

Proposed Petrol Filling Station, Electric Vehicle Hub, Retail Kiosk and  
Drive-thru Coffee Shop, Pwllheli Road, Caernarfon

# BEAUCHESTER ESTATES LIMITED

Transport Statement

October 2023





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## **1 INTRODUCTION**

### **1.1 Introduction**

- 1.1.1 Eddisons have been instructed by Beauchester Estates Ltd to advise on the traffic and transportation issues relating proposals for a petrol filling station, electric vehicle hub, retail kiosk and drive-thru coffee shop on land off the A4871 Pwllheli Road in Caernarfon.
- 1.1.2 The report provides information on the traffic and transport planning aspects of the development proposals and will form supplementary information to assist in the determination of a forthcoming planning application.
- 1.1.3 Following this introduction, Section 2 provides a description of the existing site and the development proposals.
- 1.1.4 Section 3 provides an assessment of the existing accessibility of the site by non-car modes, before Section 4 which considers the traffic impact of the proposed development. Section 5 draws together the conclusions to this report.

## 2 DEVELOPMENT SITE AND PROPOSALS

### 2.1 Existing Site

- 2.1.1 The application site is located approximately 1.9 kilometres south of Caernarfon town centre. The location of the site is shown in **Plan 1**.
- 2.1.2 The site is bound to the north and west by undeveloped land, whilst the A487 Caernarfon Road bounds the site to the south, to the east the site is bound by the A4871 Pwllheli Road.
- 2.1.3 Within the vicinity of the application site, the A4871 Pwllheli Road is a single-carriageway road with a carriageway width of approximately 7.3 metres. The speed limit of the road is 40mph.
- 2.1.4 To the north the A4871 Pwllheli Road provides vehicular access into Caernarfon town centre, whilst to the south it provides an arm of the recently constructed A487 Caernarfon Road/A4871 Pwllheli Road roundabout.
- 2.1.5 The A487 Caernarfon Road known as the Caernarfon and Bontnewydd Bypass opened on February 19<sup>th</sup> February 2022. The A487 Caernarfon Road/A4871 Pwllheli Road roundabout is subject to a 40mph speed limit, whilst the approaches to the roundabout are subject to the National Speed Limit. The A487 Caernarfon Road is combination of a single and dual carriageway road in the vicinity of the application site.
- 2.1.6 To the north of the site it provides arm of the A4086 Llanberis Road/A484 Caernarfon Road roundabout. To the west the A4086 Llanberis Road provides access into Caernarfon town centre. Whilst to the north the A484 Caernarfon Road continues until it reaches the A4871 which provides access to the wider areas of North Wales.





- 2.1.7 Whilst to the south of the A487 Caernarfon Road/A4871 Pwllheli Road roundabout, the A487 provides access to the Goat roundabout (A499/A487 junction), which again provides access to the wider highway network.

## 2.2 Development Proposals

- 2.2.1 The planning application proposals are for the provision of a petrol filling station (Unique Use) with a total of 3 pumps (6 bays) with retail kiosk and electric vehicle hub and a drive-thru coffee shop (Class A3) with a gross floor area of 167 sqm, to be operated by Costa Coffee.

- 2.2.2 The proposed site layout is displayed on **Plan 2**.

### Vehicular Access

- 2.2.3 It is proposed that vehicular access into the site will be provided for in the form a new priority controlled junction off the A4871 Pwllheli Road roundabout, approximately 90 metres north of the A487 Caernarfon Road/A4871 Pwllheli Road roundabout junction.

- 2.2.4 The proposed vehicular access into site will incorporate a right-turn lane on the A4871 Pwllheli Road This has necessitated widening the A4871 Pwllheli Road into the site frontage but does not require the acquisition of third party land to implement, as all additional land is within the existing limits of adopted highway or the application boundary.

### ***Parking Provision***

#### *Petrol Filling Station*

- 2.2.5 For the petrol filling station element, in addition to the 6 domestic fuelling and 11 EV charging bays, the proposals provide a total of 17 parking bays which include 2 mobility impaired spaces. A motorcycling parking bay is also proposed within the site layout.
- 2.2.6 In addition, there will be 5 “service” bays, comprising 4 jet wash bays with screening and 1 air and water bay.
- 2.2.7 Cycle parking is provided in the form of 3 Sheffield style parking bays (parking for up to 6 bicycles), this provision is located in a safe and convenient location adjacent to the kiosk building.

#### **Drive-thru Coffee Unit**

- 2.2.8 A total of 30 car parking spaces including 2 mobility impaired spaces and 2 EV charging spaces will be provided for the Drive-thru coffee element. The proposed car parking provision is based on Costa Coffee’s experience of other developments of this nature and will ensure that sufficient capacity is provided on the site to accommodate demand at busier periods.
- 2.2.9 Cycle parking is provided in the form of 3 Sheffield style parking bays (parking for up to 6 bicycles), this provision is located in a safe and convenient location adjacent to the building.

### ***Servicing***

- 2.2.10 The proposed petrol filling station and the drive-thru coffee unit will be serviced from within the internal layouts of the site.



*Petrol Filling Station*

- 2.2.11 Fuel deliveries will be undertaken using a 15.2 metre articulated tanker, to demonstrate that such vehicles can enter and exit the site in a safe and convenient manner a swept path analysis has been undertaken and this is shown in **Plan 3**.
- 2.2.12 Other deliveries for the petrol filling station will be undertaken by rigid vehicles using the delivery bay located adjacent to the kiosk, a swept path analysis using a 12 metre rigid, which will be the largest delivery vehicle is displayed in **Plan 4**.
- 2.2.13 The swept path analysis has demonstrated that the petrol filling station can be serviced in a safe and efficient manner.

*Drive-thru Coffee Unit*

- 2.2.14 The Drive-thru unit will be serviced from within the car park for the proposed unit. Deliveries to the site will be made during the early morning to avoid busy periods for the units.
- 2.2.15 The typical HGV that would be likely to serve these types of unit would be a large rigid HGV. It is likely that only one delivery per day would be made by HGV to each unit. A tracking exercise using a 11.2 metre rigid has been undertaken and the swept path of the 11.2 metre HGV is shown on **Plan 5**. This swept path analysis demonstrates that the drive-thru coffee unit can be serviced in a safe and efficient manner.



## 3 ACCESSIBILITY BY NON CAR MODES

### 3.1 Introduction

3.1.1 In order to accord with the aspirations of the Planning Policy for Wales (PPW), any new proposals should extend the choice in transport and secure mobility in a way that supports sustainable development.

3.1.2 The principle of the PPW policy is to encourage sustainable travel as set out in paragraph 4.1.1:

*"The planning system should enable people to access jobs and services through shorter, more efficient and sustainable journeys, by walking, cycling and public transport. By influencing the location, scale, density, mix of uses and design of new development, the planning system can improve choice in transport and secure accessibility in a way which supports sustainable development, increases physical activity, improves health and helps to tackle the causes of climate change and airborne pollution by:*

- *Enabling More Sustainable Travel Choices – measures to increase walking, cycling and public transport, reduce dependency on the car for daily travel;*
- *Network Management – measures to make best use of the available capacity, supported by targeted new infrastructure; and*
- *Demand Management – the application of strategies and policies to reduce travel demand, specifically that of single-occupancy private vehicles."*

3.1.3 New proposals should therefore attempt to influence the mode of travel to the development in terms of gaining a shift in modal split towards non-car modes, thus assisting in meeting the aspirations of current national and local planning policy.

3.1.4 The accessibility of the proposed site has been considered by the following modes of transport:

- accessibility on foot;
- accessibility by cycle;
- accessibility by bus;

### 3.2 Accessibility on Foot

3.2.1 It is important to create a choice of direct, safe, and attractive routes between where people live and where they need to travel in their day-to-day life. This philosophy clearly encourages the opportunity to walk whatever the journey purpose and also helps to create more active streets and more vibrant neighbourhoods.

3.2.2 A pedestrian footway with a width of circa 1.8 metres is located on the western side of the A4871 Pwllheli Road along eastern boundary of the site. To the north it links with the footway provision located in southern areas of Caernarfon, whilst to the south the footway links with the pedestrian provision provided at the A487 Caernarfon Road/A4871 Pwllheli Road roundabout.

3.2.3 Pedestrian facilities in the form of pedestrian footways, refuges with associated dropped kerbs are provided on each of arm of the junction. To the south of the roundabout a footway with a width of approximately 1.8 metres is provided along the A4871 Pwllheli Road which provides access to Bontnewydd.

3.2.4 The CIHT document 'Planning for Walking' from 2015 states, in paragraph 2.1, that in 2012 that 79% of all journeys made in the UK of less than a mile (1.6 kilometres) are carried out on foot.



3.2.5 Within the Institution of Highways and Transportation (IHT) document, entitled “Guidelines for Providing for Journeys on Foot”, Table 2.2 suggests distances for desirable, acceptable and preferred maximum walks to ‘town centres’, ‘commuting/schools’ and ‘elsewhere’. The ‘preferred maximum’ distances are shown below in **Table 3.1**.

| Suggested Preferred Maximum Walk |                  |           |
|----------------------------------|------------------|-----------|
| Town Centre                      | Commuting/School | Elsewhere |
| 800m                             | 2,000m           | 1,200m    |

**Table 3.1 – IHT ‘Providing for Journeys on Foot’ Walk Distances**

3.2.6 In light of the above review, a pedestrian catchment of 2 kilometres from the centre of the site, using all usable pedestrian routes, has been provided in **Plan 6** and provides an illustrative indication of the areas that can be reached based on a leisurely walk from the site.

3.2.7 As can be seen in **Plan 6**, the southern residential areas of Caernarfon together with the village of Bontnewydd are situated within the 2 kilometre walking catchment area. This demonstrates that, the proposed development on the site location will be able to attract employees from the local residential areas who will be able to access the site by foot. This also indicates that a significant proportion of potential customers will also be within reasonable walking distance of the site.

3.2.8 As illustrated, the development site benefits from being located within close proximity to the residential areas located with the Caernarfon area, which will provide the opportunity for customers and staff to travel to the proposed site by foot, therefore reducing the reliance on the private car.

### 3.3 Accessibility by Cycle

- 3.3.1 A distance of 5 kilometres is generally accepted as a distance where cycling has the potential to replace short car journeys.
- 3.3.2 A distance of 5 kilometres is generally accepted as a distance where cycling has the potential to replace short car journeys. This distance equates to a journey of around 25 minutes based on a leisurely cycle speed of 12 kilometres per hour and would encompass the entirety of Caernarfon including the town centre as was the nearby areas of Llanfaglan, Dinas, Caeathro, Pont-rug and Porth Waterloo.
- 3.3.3 In addition, National Cycle Route 8 runs from Tan-y-maes to the north-west of Caernarfon, through the centre of Caernarfon, then south via Bontnewydd and Llanwnda. It is both an on and off cycle route and is located approximately 460 metres from the centre of the site.
- 3.3.4 As stated previously, cycle parking provision is proposed as part of the development proposals.
- 3.3.5 The site can therefore be considered as being accessible by cycle.

### 3.4 Accessibility by Bus

- 3.4.1 The nearest bus stops to the site are located on the A4871 Pwllheli Road approximately 400 metres (a 5 minute walk) to the south from the application site. Additional bus stops are located further along the A4871 Pwllheli Road. All of the bus stops can be accessed via the existing pedestrian infrastructure and their locations are shown on **Plan 6**.
- 3.4.2 A summary of the services available from the nearest bus stops from the development site is provided in **Table 3.2** below.

| Service No | Route  | Monday – Friday (Per hour) |        |                    |                    | Sat                             | Sun                            |
|------------|--|----------------------------|--------|--------------------|--------------------|---------------------------------|--------------------------------|
|            |  | AM Peak                    | Midday | PM Peak            | Eve                |                                 |                                |
| 1          | Porthmadog - Caernarfon via Penygroes                    | 1 service at 10:46         | 1      | 1 service at 18:44 | 1 service at 21:04 | Service at 10:46, 18:44 & 21:04 | 0                              |
| 1F         | Penygroes - Caernarfon                                   | 1                          | 0      | 1                  | 0                  | 0.5                             | 0                              |
| 1N         | Nantlle - Caernarfon                                     | 1                          | 1      | 1                  | 0                  | 1                               | 0                              |
| 1S         | Blaenau Ffestiniog - Caernarfon via Porthmadog, Tremadog | 0                          | 0      | 0                  | 0                  | 0                               | 1                              |
| 5A         | Nasareth - Bangor via Nantlle, Caernarfon                | 0                          | 0      | 0                  | Service at 16:01   | 0                               | 0                              |
| 12         | Caernarfon - Pwllheli via Trefor                         | 1                          | 1      | 1                  | 1                  | 1                               | 0.5                            |
| T2         | Bangor - Aberystwyth                                     | 1                          | 1      | 1                  | 1                  | 1                               | Service at 7:45, 11:43 & 16:43 |

**Table 3.2 - Summary of Bus Services Operating in the Vicinity of the Site**

3.4.3 As can be seen from Table 3.2, the nearest bus stops to the site provides various services throughout the day to a wide range of destinations in the Caernarfon area.

3.4.4 The above services operate from around 07:00 am to around 22:00 pm, making travel by public transport a real alternative to travelling by car for staff trips to and from the site.

3.4.5 As demonstrated, the development site benefits from a reliable bus network travelling within the Caernarfon area which will provide the opportunity for staff to travel to the proposed site by bus, therefore reducing the reliance on the private car.

### 3.5 Accessibility Summary

3.5.1 The site has been considered in terms of accessibility by non-car modes, including walking, cycling and public transport.

3.5.2 The following conclusions can be drawn from this section of the report:

- The site is accessible on foot with the proposed footway provision linking with the existing provision which gives local employees and customers a choice about how they travel.
- The site is accessible by cycle with the Caernarfon and the surrounding areas within a cycling distance of the application site.
- The services from the bus stops on the A4871 Pwllheli Road connect the site to the surrounding areas of Caernarfon. It can be concluded that the proposed development can be accessed by bus.

3.5.3 In light of the above, it is considered the site is accessible by non-car modes and will cater for needs of the development's employees and assist in promoting a choice of travel modes other than the private car.



## 4 TRAFFIC IMPACT ANALYSIS

### 4.1 Introduction

4.1.1 Having established that the proposed development site is accessible by modes of travel other than the private car and would be in general accordance with transport policies, the following section considers the traffic impact of the development proposals on the local highway network.

### 4.2 Surveyed Flows

4.2.1 In order to establish current levels of traffic, full turning count surveys were undertaken at the A487 Caernarfon Road/A4871 Pwllheli Road roundabout junction on Thursday 11th May 2023. The full traffic survey data is contained within **Appendix 1**.

4.2.2 Analysis of the traffic survey data indicates that the weekday AM peak occurred between 0815 and 0915 hours and the weekday PM peak occurred between 1630 and 1730 hours.

4.2.3 **Figures 1** and **2** provide the 2023 surveyed traffic flows converted into passenger car units (PCUs), the unit of analysis, for the weekday AM and PM peak periods respectively.

### 4.3 Growthed Flows

4.3.1 In order to factor the surveyed traffic flows to the future assessment year of 2033 (ten years post submission of the planning application for robustness) a TEMPRO (Version 80) adjusted National Road Traffic Model (NTM) growth factor was applied for the Gwynedd 007 MSOA where the site is located.

- 2023 to 2033 AM Peak =1.0539;
- 2023 to 2033 PM Peak = 1.04365;

4.3.2 These growth factors have been applied to the 2023 Surveyed Flows for the Weekday AM, PM s and the 2033 Growthed Flows are displayed in **Figures 4 and 5**.

#### 4.4 Committed Development

4.4.1 It is our understanding that there are no major committed developments within the vicinity of the site that need to be included within this traffic impact analysis, though the growth factors will, in any case, account for planned growth in the area. As such, the growthed flows represent the base traffic flows.

#### 4.5 Proposed Trip Distribution

4.5.1 The directional distribution of the traffic associated with the proposals has been assigned to the local highway network in line with the observed vehicle movements.

4.5.2 The resulting traffic trip distribution for the AM peak period is shown in **Figure 5** whilst the proposed distribution for PM peak traffic is shown in **Figure 6**.

#### 4.6 Proposed Development

The planning application proposals are for the provision of a petrol filling station (Unique Use) with a total of 3 pumps (6 bays) and a drive-thru coffee shop (Class A3) with a gross floor area of 167 sqm, to be operated by Costa Coffee.

### ***Proposed Petrol Filling Station Generation***

- 4.6.1 To derive traffic generation for the proposed petrol filling station reference has been made to the Transport Statement submitted in support of the consented petrol filling station off Tenby Road in St. Clears, Carmarthenshire (Planning Ref: PL/00978), which is available on the Carmarthenshire Council planning website.
- 4.6.2 **Table 4.1** below summarises the trip rates and traffic generation for the proposed petrol filling station whilst the traffic generation information for the Tenby Road site is contained within **Appendix 2**.

| Peak Period            | Trip Rates (per bay) |       | Trip Generation |     |
|------------------------|----------------------|-------|-----------------|-----|
|                        | Arr                  | Dep   | Arr             | Dep |
| <b>Weekday AM Peak</b> | 9.625                | 9.300 | 58              | 56  |
| <b>Weekday PM Peak</b> | 9.700                | 9.575 | 58              | 57  |

**Table 4.1 - Forecast Trip Generation of Proposed Petrol Filling Station (140sqm)**

- 4.6.3 The proposed petrol filling station is forecast to generate a total of 114 two-way trips in the Weekday AM peak and 115 two-way trips in the Weekday PM peak.

- 4.6.4 Clearly the vast majority of these trips would not be new to the local highway network as they are currently purchasing fuel from other petrol filling station in the vicinity and would divert to the new petrol filling station. The vehicular access into the site is provided off A4871 Pwllheli Road, it is located adjacent to the A487 Caernarfon Road/A4871 Pwllheli roundabout junction. Therefore, the pass-by and diverted trips to the petrol filling station will be at the roundabout junction or at the proposed site access junction.
- 4.6.5 With regard to trip types for petrol filling station, the Tenby Road planning application
- Primary New Trips – 4%;
  - Pass-by Trips – 92%;
  - Cross Visitation with other provision on site - 4%
- 4.6.6 Notwithstanding the above, the following trip types have been assumed for this traffic impact assessment, this provides an extremely robust assessment, as it is highly unlikely a driver would make a specific trip to purchase fuel during the peak hours;
- Primary New Trips – 15%;
  - Pass-by Trips – 85%;
- 4.6.7 It is important to note there is also likely to be level of cross-visitation trips with the neighbouring Costa Coffee and vice versa, however, to provide a robust assessment, no reduction to the traffic generation has been applied to take into account this trip type.
- 4.6.8 **Table 4.2** summarises the trip types and proportions for the proposed shop unit, as with the proposed petrol filling station unit.

| Trip Type     | Trip Type Proportions |             | Trips     |           |           |           |
|---------------|-----------------------|-------------|-----------|-----------|-----------|-----------|
|               | AM Peak               | PM Peak     | AM Peak   |           | PM Peak   |           |
|               |                       |             | Arr       | Dep       | Arr       | Dep       |
| Primary Trips | 15%                   | 15%         | 9         | 8         | 9         | 9         |
| Pass-by Trips | 85%                   | 85%         | 49        | 47        | 49        | 47        |
| <b>Total</b>  | <b>100%</b>           | <b>100%</b> | <b>58</b> | <b>56</b> | <b>58</b> | <b>57</b> |

**Table 4.2 Proposed Petrol Filling Station Trips by Type**

4.6.9 The proposed primary and pass-by/diverted trips for the petrol filling station have been assigned to the local highway network using the proposed trip distribution contained within Figures 5 and 6 and observed traffic movements for the pass-by/diverted trips.

