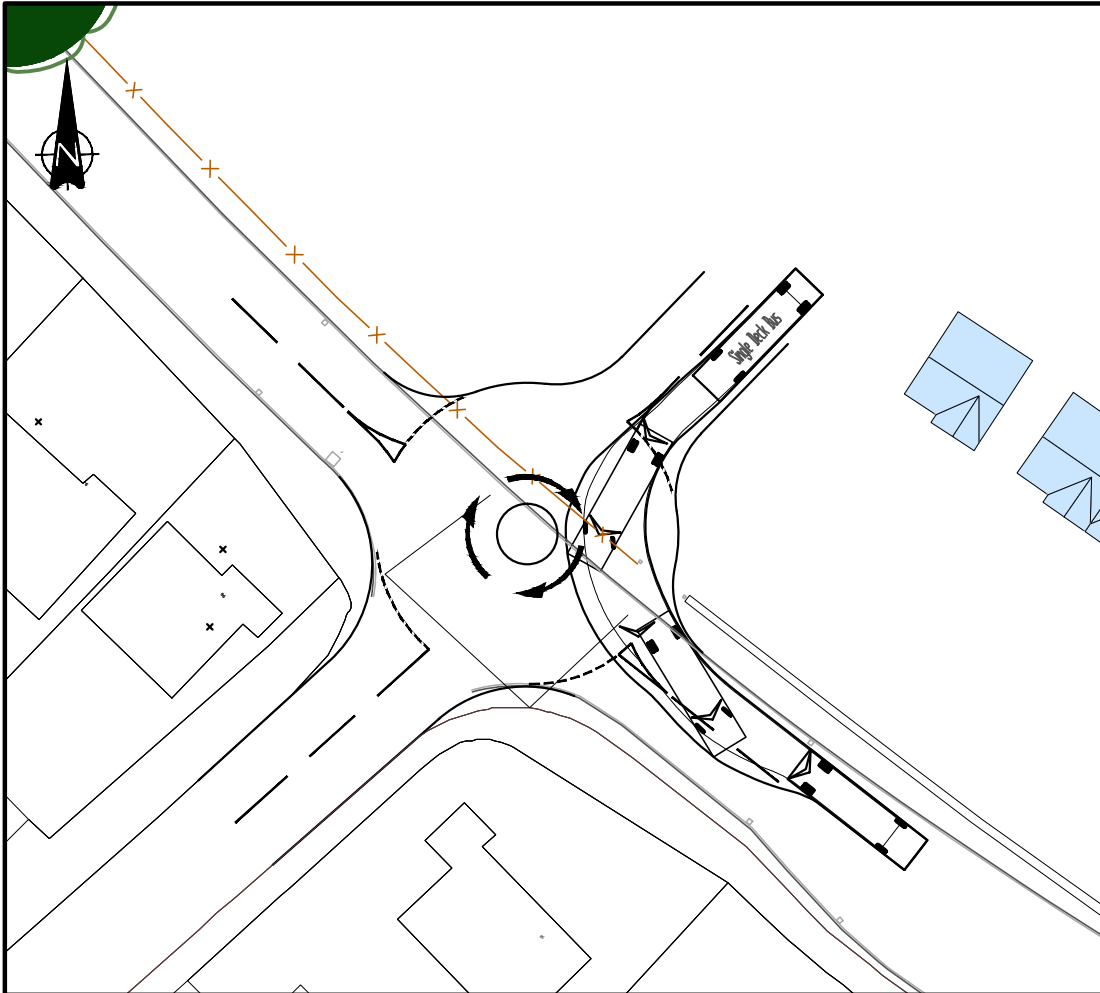
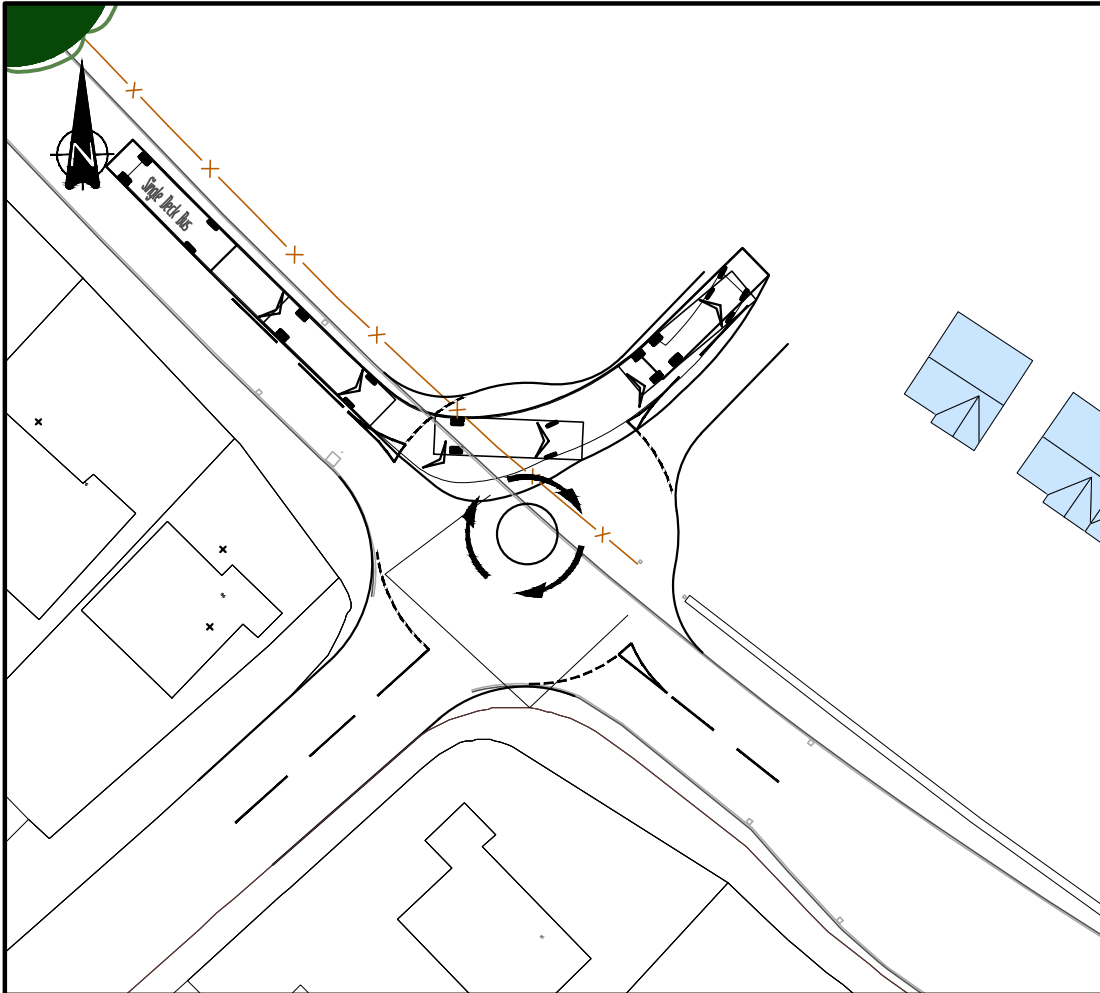
PROPOSED SITE ACCESS 3
LARGE CAR SWEEP PATH ANALYSIS