4.6.10 The resultant petrol filling station primary new trips and pass-by trips are displayed in **Figures 7 to 10** for the Weekday peak periods.

#### ***Proposed Costa Coffee Unit Traffic Generation***

4.6.11 To calculate the likely level of trips to be generated by the proposed Costa Coffee, reference has been made to traffic survey information which relates to Costa Coffee shops (with a drive-thru facility). The survey information sets out the traffic generation, trip types and drive-thru queues based on existing Costa restaurants located in Cambridge, Warrington, Didcot, Bedford, Sheffield and Banbury. The Note is appended to this report as **Appendix 3**.

4.6.12 The average traffic generation established from the surveys undertaken are

summarised below in **Table 4.3**.

| Peak Period     | Trip Generation |     |
|-----------------|-----------------|-----|
|                 | Arr             | Dep |
| Weekday AM Peak | 86              | 80  |
| Weekday PM Peak | 71              | 72  |
| Saturday Peak   | 83              | 78  |

**Table 4.3 – Average Costa Coffee Drive-thru Traffic Generation**

- 4.6.13 Based on the above, the proposed Coffee drive-thru unit is forecast to generate a total of 166 two-way trips in the Weekday AM peak and 143 two-way trips in the Weekday PM peak. Whilst during the Saturday peak period the proposed unit is forecast to generate 168 two-way trips.
- 4.6.14 Of course, given the land use type, the vast majority of the trips associated with the proposed development will not be new to the highway network with a high proportion being pass-by trips already on the highway network.
- 4.6.15 As way of demonstration reference has again been made to Costa Coffee survey data. The customers at the stores were surveyed to determine the trip types and essentially what proportion of the trips (set out in Table 4,3 above) are existing (pass-by/diverted) and what proportion were new trips, with the primary purpose of visiting the drive-thru coffee shops.
- 4.6.16 The average pass-by/diverted percentage is noted to be 90% on a weekday. In view of this, the following trip type proportions, and corresponding vehicle trips, have been



adopted.

| Trip Type     | Trip Type Proportions |             | Trips     |           |           |           |
|---------------|-----------------------|-------------|-----------|-----------|-----------|-----------|
|               | AM Peak               | PM Peak     | AM Peak   |           | PM Peak   |           |
|               |                       |             | Arr       | Dep       | Arr       | Dep       |
| Primary Trips | 10%                   | 10%         | 9         | 8         | 7         | 7         |
| Pass-by Trips | 90%                   | 90%         | 77        | 72        | 64        | 65        |
| <b>Total</b>  | <b>100%</b>           | <b>100%</b> | <b>86</b> | <b>80</b> | <b>71</b> | <b>72</b> |

**Table 4.4 Proposed Coffee Drive-thru Trips by Type**

4.6.17 For the purpose of this traffic impact analysis, primary new trips have been assigned using the same methodology has been used as the proposed petrol filling station. The resultant Costa Coffee primary new trips and pass-by trips are displayed in **Figures 11** to **14** for the Weekday periods.

## 4.7 Total Development Flows

4.7.1 To calculate the total development flows for the development site, the petrol filling station total development flows displayed in Figures 7 to 10 have been added to the total shop unit flows displayed in Figures 11 to 14. The resultant total development flows are displayed in **Figures 15** and **16**.

## 4.8 With Development Flows

4.8.1 To calculate the 2033 With Development Flows, the proposed development flows contained within Figures 15 and 16 have been added to the 2033 Growthed Flows displayed in Figures 3 and 4. The resultant 2033 'With Development' Flows are

displayed in **Figures 17** and **18** for the Weekday peak periods.

## 4.9 Capacity Assessments

4.9.1 For the purposes of this traffic impact analysis capacity assessments have been undertaken of the following junctions on the local highway network;

- A4871 Pwllheli Road/Proposed Site Access priority controlled junction;
- A487 Caernarfon Road/A4871 Pwllheli Road roundabout junction.

### **A4871 Pwllheli Road/Proposed Site Access Priority Controlled Junction**

4.9.2 To assess the operation of the proposed A4871 Pwllheli Road/Site Access junction priority controlled site access junction the computer program JUNCTIONS 9 has been utilised.

4.9.3 The operation of the junction has been assessed using the 2033 'With Development' flows. The results of this analysis are summarised below in **Table 4.6** whilst the full output is contained within **Appendix 4**.

| Arm                     | 2033 With Development Flows |   |            |     |
|-------------------------|-----------------------------|---|------------|-----|
|                         | Weekday AM                  |   | Weekday PM |     |
|                         | RFC                         | Q | RFC        | RFC |
| Site Access Left        | 0.06                        | 0 | 0.06       | 0   |
| Site Access Right       | 0.27                        | 0 | 0.35       | 1   |
| A4871 Pwllheli Road (N) | 0.05                        | 0 | 0.27       | 0   |

**Table 4.6- Summary of JUNCTIONS 9 Results for the A4871 Pwllheli Road/Site Access Junction  
– 2033 With Development Flows**

4.9.4 As can be seen in Table 4.6, the A4871 Pwllheli Road/Site Access junction is forecast to operate well within its theoretical capacity in the 2033 With Development scenarios.

4.9.5 Based on the above it is concluded that the proposed site access junction can accommodate the levels of traffic forecast to be generated by the proposed development.

#### ***A487 Caernarfon Road/A4871 Pwllheli Road Roundabout Junction***

4.9.6 To assess the operation of the proposed A487 Caernarfon Road/A4871 Pwllheli Road roundabout junction, the JUNCTIONS 9 Computer programme has been utilised.

- 4.9.7 On-site observations provided by the independent survey company who completed the surveys on Thursday 11<sup>th</sup> September 2023, indicated that there were little or no observed queues on the arms of the junction during the Weekday peak period i.e. 2-5 vehicles.
- 4.9.8 To replicate the existing situation capacity adjustments have been made to the model to represent the observed queuing, **Table 4.6** summarises the JUNCTIONS 9 assessment of the validated model for the 2023 Surveyed Flows, which shows queus that are reflective of the current conditions, whilst the full output is contained within **Appendix 5**.

| Arm                      | 2023 With Development Flows |   |            |     |
|--------------------------|-----------------------------|---|------------|-----|
|                          | Weekday AM                  |   | Weekday PM |     |
|                          | RFC                         | Q | RFC        | RFC |
| A4871 Pwllheli Road (N)  | 0.36                        | 1 | 0.82       | 4   |
| A487 Caernarfon Road (E) | 0.45                        | 1 | 0.68       | 2   |
| A4871 Pwllheli Road (S)  | 0.71                        | 2 | 0.61       | 2   |
| A487 Caernarfon Road (W) | 0.52                        | 1 | 0.57       | 1   |

**Table 4.6 - Summary of JUNCTIONS 9 Results for the A487 Caernarfon Road/A4871 Pwllheli Road Junction – 2023 Surveyed Flows**

- 4.9.9 As can be seen in Table 4.6, the A587 Caernarfon Road/A4871 Pwllheli Road roundabout currently operates within its theoretical capacity in both the Weekday peaks.
- 4.9.10 To ascertain the impacts of the proposed development, assessments have been undertaken using the 2033 Base Flows and 'With Development' Flows. The results of this analysis are summarised below in **Table 4.7** whilst the full output is contained within **Appendix 6**.

| Arm                             | 2033 Base Flows |   |            |   | 2033 With Development Flows |   |            |    |
|---------------------------------|-----------------|---|------------|---|-----------------------------|---|------------|----|
|                                 | Weekday AM      |   | Weekday PM |   | Weekday AM                  |   | Weekday PM |    |
|                                 | RFC             | Q | RFC        | Q | RFC                         | Q | RFC        | Q  |
| <b>A4871 Pwllheli Road (N)</b>  | 0.39            | 1 | 0.88       | 6 | 0.49                        | 1 | 0.96       | 14 |
| <b>A487 Caernarfon Road (E)</b> | 0.48            | 1 | 0.72       | 3 | 0.50                        | 1 | 0.74       | 3  |
| <b>A4871 Pwllheli Road (S)</b>  | 0.78            | 3 | 0.68       | 2 | 0.83                        | 4 | 0.74       | 3  |
| <b>A487 Caernarfon Road (W)</b> | 0.56            | 1 | 0.67       | 2 | 0.57                        | 1 | 0.69       | 2  |

**Table 4.7- Summary of JUNCTIONS 9 Results for the A487 Caernarfon Road/A4871 Pwllheli Road Junction – 2033 Base and With Development Flows**



- 4.9.11 As can be seen in Table 4.7, the A487 Caernarfon Road/A4871 Pwllheli Road roundabout junction is forecast to operate within its actual capacity in the 2033 Base scenarios on all arms of the roundabout.
- 4.9.12 With the addition of the development traffic, the junction is forecast to operate within its actual capacity with minimal increases in the RFC and forecast queuing.
- 4.9.13 It must also be noted that this analysis includes the extremely robust traffic growth i.e. 10 years post submission of the planning application and the assumptions regarding primary new trips to both elements of the development proposals. The above analysis has demonstrated that the proposed development will have a minimal impact on the operation of the junction development even based on the robust assumptions contained within this traffic impact analysis.

#### **4.10 Traffic Impact Summary**

The above has demonstrated that the proposed development will have a minimal impact on the local highway network even based on the robust assumptions included within the assessments.





## 5 CONCLUSIONS

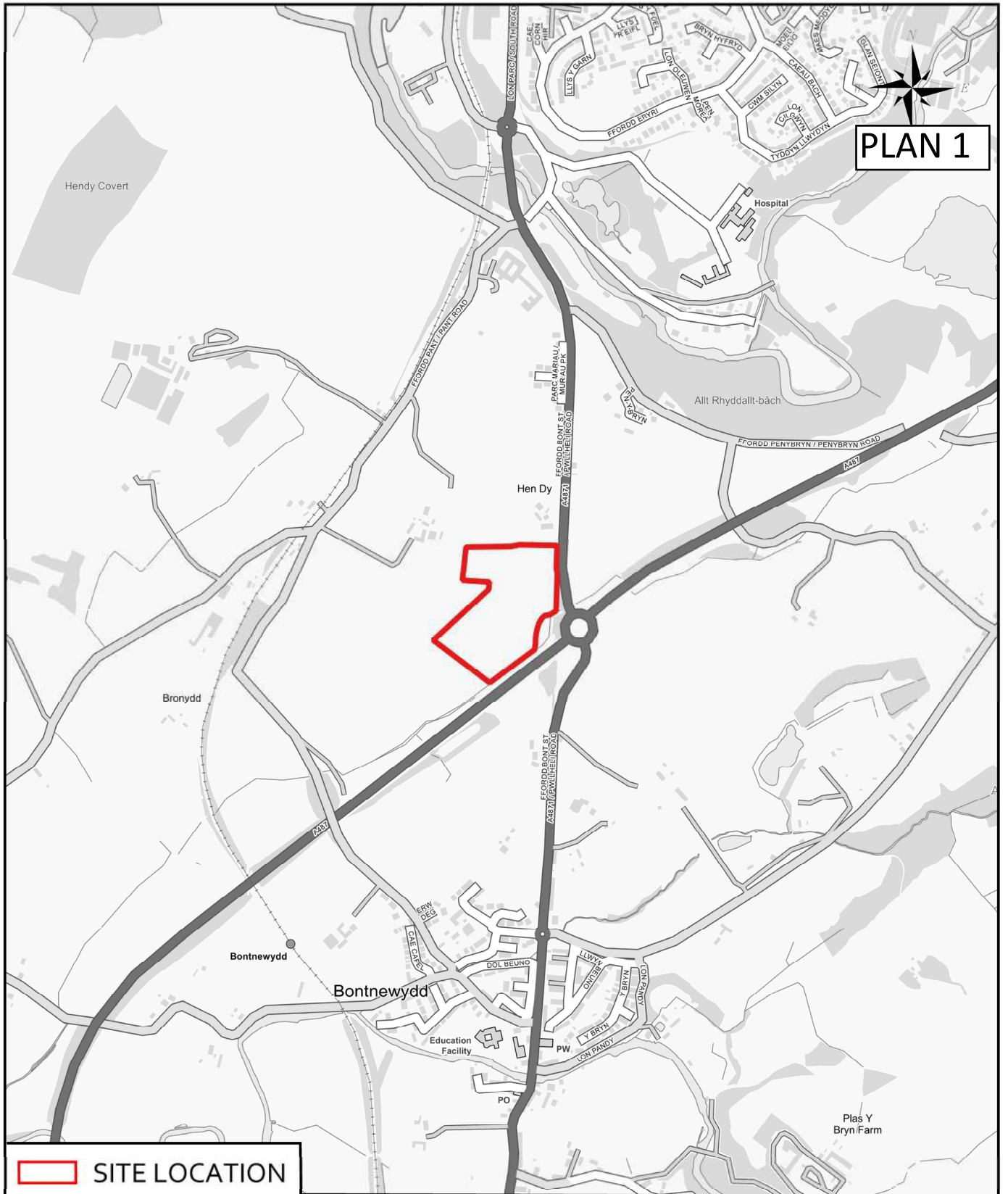
5.1.1 This report has considered the traffic and transportation issues relating to the proposals for the redevelopment of land off the A4871 Pwllheli Road in Caernarfon for a proposed petrol filling station, electric vehicle hub, retail kiosk and drive-thru coffee shop.

5.1.2 The following conclusions have been drawn with regard to the proposed development:

- The existing pedestrian infrastructure located in the vicinity of the site will enable safe pedestrian movement between the development site and the residential areas located within the surrounding areas of Caernarfon.
- The site can be accessed in a safe and efficient manner.
- The parking provision within the site and the surrounding highway network will have sufficient capacity to accommodate the demand generated by the proposed development.
- The proposals will not result in a severe impact on the operation of the local highway network.

5.1.3 Based on the above it is the conclusion of this Report that there are no material reasons why the proposed development should not be granted planning consent on highways or transportation grounds.

# PLANS



**PLAN 1**

 **SITE LOCATION**

CLIENT: **BEAUCHESTER ESTATES LTD**

DRAWING TITLE: **FFORDD BONT SAINT, CAERNAFRON  
SITE LOCATION**

Eddisons  
340 Deansgate  
Manchester  
M3 4LY  
Email: [info@croffts.co.uk](mailto:info@croffts.co.uk)  
Tel: 0161 837 7380  
Web: [www.eddisons.com/services/transport-planning](http://www.eddisons.com/services/transport-planning)

|                                   |                |
|-----------------------------------|----------------|
| DRAWING NUMBER:<br><b>3406-01</b> | REVISION:<br>- |
|-----------------------------------|----------------|

|                     |                          |                        |                          |                            |
|---------------------|--------------------------|------------------------|--------------------------|----------------------------|
| DRAWN:<br><b>LG</b> | DATE:<br><b>31.05.23</b> | CHECKED:<br><b>PJW</b> | DATE:<br><b>31.05.23</b> | SCALES:<br><b>NTS @ A4</b> |
|---------------------|--------------------------|------------------------|--------------------------|----------------------------|



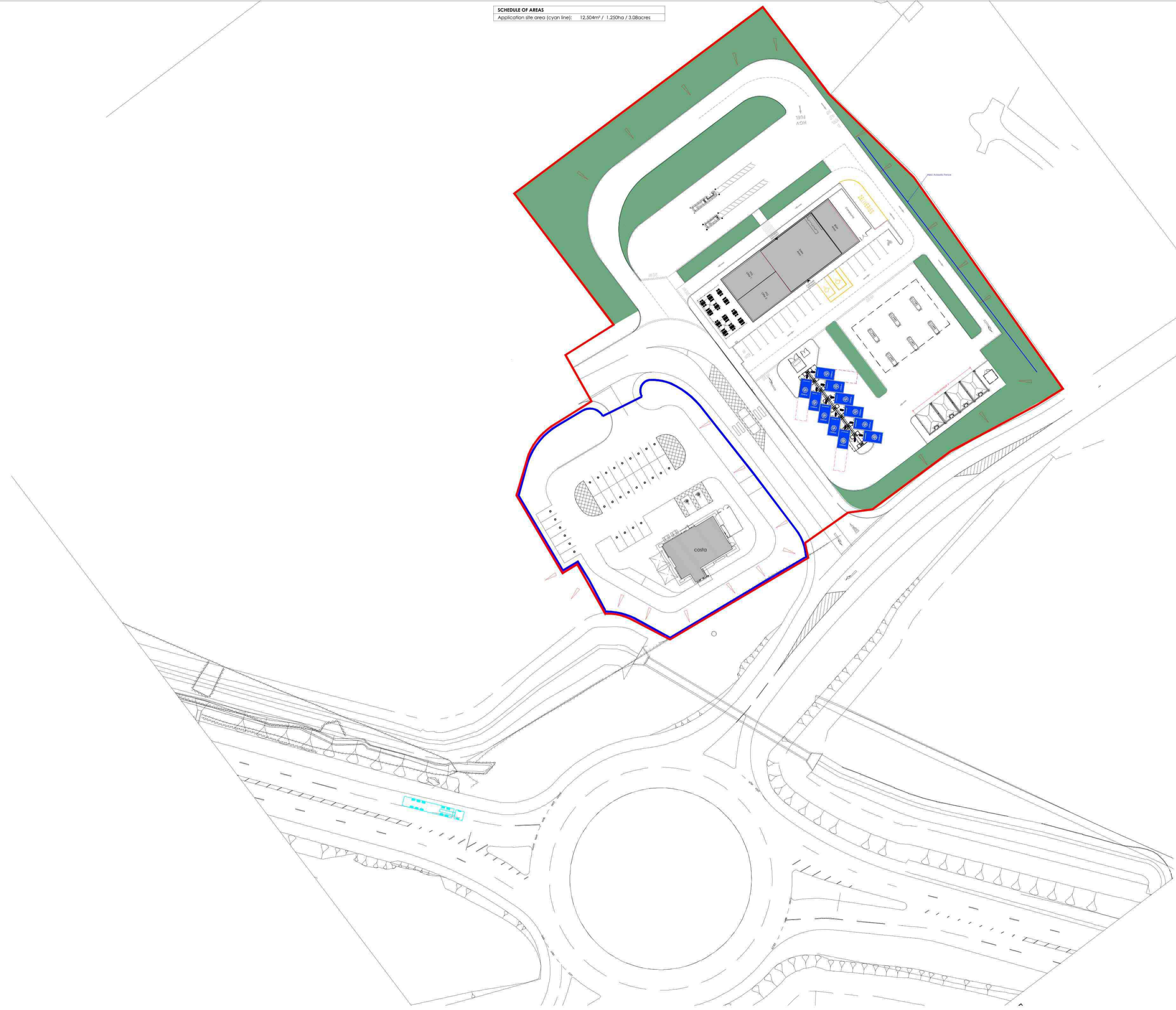
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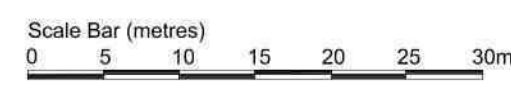
**SCHEDULE OF AREAS**  
 Application site area (cyan line): 12,504m<sup>2</sup> / 1.250ha / 3.08acres



**PLAN 2**



Proposed Site Layout Plan - Option 2  
 Scale 1:500



| rev | date     | by  | description     |
|-----|----------|-----|-----------------|
| ~   | 05/10/22 | ELA | Drawing created |

**CLIENT**  
**mfg** Gladstone Road  
 motor fuel group 36-38 Upper Marlborough Road  
 St Albans, AL1 3UU

**PROJECT LOCATION**  
 Llanberis Road  
 Caernarfon  
 Gwynedd

**DRAWING**  
 Proposed Site Redevelopment  
 Option 4

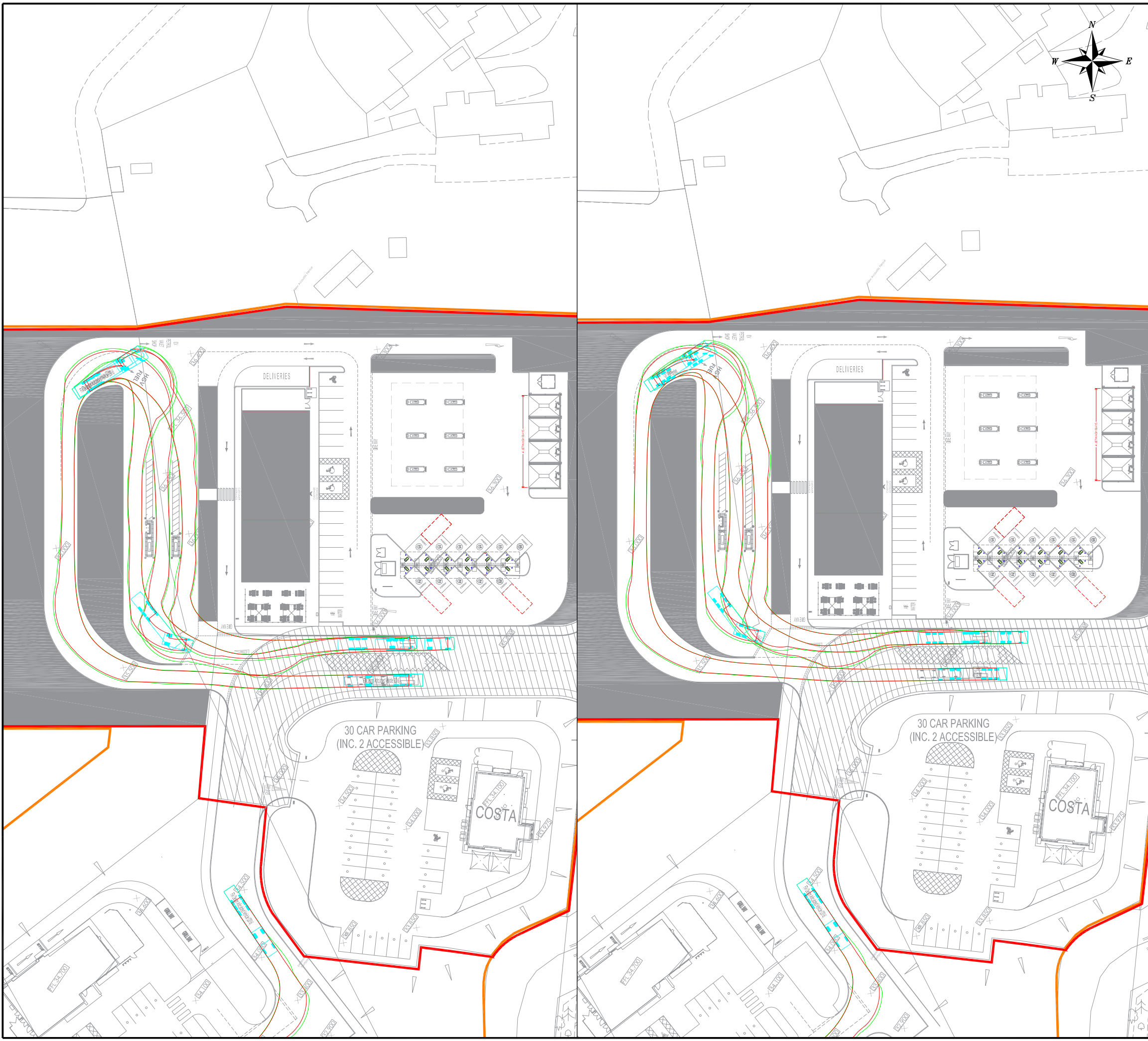
**Wyeth** Projects Services  
 The Cart Shed, Amberley Court,  
 Amberley Lane, Millford, Surrey,  
 GU8 5EB, United Kingdom  
 Tel: +44 (0)1483 424704  
 Email: enquires@wyethprojects.com  
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|        |              |          |                  |           |
|--------|--------------|----------|------------------|-----------|
| Date:  | October 2022 | Draw By: | ELA              | <b>A1</b> |
| Scale: | 1:500        | Dwg No.: | WPS-MFG-500-P-22 | Rev:      |
|        |              |          |                  | ~         |

**PLANNING**



Z:\projects\3406 Ffordd Bont Saint, Caernarfon\CAD\Croft Drawings\3406-SP03\_Option2.dwg



### NOTES

FTA Design Articulated Vehicle (2016)  
 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 3.03s  
 Kerb to Kerb Turning Radius 6.600m

FTA Design Articulated Vehicle (2014)  
 Overall Length 15.289m  
 Overall Width 2.500m  
 Overall Body Height 2.704m  
 Min Body Ground Clearance 0.419m  
 Track Width 2.400m  
 Lock to lock time 4.00s  
 Kerb to Kerb Turning Radius 6.670m

Oil Tanker  
 Overall Length 15.289m  
 Overall Width 2.500m  
 Overall Body Height 2.704m  
 Min Body Ground Clearance 0.419m  
 Track Width 2.400m  
 Lock to lock time 4.00s  
 Kerb to Kerb Turning Radius 6.670m

**PLAN 3**

| REV | DETAILS | DRAWN | CHECKED | DATE |
|-----|---------|-------|---------|------|
|     |         |       |         |      |

CLIENT:  
**BEAUCHESTER ESTATES LTD**

PROJECT:  
**FFORDD BONT SAINT,  
CAERNARFON**

DRAWING TITLE:  
**SWEPT PATH ANALYSIS**

SCALES:  
**1:500 @ A3**

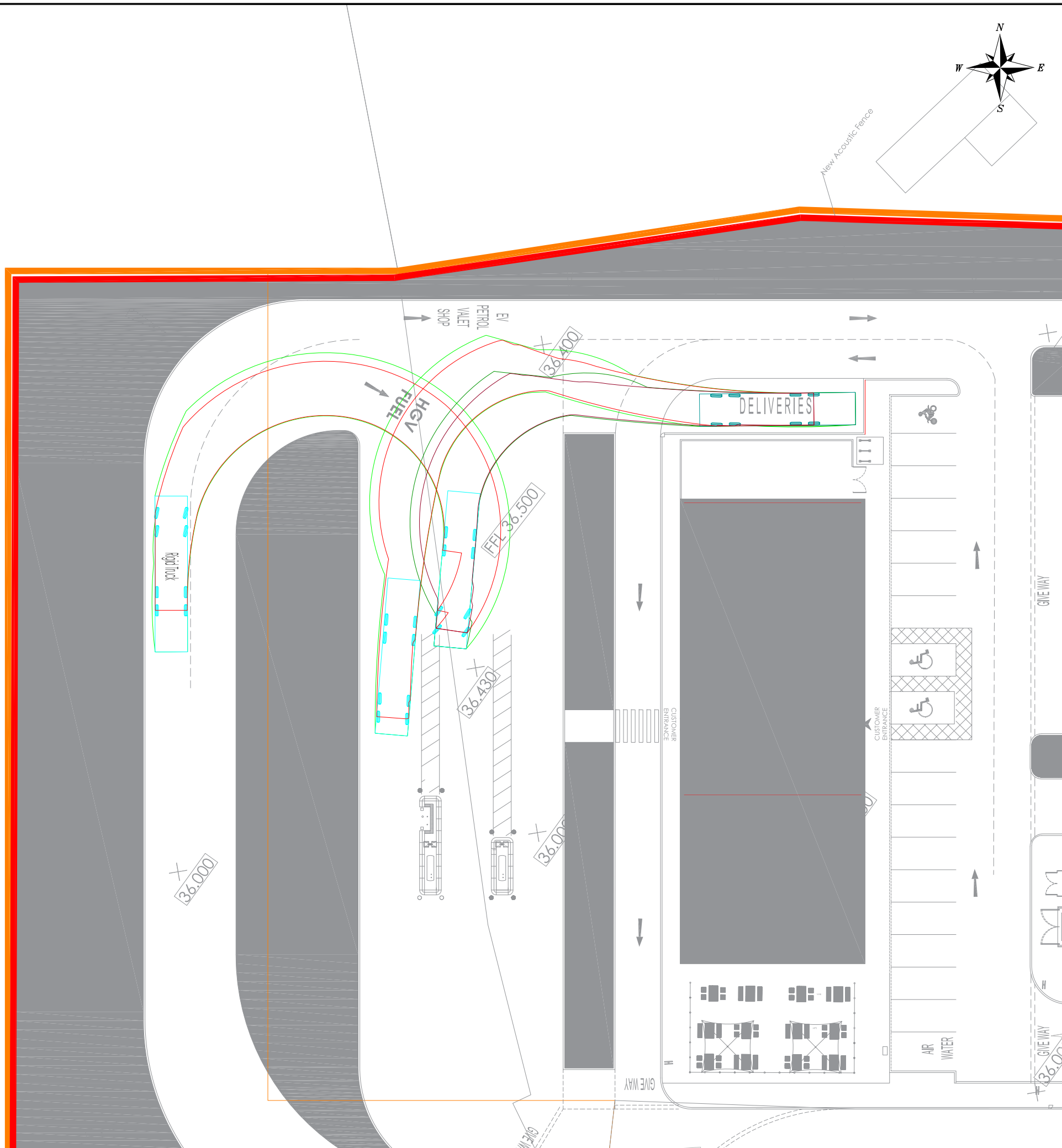
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| DRAWN: <b>GW</b> | CHECKED: <b>PW</b> | DATE: <b>APR 2023</b> |
|------------------|--------------------|-----------------------|

Eddisons  
340 Deansgate  
Manchester  
M3 4LY

Email: [info@crofts.co.uk](mailto:info@crofts.co.uk)  
Tel: 0161 837 7380  
Web: [www.eddisons.com/services/transport-planning](http://www.eddisons.com/services/transport-planning)

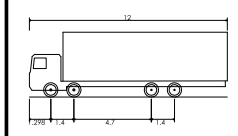
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| DRAWING NUMBER:<br><b>3406-SP03-OP2.2</b> | REVISION:<br>- |
|---|----------------|

Z:\projects\3406 Ffordd Bont Saint, Caernarfon\CAD\Croft Drawings\3406-SP03\_Option2.dwg



NOTES

PLAN 4



Rigid Truck  
 Overall Length 12.000m  
 Overall Width 2.500m  
 Overall Body Height 3.928m  
 Min Body Ground Clearance 0.412m  
 Track Width 2.471m  
 Lock to lock time 6.00s  
 Kerb to Kerb Turning Radius 11.900m



| REV | DETAILS | DRAWN | CHECKED | DATE |
|-----|---------|-------|---------|------|
|-----|---------|-------|---------|------|

CLIENT:  
**BEAUCHESTER ESTATES LTD**

PROJECT:  
**FFORDD BONT SAINT,  
 CAERNARFON**

DRAWING TITLE:  
**SWEPT PATH ANALYSIS**

SCALES:  
**1:500 @ A3**

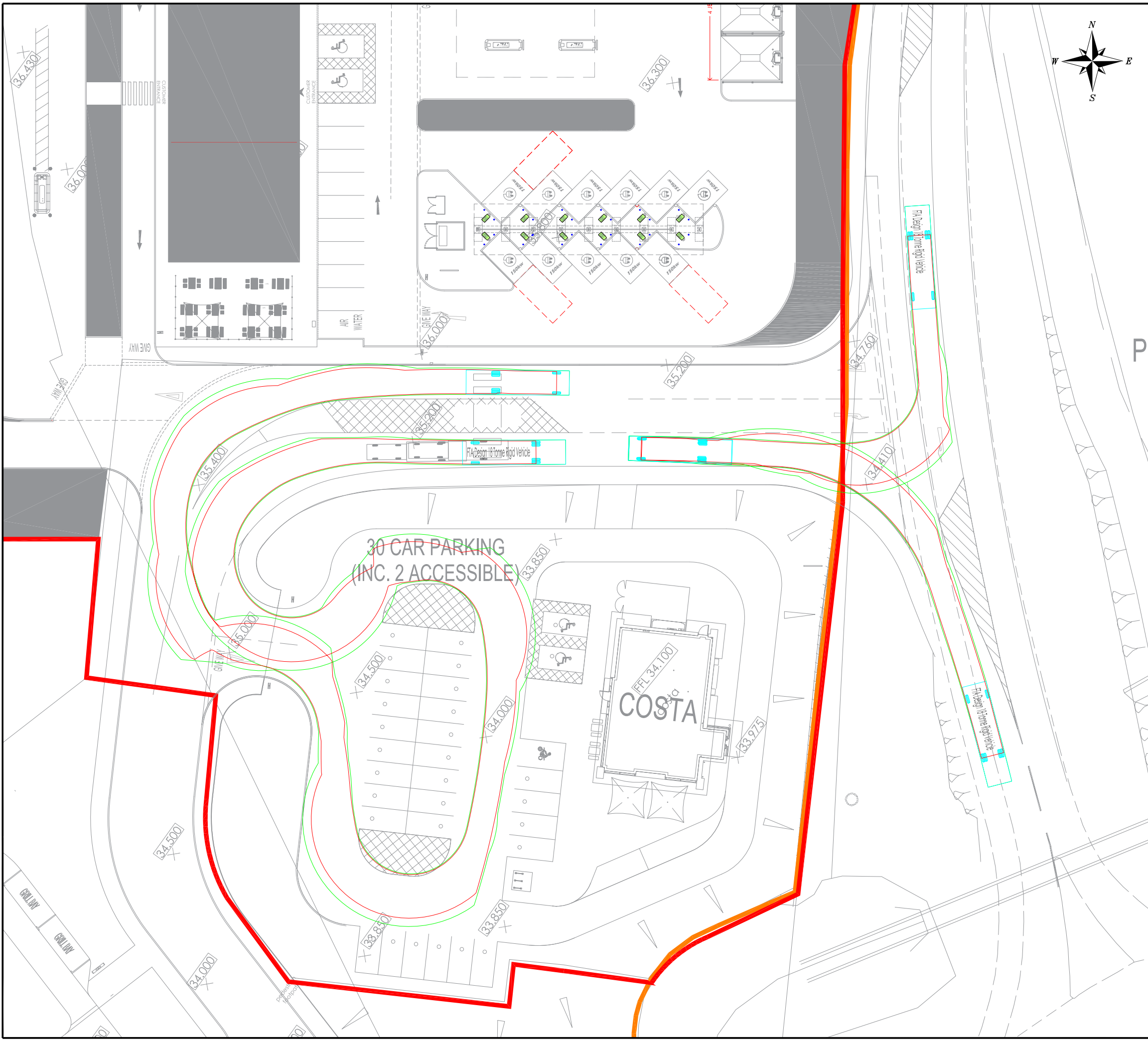
DRAWN: **GW** CHECKED: **PW** DATE: **APR 2023**

Eddisons  
 340 Deansgate  
 Manchester  
 M3 4LY  
 Email: [info@crofts.co.uk](mailto:info@crofts.co.uk)  
 Tel: 0161 837 7380  
 Web: [www.eddisons.com/services/transport-planning](http://www.eddisons.com/services/transport-planning)

DRAWING NUMBER: **3406-SP03-OP2.3** REVISION: **-**



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**NOTES**

FTA Design 18 Tonne Rigid Vehicle  
 Overall Length 11.200m  
 Overall Width 2.450m  
 Overall Body Height 3.645m  
 Min Body Ground Clearance 0.440m  
 Track Width 2.470m  
 Lock to lock time 3.02s  
 Kerb to Kerb Turning Radius 10.800m

**PLAN 5**

| REV | DETAILS | DRAWN | CHECKED | DATE |
|-----|---------|-------|---------|------|
|     |         |       |         |      |

CLIENT:  
**BEAUCHESTER ESTATES LTD**

PROJECT:  
**FFORDD BONT SAINT, CAERNARFON**

DRAWING TITLE:  
**SWEPT PATH ANALYSIS**

SCALES:  
**1:500 @ A3**

|           |             |                |
|-----------|-------------|----------------|
| DRAWN: GW | CHECKED: PW | DATE: APR 2023 |
|-----------|-------------|----------------|

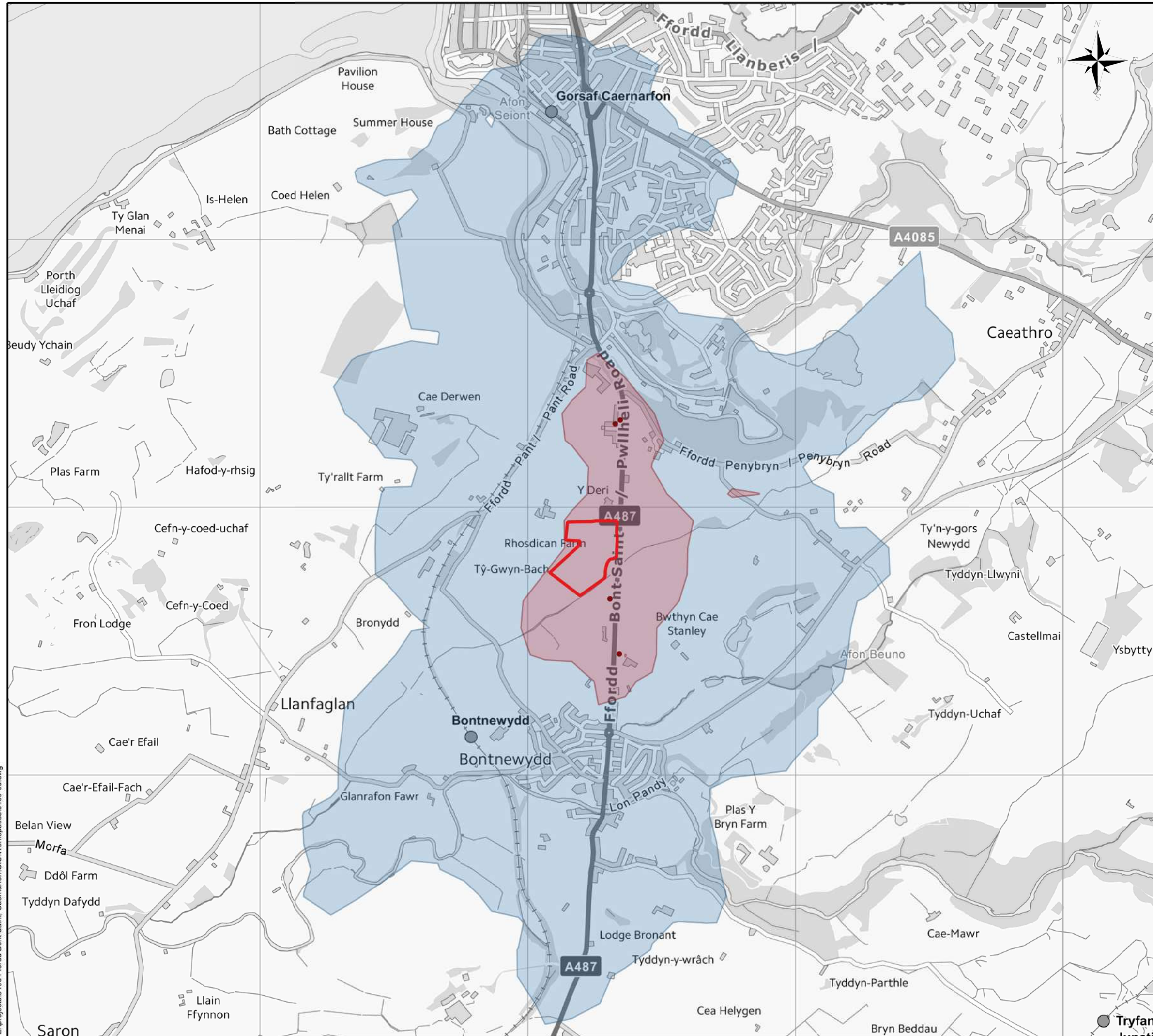
Eddisons  
 340 Deansgate  
 Manchester  
 M3 4LY