Scale: Size: First Issue: Drawn: Checked:

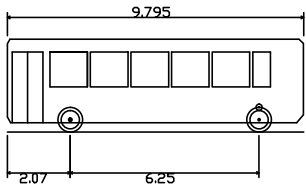
1:250 A3 21.11.2014 MF KY

Drg No: Rev:

TPMA5021_014 /



VEHICLE PROFILE:



Single Deck Bus	9.795m
Overall Length	2.500m
Overall Width	3.070m
Overall Body Height	0.306m
Min Body Ground Clearance	2.322m
Track Width	6.00s
Lock to Lock Time	10.111m
Kerb to Kerb Turning Radius	

Rev:	Description:	Date:	By:	Chkd:
------	--------------	-------	-----	-------



Curtins Consulting Ltd,
10 Oxford Court, Bishopgate, Manchester, M2 3WQ
t: 0161 236 2394
e: manchester@curtins.com
www.curtins.com

Structures • Civils • Environmental • Infrastructure • Transport Planning • Sustainability • Expert Advisory Services
Birmingham • Bristol • Cardiff • Douglas • Edinburgh • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: PRELIMINARY

Project: HOME FARM RESIDENTIAL
DEVELOPMENT, LLAY

Drg Title: PROPOSED SITE ACCESS 3
SINGLE DECK BUS SWEPT PATH ANALYSIS

Scale:	Size:	First Issue:	Drawn:	Checked:
1:250	A3	24.11.2014	MF	KY

Drg No:	Rev:
TPMA5021_015	/