Email: [info@crofts.co.uk](mailto:info@crofts.co.uk)  
 Tel: 0161 837 7380  
 Web: [www.eddisons.com/services/transport-planning](http://www.eddisons.com/services/transport-planning)

|   |                |
|---|----------------|
| DRAWING NUMBER:<br><b>3406-SP03-OP2.1</b> | REVISION:<br>- |
|---|----------------|

**Eddisons**





**NOTES**

**PLAN 6**

- Site Location
- 800m Pedestrian Catchment
- 2km Pedestrian Catchment
- Nearest Bus Stops

| REV | DETAILS | DRAWN | CHECKED | DATE |
|-----|---------|-------|---------|------|
|     |         |       |         |      |

CLIENT:  
**BEAUCHESTER ESTATES LTD**

PROJECT:  
**FFRODD BONT SAINT, CAERNFRON**

DRAWING TITLE:  
**800M & 2KM PEDESTRIAN CATCHMENT WITH AMENITIES**

SCALES:  
**NTS @ A3**

|           |              |              |
|-----------|--------------|--------------|
| DRAWN: LG | CHECKED: PJW | DATE: MAY 23 |
|-----------|--------------|--------------|

Eddisons  
340 Deansgate  
Manchester  
M3 4LY

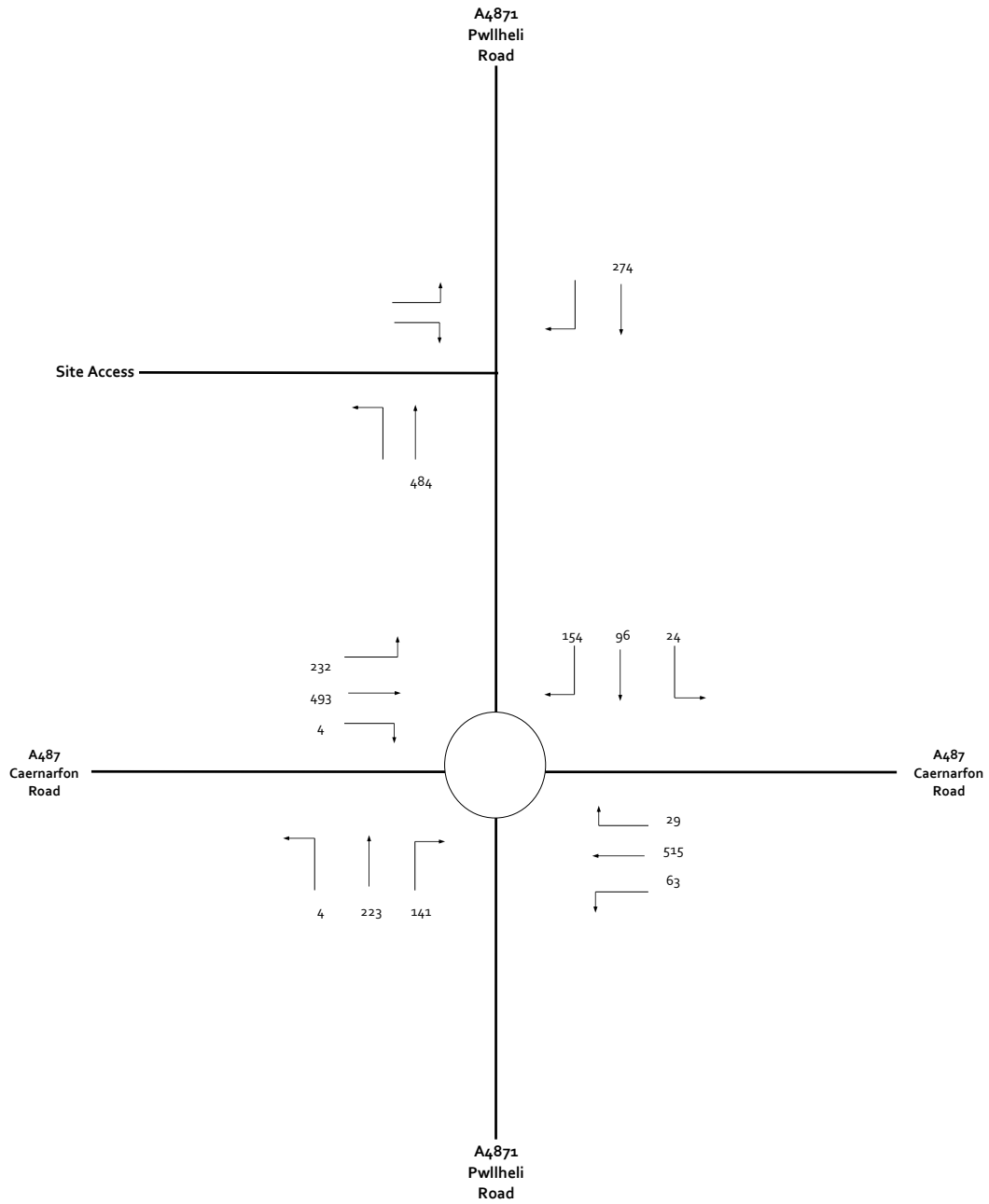
Email: [info@crofts.co.uk](mailto:info@crofts.co.uk)  
Tel: 0161 837 7380  
Web: [www.eddisons.com/services/transport-planning](http://www.eddisons.com/services/transport-planning)

|                                   |                |
|-----------------------------------|----------------|
| DRAWING NUMBER:<br><b>3406-03</b> | REVISION:<br>- |
|-----------------------------------|----------------|



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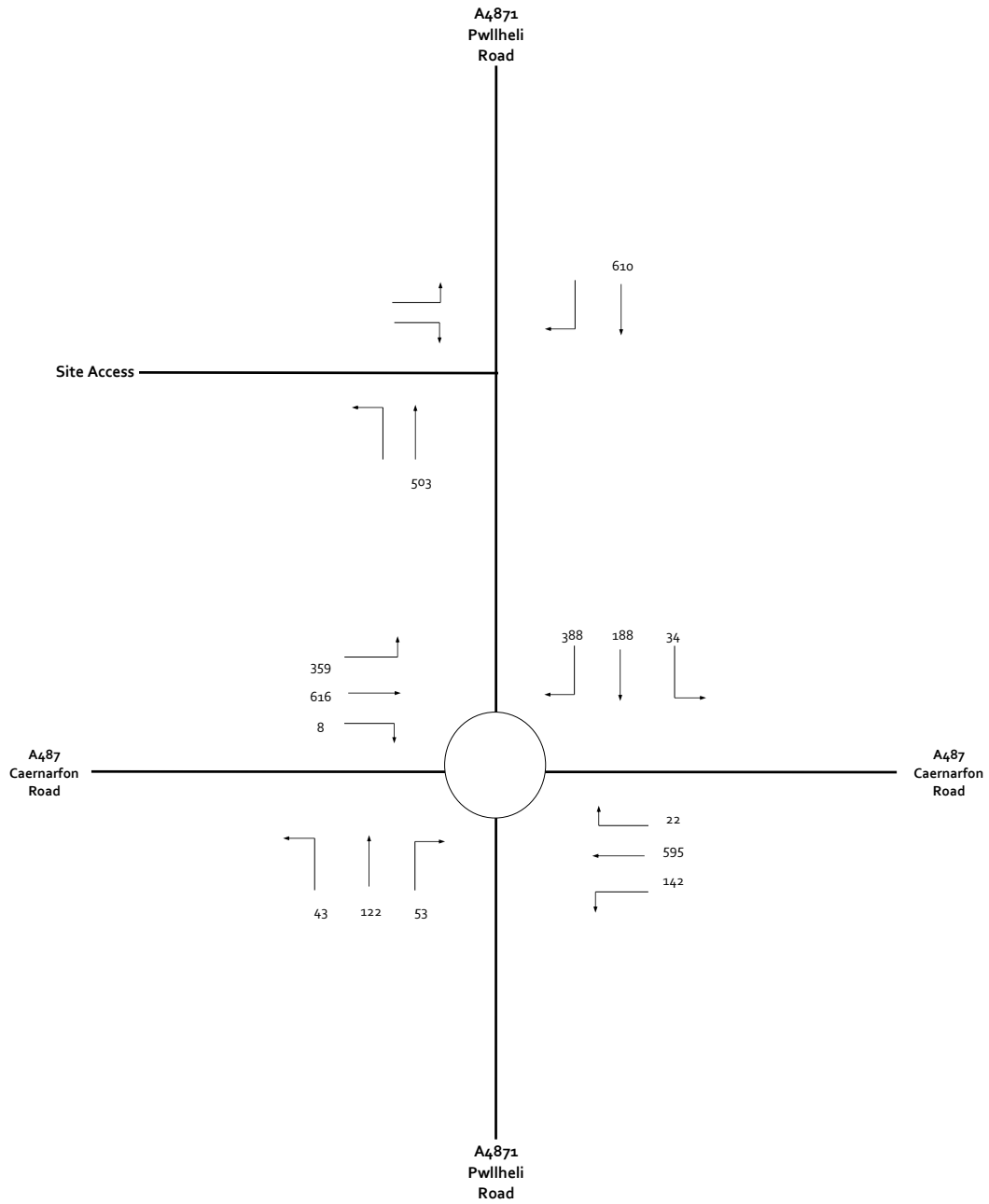
## FIGURES



Flows in PCUs

Figure 1 2023 Surveyed Flows - Weekday AM Peak (0815 - 0915)

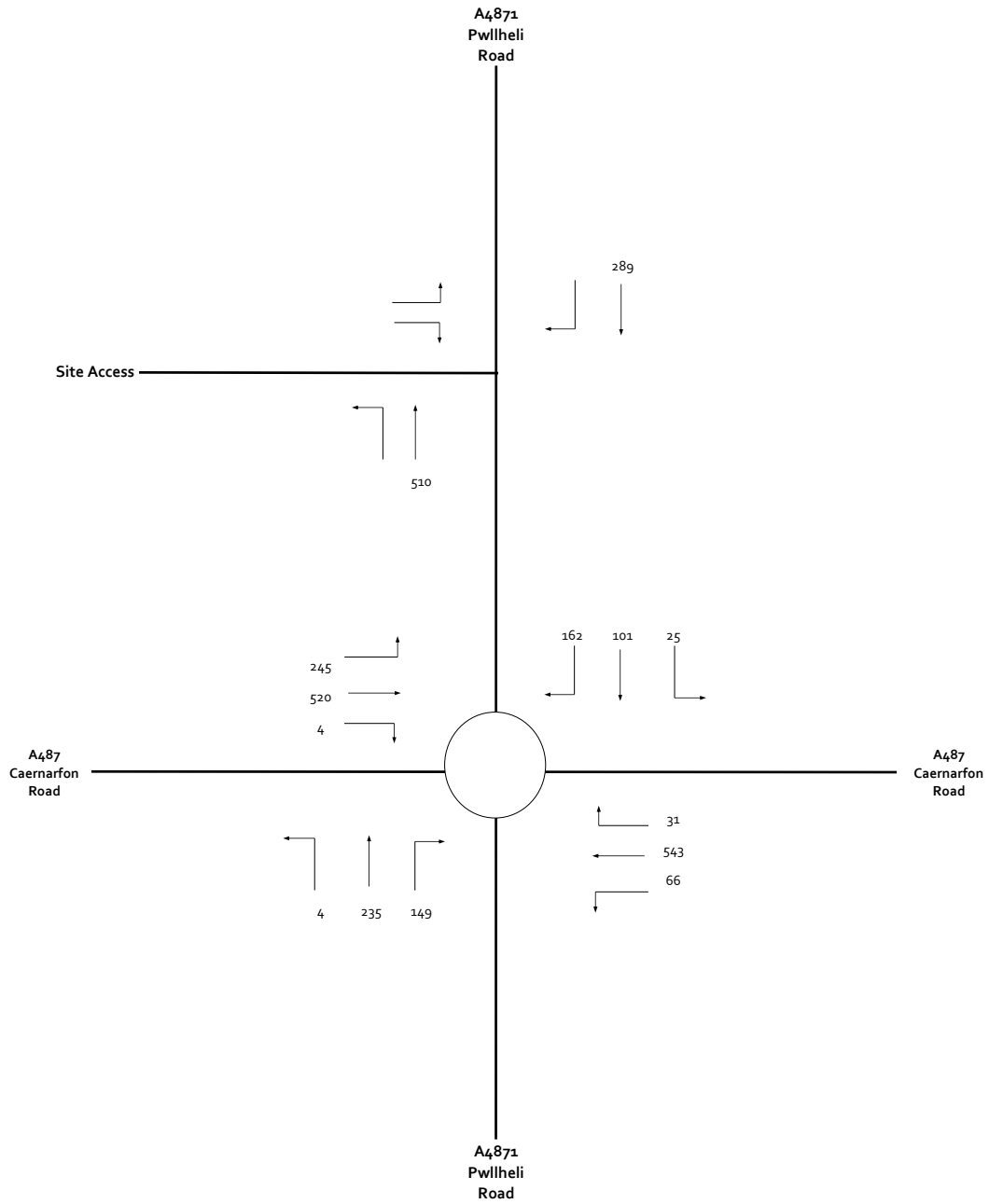




Flows in PCUs

Figure 2 2023 Surveyed Flows - Weekday PM Peak (1630 - 1730)

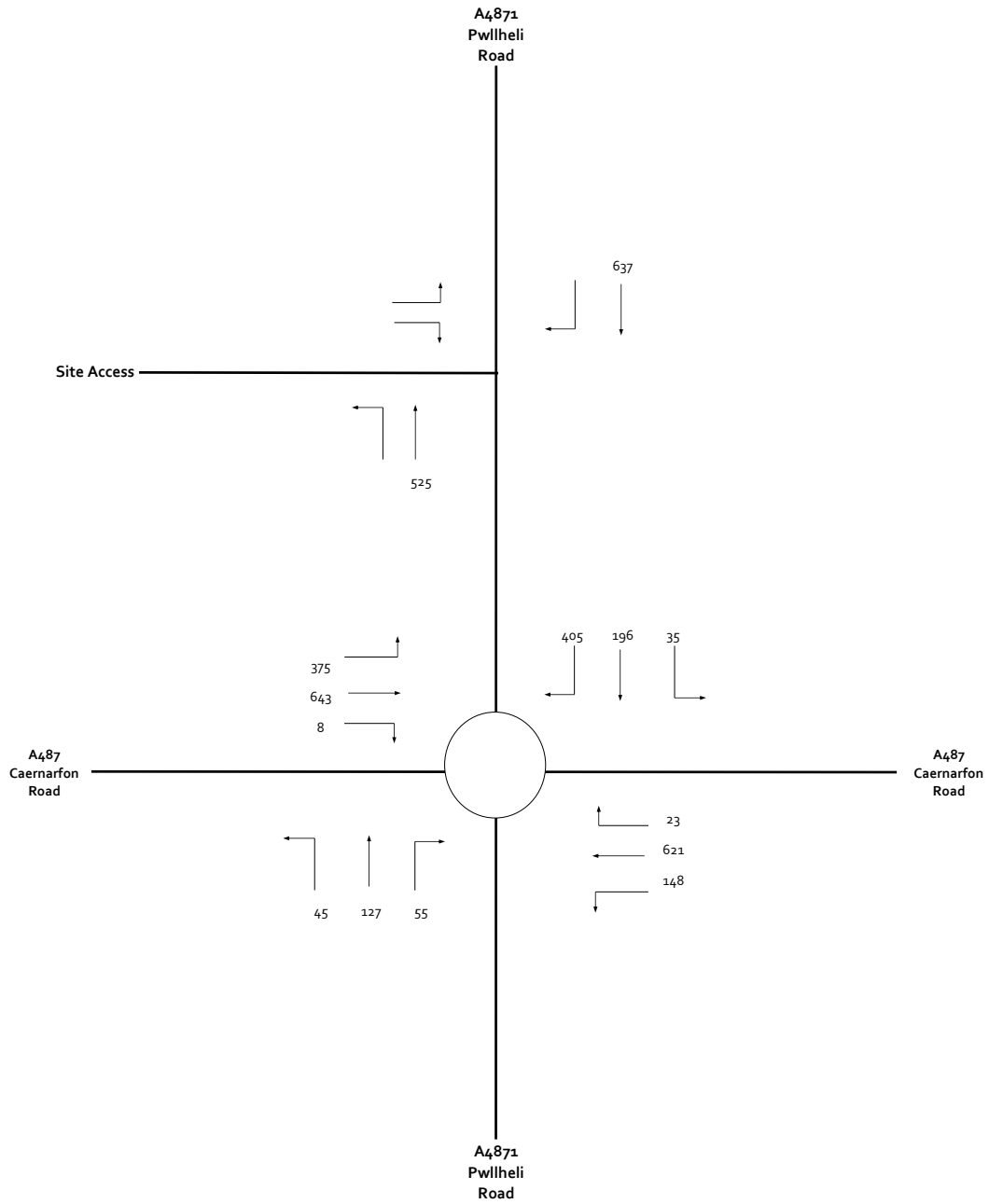




TEMPRO Growth Factor 2023-2033 1.054

Figure 3 2033 Growthed Flows - Weekday AM Peak





TEMPRO Growth Factor 2023-2033 1.044

Figure 4 2033 Growthed Flows - Weekday PM Peak

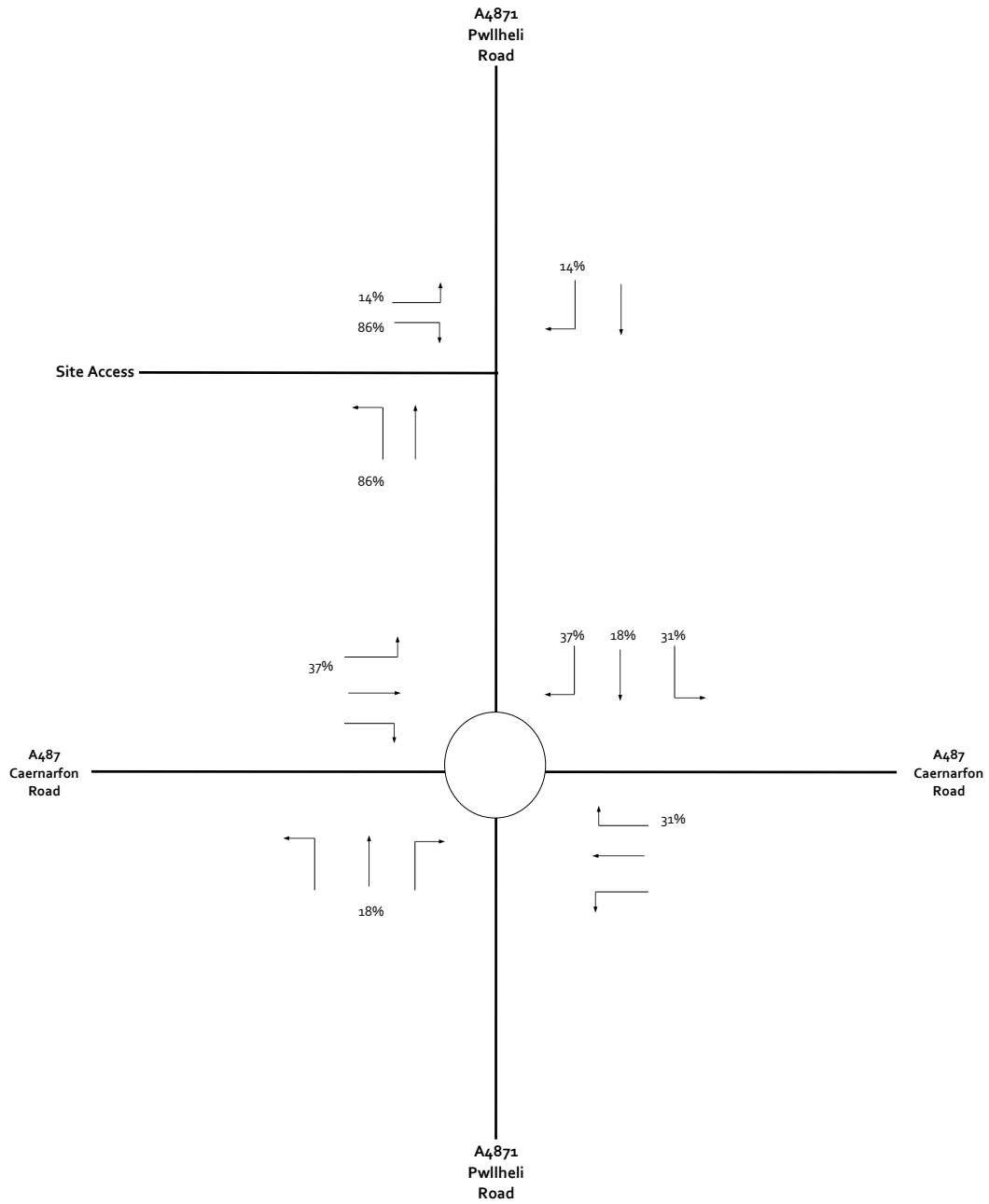


Figure 5 Proposed Trip Distribution - Weekday AM Peak



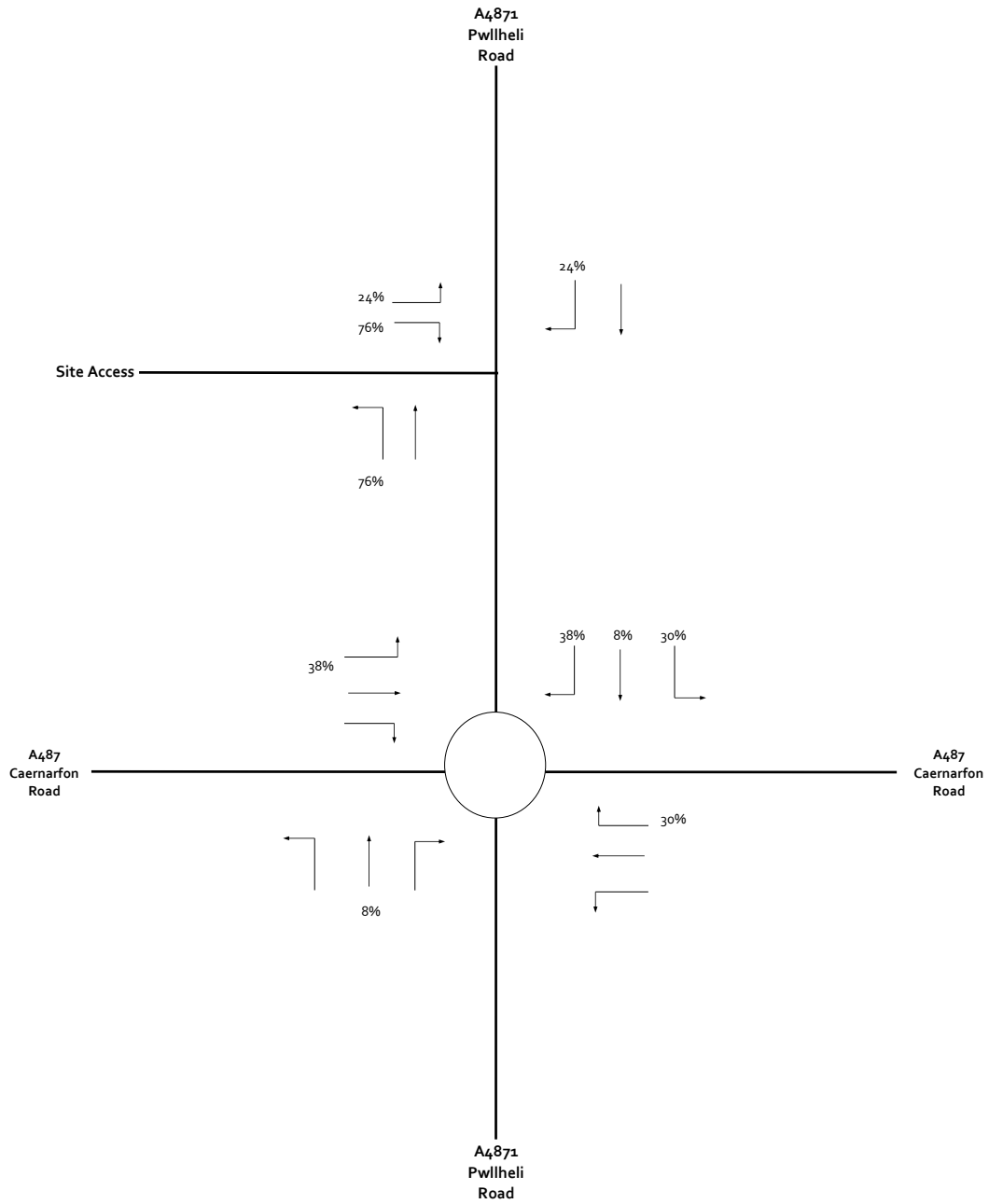
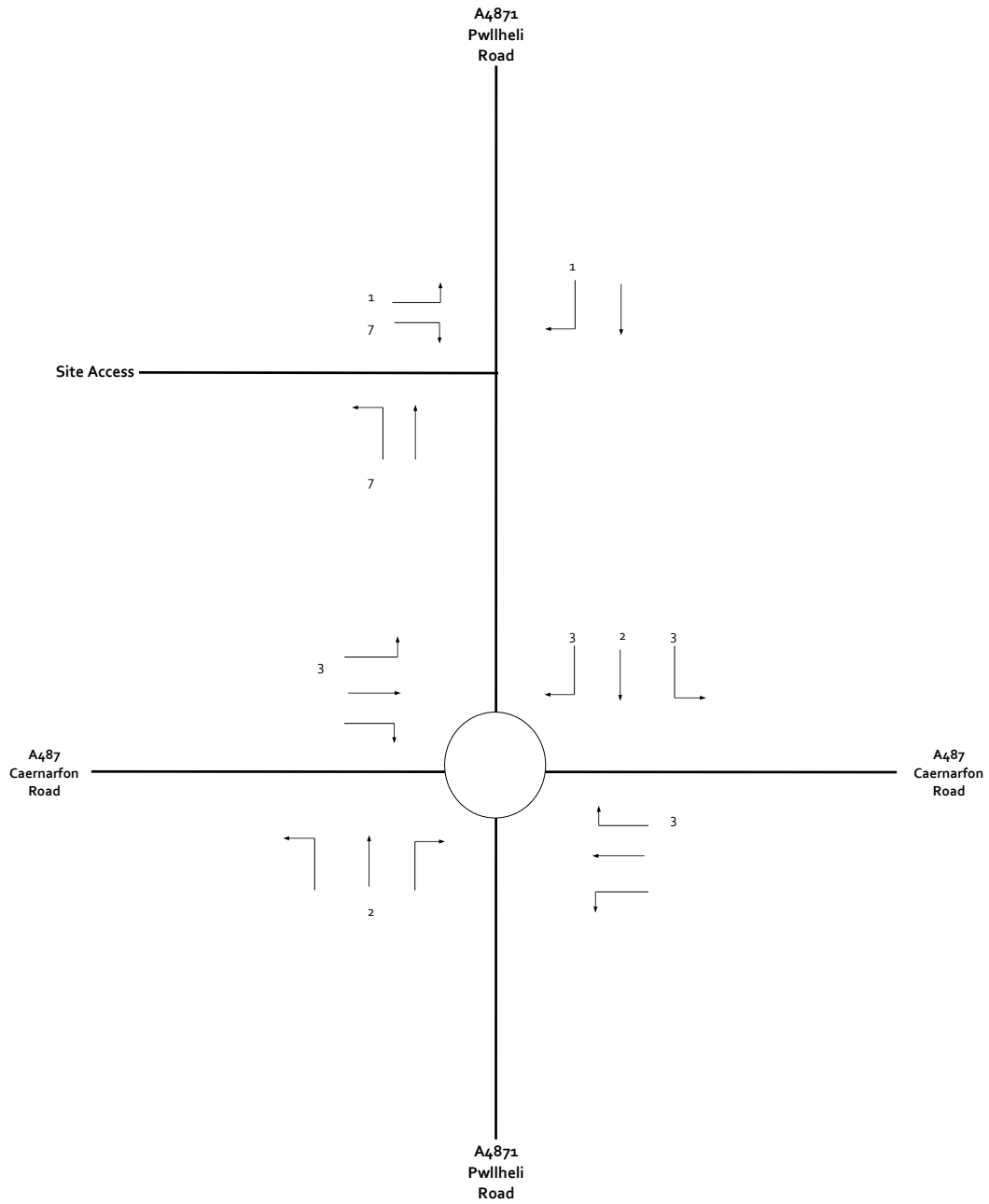
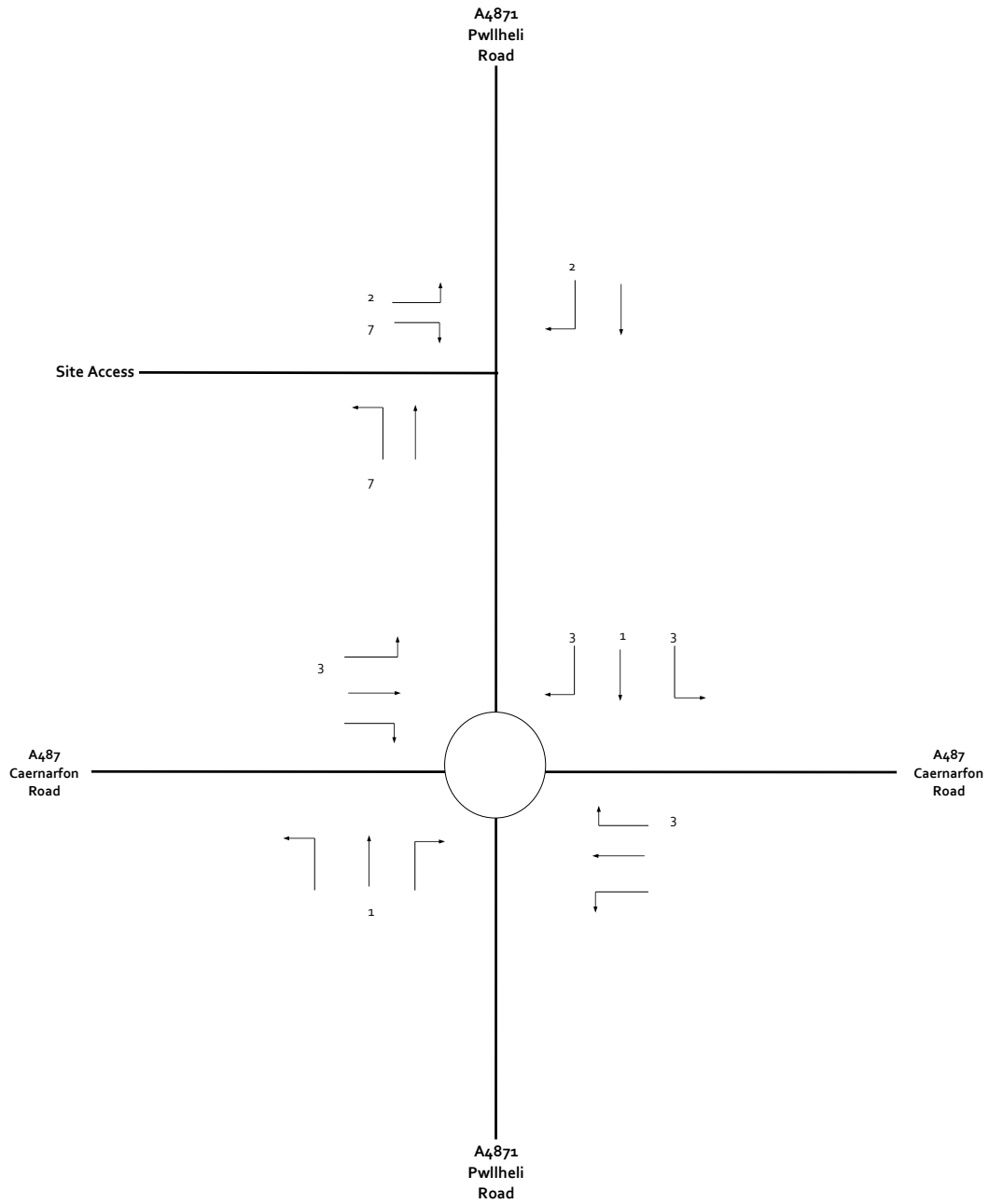


Figure 6 Proposed Trip Distribution - Weekday PM Peak



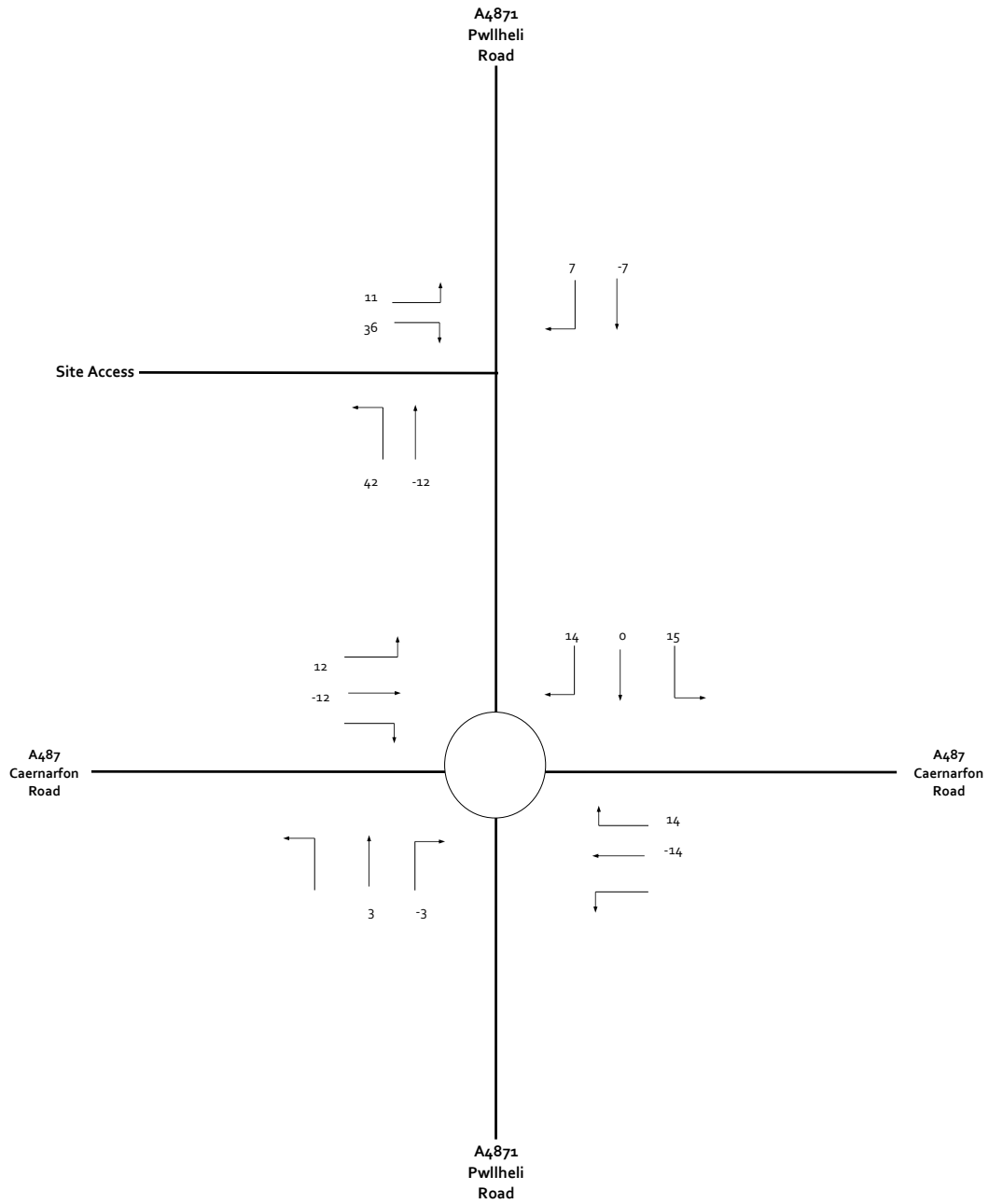
ARR 9  
 DEP 8

Figure 7 Proposed PFS Primary New Trips - Weekday AM Peak



ARR 9  
 DEP 9

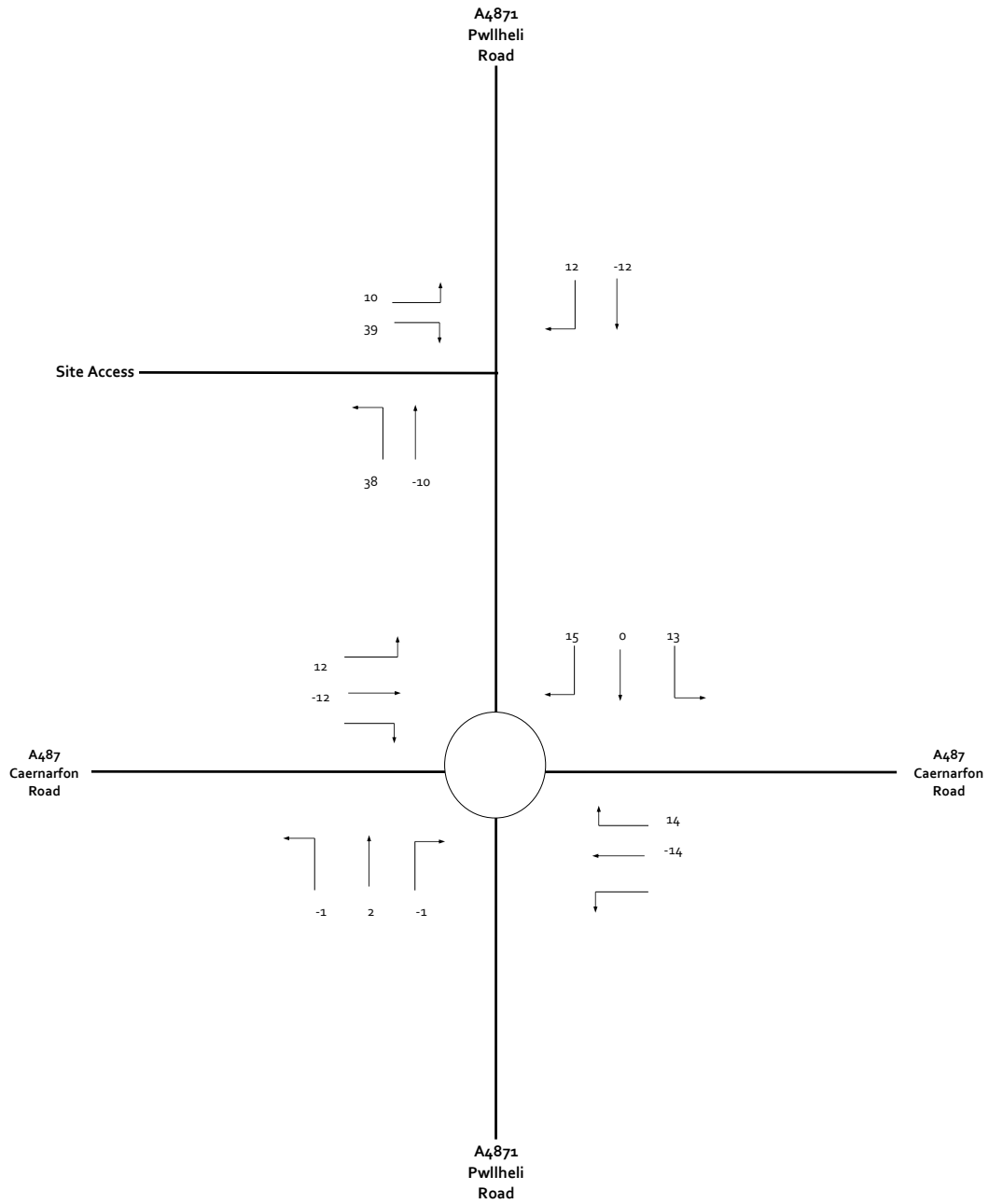
Figure 8 Proposed PFS Primary New Trips - Weekday PM Peak



ARR 49  
 DEP 47

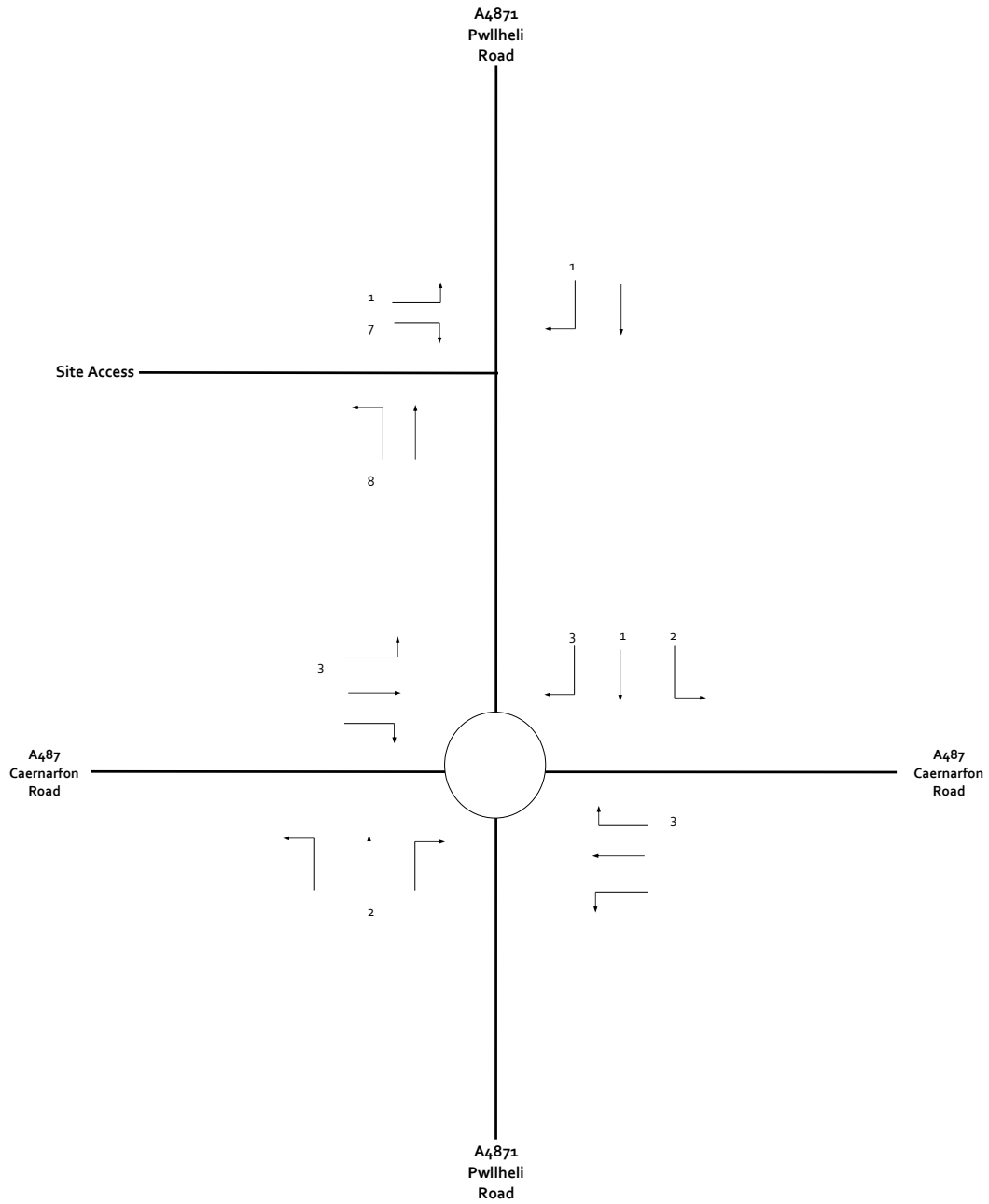
Figure 9 Proposed PFS Pass-by/Diverted Trips - Weekday AM Peak





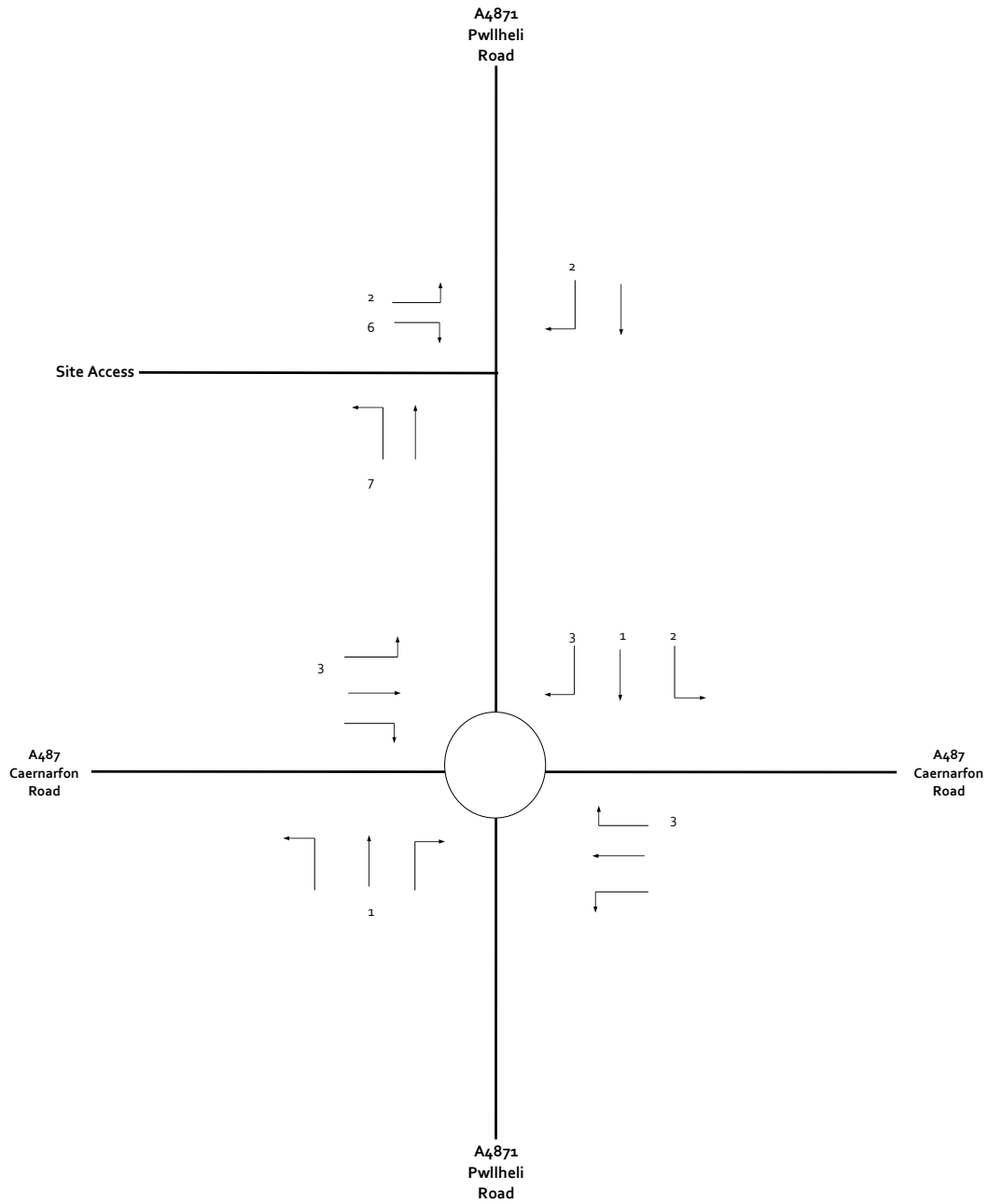
ARR 49  
DEP 49

Figure 10 Proposed PFS Pass-by/Diverted Trips - Weekday PM Peak



ARR 9  
 DEP 8

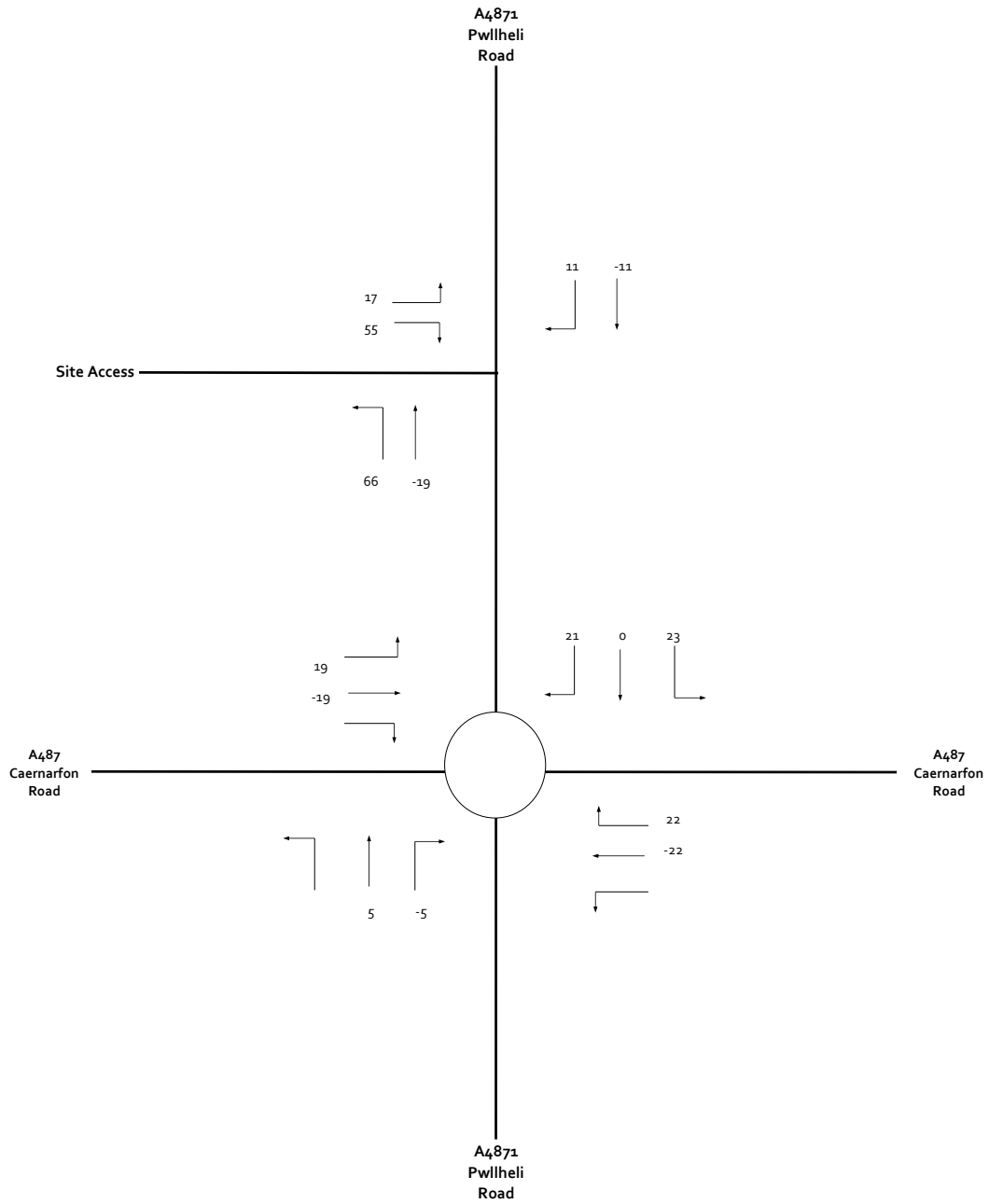
Figure 11 Proposed Costa Primary New Trips - Weekday AM Peak



ARR 9  
 DEP 8

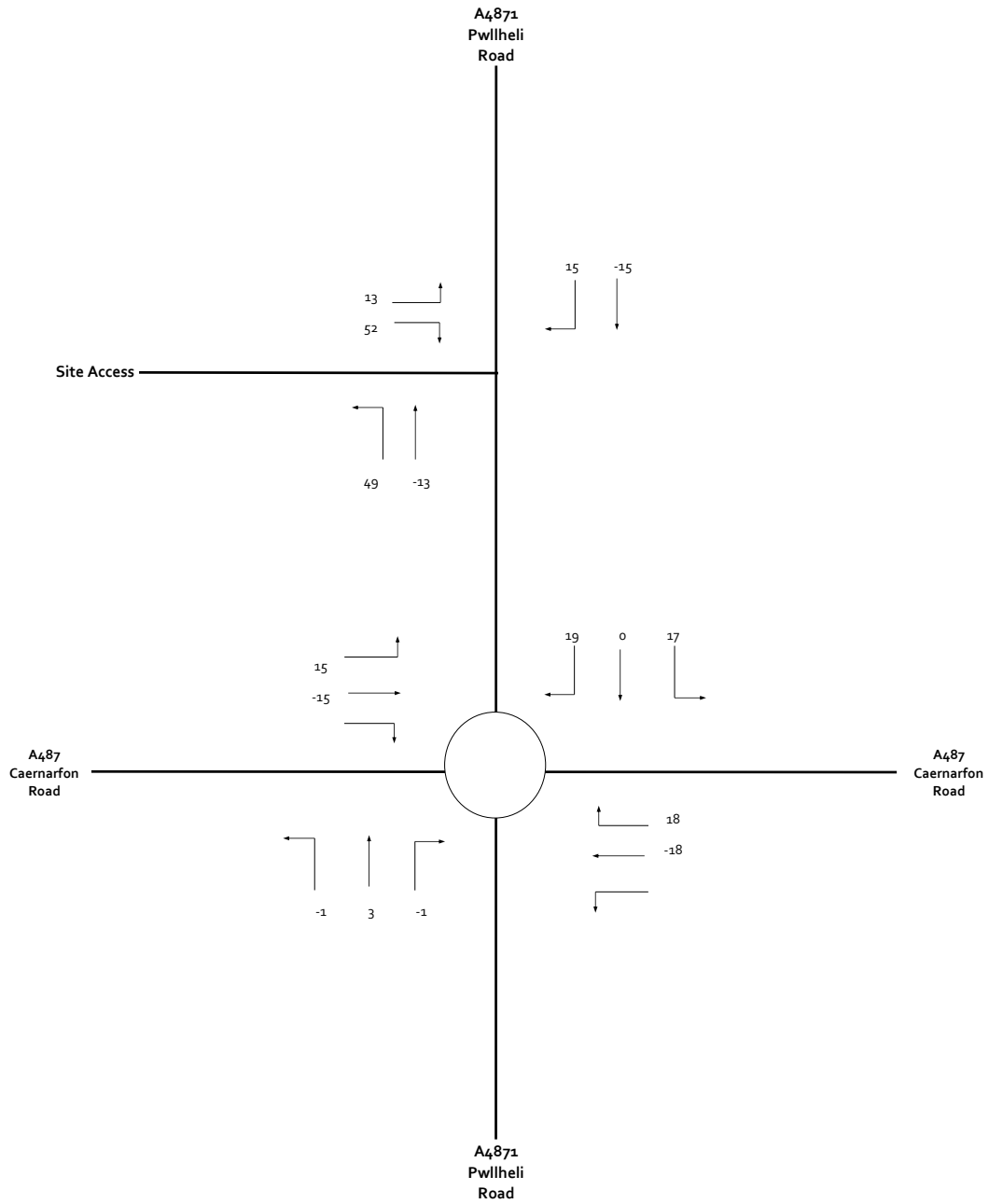
Figure 12 Proposed Costa Primary New Trips - Weekday PM Peak





ARR 77  
 DEP 72

Figure 13 Proposed Costa Pass-by/Diverted Trips - Weekday AM Peak



ARR 64  
DEP 65

Figure 14 Proposed Costa Pass-by/Diverted Trips - Weekday PM Peak

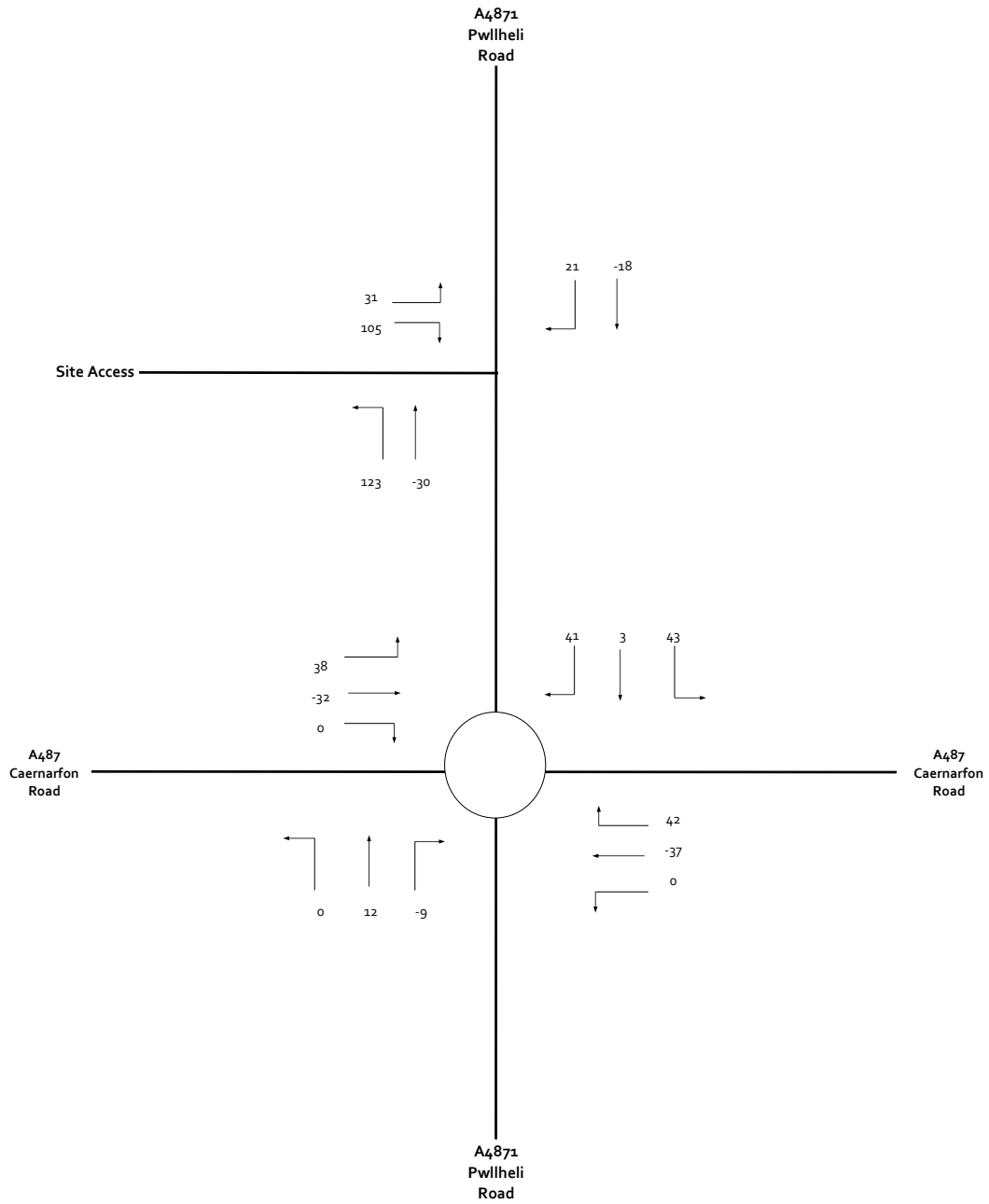


Figure 15 Total Proposed Development Trips - Weekday AM Peak

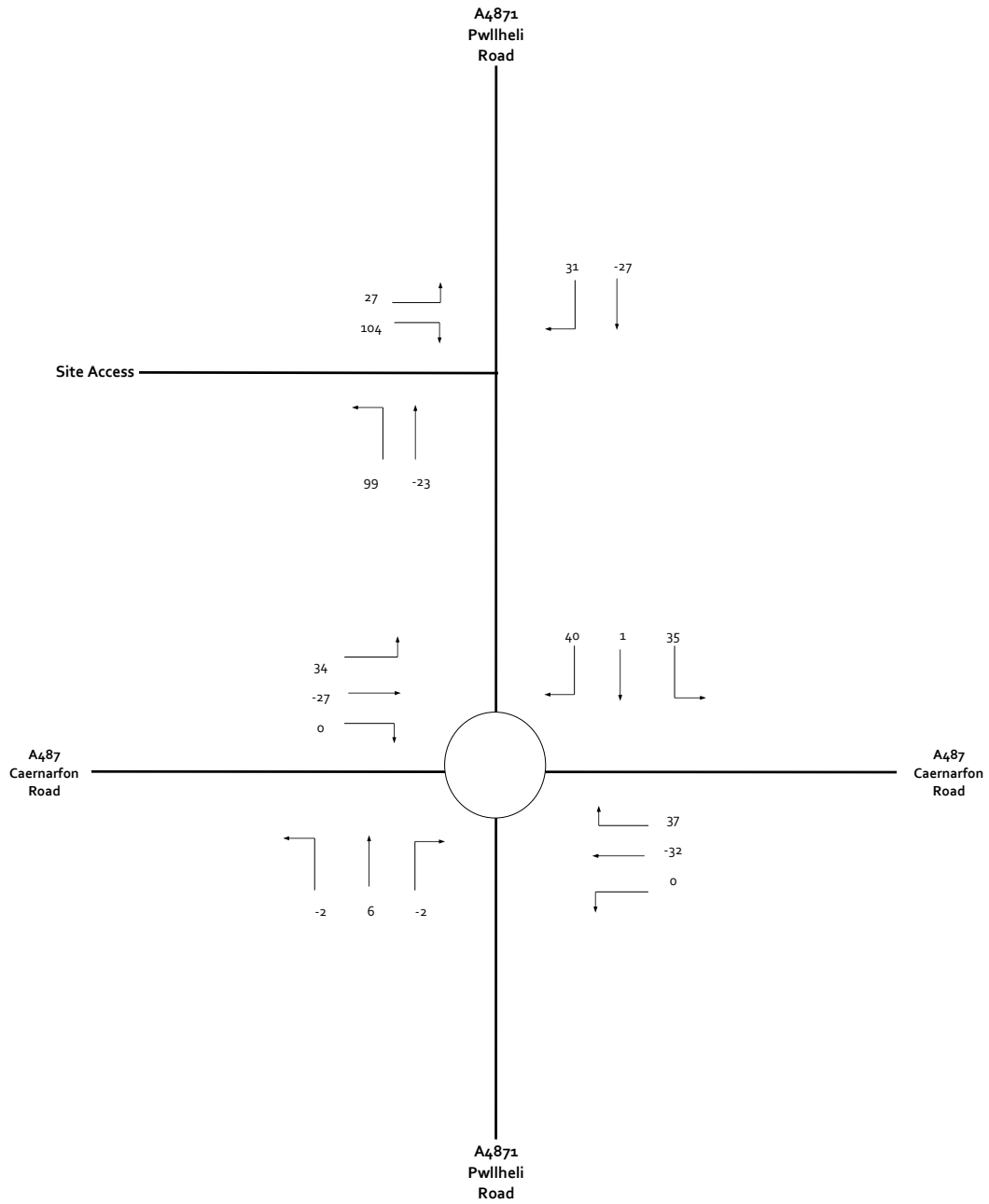


Figure 15 Total Proposed Development Trips - Weekday AM Peak

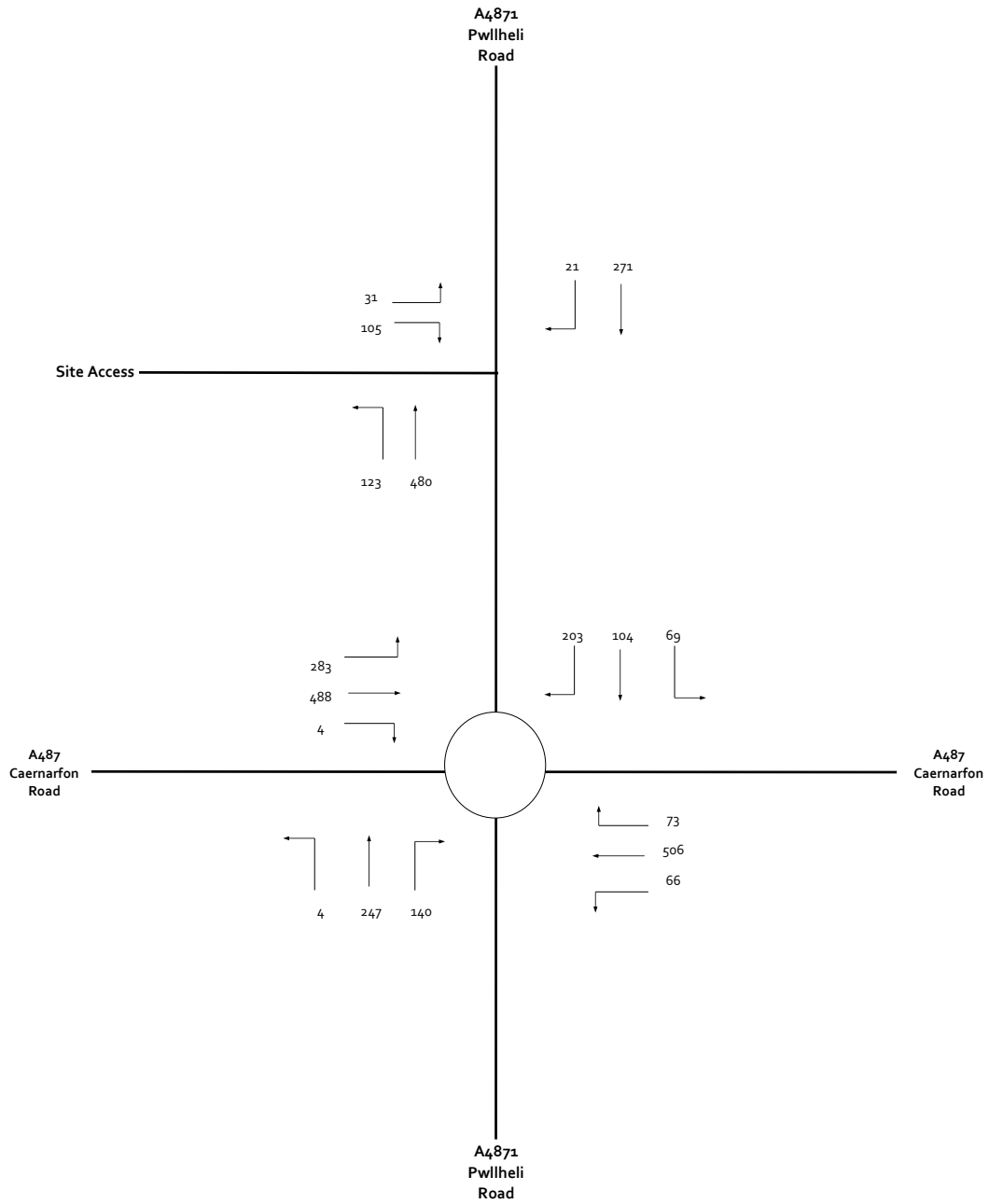


Figure 17 2033 With Development Flows - Weekday AM Peak

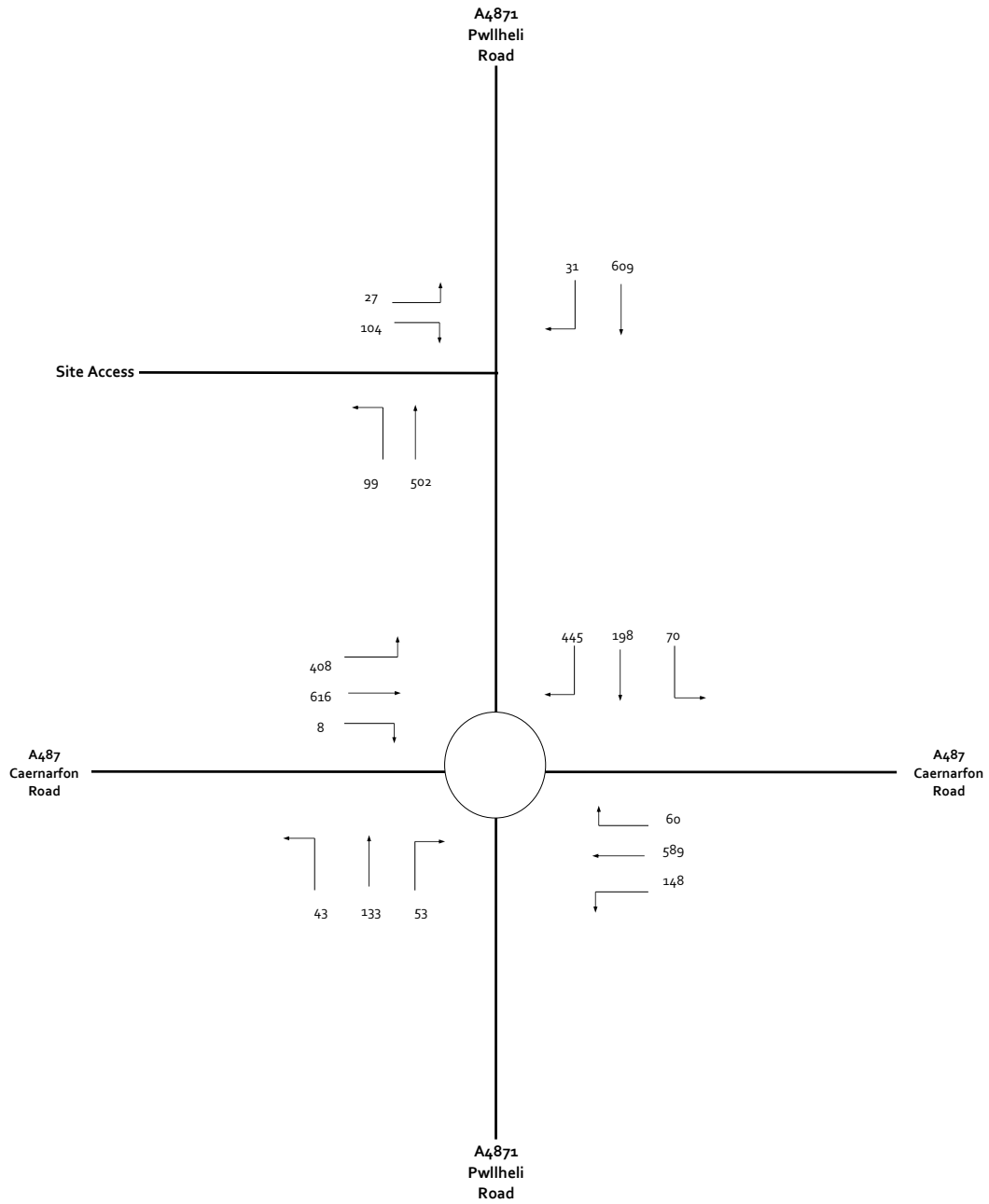


Figure 18 2033 With Development Flows - Weekday PM Peak

## APPENDICES



# APPENDIX 1

## Traffic Count Data

**SURVEY CONTROL**

**Client:** Eddisons

**Client Contact:** Phil Wooliscroft

**Survey Location:** Caernarfon

**Date(s) of Survey:** Thursday 11th May 2023

**Notes:**

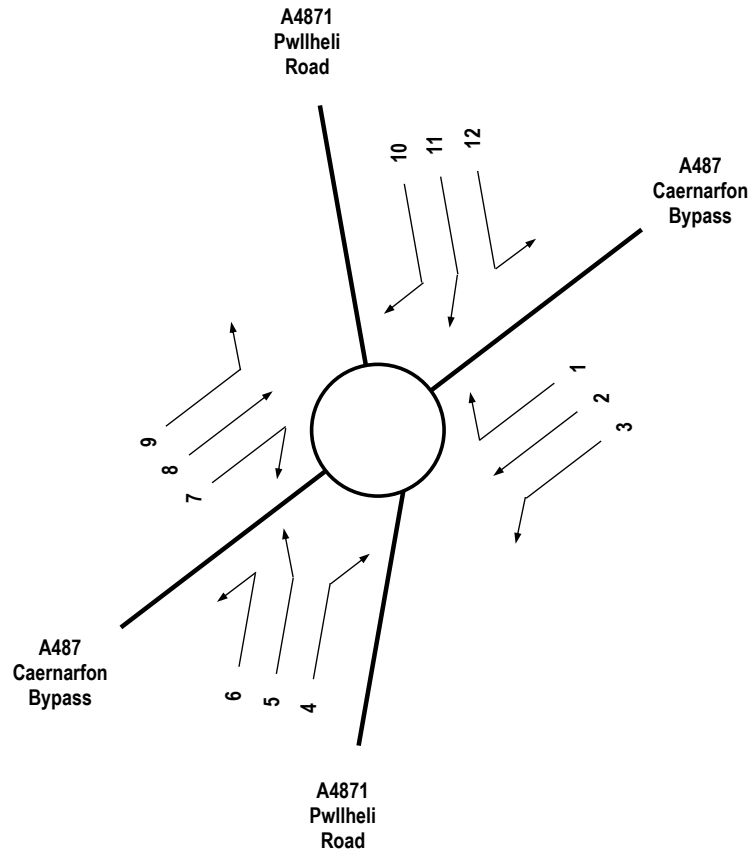
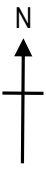
**On Site Supervisor:** Rachel Wong

**Data Checking:** David Cheng

**Survey Reference:** 23.014 Caernarfon

**Status:** Final

**Date of Issue:** 16th May 2023



DRAWING TITLE

TRAFFIC MOVEMENT REFERENCE

JOB TITLE

23.014 CAERNARFON

**Transport Data Specialists Ltd**

W: [www.transportds.co.uk](http://www.transportds.co.uk)  
E: [enquiries@transportds.co.uk](mailto:enquiries@transportds.co.uk)  
T: 0777 625 2475 T: 0794 007 1260

DRAWN BY

DC

DATE

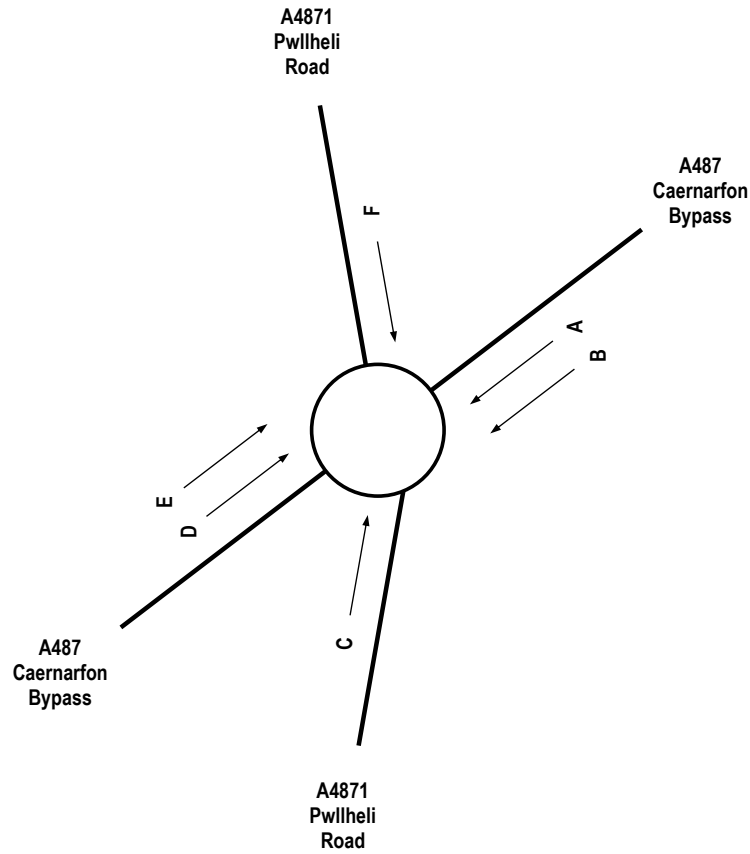
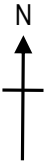
MAY 2023

SCALE

NTS

REF

FIGURE 1



DRAWING TITLE

QUEUE REFERENCE

JOB TITLE

23.014 CAERNARFON

**Transport Data  
Specialists Ltd**

W: [www.transportds.co.uk](http://www.transportds.co.uk)  
E: [enquiries@transportds.co.uk](mailto:enquiries@transportds.co.uk)  
T: 0777 625 2475 T: 0794 007 1260

DRAWN BY

DC

DATE

MAY 2023

SCALE

NTS

REF

FIGURE 2

| A487 Caernarfon Bypass/A4781 Pwllheli Road - Thursday 11th May 2023 |    |    |     |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |    |    |    |    |    |    |
|---|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|
| Time Beginning  | 1  |    | 2   |    | 3  |    | 4  |    | 5  |    | 6  |    | 7  |    | 8   |    | 9  |    | 10 |    | 11 |    | 12 |    |
|   | LV | HV | LV  | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV  | HV | LV | HV | LV | HV | LV | HV | LV | HV |
| 0730  | 4  | 0  | 58  | 10 | 4  | 1  | 36 | 1  | 23 | 2  | 0  | 0  | 0  | 0  | 110 | 6  | 35 | 3  | 28 | 4  | 7  | 4  | 4  | 0  |
| 0745  | 12 | 0  | 92  | 15 | 13 | 1  | 36 | 1  | 26 | 1  | 0  | 0  | 0  | 0  | 118 | 5  | 75 | 3  | 35 | 2  | 11 | 1  | 4  | 0  |
| 0800  | 7  | 0  | 97  | 16 | 10 | 0  | 50 | 0  | 29 | 2  | 0  | 0  | 0  | 0  | 137 | 9  | 48 | 4  | 44 | 1  | 19 | 5  | 11 | 0  |
| 0815  | 5  | 0  | 111 | 15 | 9  | 3  | 38 | 0  | 31 | 4  | 0  | 0  | 1  | 0  | 172 | 8  | 86 | 1  | 33 | 3  | 17 | 2  | 8  | 0  |
| 0830  | 9  | 1  | 104 | 15 | 8  | 1  | 42 | 3  | 55 | 6  | 1  | 0  | 4  | 0  | 141 | 7  | 76 | 2  | 32 | 0  | 17 | 2  | 4  | 0  |
| 0845  | 6  | 0  | 88  | 17 | 16 | 1  | 34 | 0  | 57 | 0  | 2  | 0  | 1  | 0  | 104 | 16 | 88 | 4  | 30 | 5  | 25 | 2  | 3  | 1  |
| 0900  | 7  | 0  | 94  | 12 | 20 | 0  | 21 | 0  | 54 | 3  | 1  | 0  | 2  | 0  | 109 | 14 | 89 | 3  | 37 | 3  | 23 | 1  | 5  | 1  |
| 0915  | 8  | 0  | 91  | 10 | 13 | 1  | 23 | 0  | 44 | 4  | 0  | 0  | 0  | 0  | 85  | 8  | 83 | 4  | 44 | 2  | 18 | 2  | 2  | 1  |

| A487 Caernarfon Bypass/A4781 Pwllheli Road - Thursday 11th May 2023 |    |    |     |    |    |    |    |    |    |    |    |    |    |    |     |    |    |    |     |    |    |    |    |    |
|---|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|----|----|----|-----|----|----|----|----|----|
| Time Beginning  | 1  |    | 2   |    | 3  |    | 4  |    | 5  |    | 6  |    | 7  |    | 8   |    | 9  |    | 10  |    | 11 |    | 12 |    |
|   | LV | HV | LV  | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV | HV | LV  | HV | LV | HV | LV  | HV | LV | HV | LV | HV |
| 1630  | 6  | 0  | 149 | 5  | 36 | 0  | 12 | 1  | 28 | 3  | 0  | 0  | 1  | 0  | 106 | 13 | 54 | 0  | 95  | 2  | 44 | 0  | 15 | 0  |
| 1645  | 6  | 0  | 142 | 3  | 38 | 0  | 14 | 1  | 33 | 1  | 0  | 0  | 1  | 0  | 97  | 7  | 58 | 1  | 91  | 2  | 46 | 4  | 10 | 0  |
| 1700  | 5  | 1  | 149 | 7  | 28 | 1  | 9  | 0  | 26 | 1  | 1  | 0  | 1  | 0  | 117 | 9  | 52 | 1  | 106 | 0  | 42 | 1  | 5  | 0  |
| 1715  | 3  | 0  | 121 | 2  | 34 | 2  | 12 | 1  | 25 | 0  | 2  | 0  | 1  | 0  | 109 | 3  | 62 | 1  | 84  | 2  | 44 | 1  | 4  | 0  |
| 1730  | 7  | 0  | 124 | 0  | 40 | 0  | 16 | 0  | 27 | 2  | 1  | 0  | 2  | 0  | 106 | 2  | 78 | 1  | 77  | 0  | 29 | 1  | 10 | 0  |
| 1745  | 3  | 0  | 103 | 4  | 28 | 0  | 10 | 0  | 31 | 0  | 1  | 0  | 2  | 0  | 90  | 4  | 50 | 1  | 55  | 0  | 41 | 2  | 4  | 0  |
| 1800  | 1  | 0  | 90  | 4  | 16 | 0  | 19 | 1  | 20 | 0  | 1  | 0  | 1  | 0  | 77  | 5  | 55 | 0  | 52  | 1  | 40 | 1  | 3  | 0  |
| 1815  | 5  | 0  | 87  | 1  | 19 | 0  | 8  | 0  | 21 | 3  | 0  | 0  | 2  | 0  | 68  | 6  | 39 | 0  | 55  | 0  | 40 | 0  | 5  | 0  |

signal surveys

| Time Beginning | A487 Caernarfon Bypass/A4781 Pwllheli Road, Queues (vehs) - Thursday 11th May 2023 |   |   |   |    |   | Time Beginning | A487 Caernarfon Bypass/A4781 Pwllheli Road, Queues (vehs) - Thursday 11th May 2023 |   |   |   |   |    |
|----------------|--|---|---|---|----|---|----------------|--|---|---|---|---|----|
|                | A  | B | C | D | E  | F |                | A  | B | C | D | E | F  |
| 0730           | 0  | 0 | 0 | 0 | 0  | 2 | 1630           | 0  | 3 | 1 | 0 | 0 | 4  |
| 0735           | 0  | 0 | 0 | 0 | 1  | 0 | 1635           | 0  | 5 | 2 | 0 | 1 | 3  |
| 0740           | 0  | 1 | 2 | 0 | 0  | 0 | 1640           | 0  | 0 | 1 | 0 | 1 | 13 |
| 0745           | 0  | 0 | 1 | 0 | 1  | 0 | 1645           | 0  | 1 | 2 | 0 | 0 | 4  |
| 0750           | 0  | 0 | 6 | 1 | 4  | 0 | 1650           | 0  | 3 | 2 | 0 | 0 | 11 |
| 0755           | 0  | 0 | 1 | 0 | 1  | 0 | 1655           | 0  | 1 | 1 | 0 | 2 | 3  |
| 0800           | 0  | 3 | 4 | 0 | 1  | 1 | 1700           | 0  | 8 | 1 | 1 | 4 | 6  |
| 0805           | 0  | 0 | 1 | 0 | 0  | 0 | 1705           | 0  | 6 | 0 | 0 | 0 | 2  |
| 0810           | 0  | 2 | 1 | 0 | 2  | 3 | 1710           | 0  | 1 | 2 | 3 | 1 | 5  |
| 0815           | 0  | 0 | 0 | 1 | 2  | 0 | 1715           | 0  | 0 | 3 | 0 | 3 | 2  |
| 0820           | 0  | 0 | 1 | 0 | 2  | 0 | 1720           | 0  | 5 | 2 | 0 | 2 | 0  |
| 0825           | 0  | 1 | 1 | 0 | 5  | 0 | 1725           | 0  | 4 | 1 | 0 | 0 | 6  |
| 0830           | 0  | 0 | 0 | 0 | 1  | 0 | 1730           | 0  | 0 | 0 | 0 | 6 | 1  |
| 0835           | 2  | 0 | 3 | 4 | 5  | 1 | 1735           | 0  | 1 | 0 | 0 | 1 | 7  |
| 0840           | 0  | 0 | 4 | 3 | 11 | 3 | 1740           | 0  | 4 | 0 | 0 | 0 | 0  |
| 0845           | 0  | 0 | 0 | 0 | 2  | 0 | 1745           | 0  | 3 | 0 | 0 | 0 | 0  |
| 0850           | 0  | 0 | 1 | 0 | 4  | 0 | 1750           | 2  | 3 | 1 | 0 | 2 | 1  |
| 0855           | 0  | 2 | 4 | 0 | 3  | 2 | 1755           | 1  | 3 | 1 | 0 | 0 | 7  |
| 0900           | 0  | 2 | 0 | 1 | 3  | 0 | 1800           | 0  | 0 | 2 | 0 | 1 | 3  |
| 0905           | 0  | 0 | 1 | 1 | 1  | 0 | 1805           | 0  | 1 | 1 | 0 | 1 | 3  |
| 0910           | 0  | 0 | 7 | 0 | 1  | 0 | 1810           | 0  | 1 | 1 | 0 | 0 | 1  |
| 0915           | 0  | 3 | 1 | 0 | 1  | 2 | 1815           | 2  | 4 | 0 | 0 | 1 | 4  |
| 0920           | 0  | 0 | 0 | 0 | 1  | 2 | 1820           | 0  | 0 | 2 | 0 | 1 | 3  |
| 0925           | 0  | 3 | 1 | 0 | 8  | 4 | 1825           | 0  | 0 | 0 | 0 | 0 | 1  |
| 0930           | 0  | 3 | 0 | 0 | 0  | 0 | 1830           | 0  | 0 | 2 | 0 | 2 | 2  |

## **APPENDIX 2**

### **Petrol Filling Station Traffic Generation Information**

**TRANSPORT ASSESSMENT  
PROPOSED PETROL FILLING STATION  
TENBY ROAD  
ST CLEARS  
CARMARTHENSHIRE**



## 5.0 TRAFFIC GENERATION

### 5.1 Petrol Filling Station with Retail

5.1.1 In order to calculate the traffic generation for a 10 bay PFS, ADL have reviewed the TRICS database using the edge of town sites from the category “PFS with Retail” from Wales (and subsequently England to broaden the number of sites, but excluding London).

5.1.2 TRICS provides the following trip rates for the weekday AM and PM peak hours, as well as the Saturday daytime peak.

**Table 5A Peak Hour Trip Rates and Trips: PFS with Retail**

|                       | In                |                   | Out               |                   | 2-way |
|-----------------------|-------------------|-------------------|-------------------|-------------------|-------|
|                       | Trip Rate per Bay | Trips for 10 Bays | Trip Rate per Bay | Trips for 10 Bays |       |
| Weekday AM Peak       | 9.625             | 96                | 9.300             | 93                | 189   |
| Weekday PM Peak       | 9.700             | 97                | 9.575             | 96                | 193   |
| Saturday Daytime Peak | 13.405            | 134               | 13.514            | 135               | 269   |

5.1.3 Table 5A demonstrates that based on the TRICS calculations the proposal would generate the following vehicle trips:

- Weekday AM: 189 two-way vehicle trips
- Weekday PM: 193 two-way vehicle trips
- Saturday Peak: 269 two-way vehicle trips

5.1.4 The TRICS data is provided at Appendices 8.1 and 8.2 for the weekday and Saturday respectively.

5.1.5 Of the five PFS sites contained in the Weekday TRICS data, two have a defined food offering:

- GM-13-B-01: BP PFS with Spar sales area, Greggs & Subway takeaways areas
- SF-13-B-02: BP PFS with M&S foodstore and Wild Bean Café

5.1.6 By means of a sensitivity test a trip rate has been prepared for these sites only and Table 5B shows a comparison of the daily trip rates.

**Table 5B Comparison of PFS including food concession**

|                                     | In      | Out     | 2-way   |
|-------------------------------------|---------|---------|---------|
| PFS with retail                     | 128.781 | 129.425 | 258.206 |
| PFS with retail and food concession | 112.250 | 112.061 | 224.311 |

5.1.7 As shown, the addition of the food operator within the retail unit does not appear to have an effect on the traffic generating ability of these sites. As a result, no specific site selections have been made to include or exclude food offerings, given their negligible effect on trip rates.

## 5.2 Trip Types

5.2.1 In an edge of town location such as the proposals are shown, there are two trip types expected to cover the majority of customers:

- Diverted from the A40 as part of a journey
- Passby from the A40 roundabout to St Clears (or vice versa) as part of a journey to or from the town

5.2.2 There is a possibility of a small proportion of trips being made as new visits originating from St Clears, however, the nearest petrol filling station to St Clears is located to the south west of the A40 roundabout on the A477, so it is likely that these trips are already occurring on the network and they may opt to visit the proposals site, instead of the existing facility.

5.2.3 Some trips are likely to be shared with the permitted drive thru restaurant and coffee shop and the trip types for both of these uses are replicated from the permitted scheme documentation in Table 5C.

**Table 5C Trip Types: Permitted Development**

|            | Weekday    |       | Saturday   |       |
|------------|------------|-------|------------|-------|
|            | McDonald's | Costa | McDonald's | Costa |
| Additional | 22%        | 4%    | 26%        | 7%    |
| Existing   | 74%        | 96%   | 72%        | 93%   |
| PFS shared | 4%         | -     | 2%         | -     |
| Total      | 100%       | 100%  | 100%       | 100%  |

5.2.4 Given the very low rates of additional trips to the permitted restaurant and coffee shop, the proposed split of trips during the peak hours to the PFS are considered to closely reflect those of the coffee shop, whilst allowing for an element of shared trips to the two drive thru operators, given that it is highly unlikely a driver would make a specific trip to purchase fuel during the peak hours. The proposed trip type split is shown in Table 5D.

**Table 5D PFS Trip Type Split**

|                         | <b>Weekday</b> | <b>Saturday</b> |
|-------------------------|----------------|-----------------|
| Additional              | 4%             | 7%              |
| Existing                | 92%            | 91%             |
| Shared with drive thrus | 4%             | 2%              |
| <b>Total</b>            | <b>100%</b>    | <b>100%</b>     |

5.2.5 By applying this to the traffic generation, this results in the following trips.

**Table 5E PFS Traffic Generation**

|              | <b>Weekday AM</b> |            | <b>Weekday PM</b> |            | <b>Saturday</b> |            |
|--------------|-------------------|------------|-------------------|------------|-----------------|------------|
|              | <b>In</b>         | <b>Out</b> | <b>In</b>         | <b>Out</b> | <b>In</b>       | <b>Out</b> |
| Additional   | 4                 | 4          | 4                 | 4          | 9               | 9          |
| Existing     | 88                | 85         | 89                | 88         | 122             | 123        |
| Shared       | 4                 | 4          | 4                 | 4          | 3               | 3          |
| <b>Total</b> | <b>96</b>         | <b>93</b>  | <b>97</b>         | <b>96</b>  | <b>134</b>      | <b>135</b> |

5.2.6 Development traffic distribution and impact is considered at Chapter 7.0.

## **APPENDIX 3**

### **Costa Coffee – Traffic Data Information**

Costa Ltd

## Drive Thru Operations, Baseline Traffic & Customer Surveys Summary Report

Project Reference: 1604-09/TN/01

Technical Note: Survey Results Summary



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### 1 INTRODUCTION

- 1.1 Transport Planning Associates has been instructed by Costa Limited to review the traffic generation, modal share and traffic related aspects of its Drive-Thru sites across England. The results of the review will be used to support future Costa Drive-Thru planning applications.
- 1.2 In order to provide a representative sample of 'average' sites, those considered to be 'top' and 'bottom end' performers were excluded from the list of Costa sites, to leave the mid-band performers from which to select the sites. The sites selected were located in Didcot, Cambridge, Bedford, Warrington, Sheffield and Banbury, details of which are provided in the table below, with location plans of the sites included at **Appendix A**.

Table 1 Site Locations

| Site Location | Description   | Passing Traffic |
|---------------|---|-----------------|
| Cambridge     | Roadside off A428, shared with McDonald's Drive Thru. Shared parking.                           | 27,865          |
| Warrington    | Prominent roundabout location. Shared with supermarket and small retail parade.                 | 49,953          |
| Didcot        | Urban roadside (A4130) off the A34, next to petrol garage and McDonald's. 36 car parking spaces | 63,042          |
| Bedford       | Retail park location, including M&S Simply Food. Shared parking.                                | 28,957          |
| Sheffield     | Opposite Meadowhall Shopping Centre and next to large Next superstore. 20 car parking spaces.   | 28,336          |
| Banbury       | Urban roadside off A road into town centre.   | 32,496          |

1.3 To identify traffic generation and activity, traffic surveys were commissioned to record the following:

- Peak hour traffic flows;
- The pass-by and diverted trips to the site;
- Maximum queues at drive thru;
- Vehicle occupants; and,
- Age range of visitors.

1.4 The surveys were conducted by PCC Traffic Information Consultancy, on one weekday, and one Saturday over two weeks. The number of vehicles driving in and out of the site, were observed at 15-minute intervals between 6am and 7pm, with an interviewer stationed at the drive-thru. A copy of the questionnaire, and the survey results is included in **Appendix B**.

## 2 SURVEY RESULTS

### Peak Hour Traffic Generation

2.1 Peak hour traffic flows were observed from both weekday, and Saturday surveys for all six sites. As the peak times varied for each site, two-way traffic flows were observed during the two busiest hours on each day (weekday and Saturday) for each site.

2.2 Peak hour traffic generation is summarised in the tables below, which show the survey results for the following:

- Total vehicles accessing the site (car park and drive-thru)
- Car park traffic generation; and,
- Drive-thru traffic generation.

Table 2 Total Peak Hour Traffic Attraction

| Site        | Weekday |     |         |     | Saturday |     |         |     |
|-------------|---------|-----|---------|-----|----------|-----|---------|-----|
|             | AM Peak |     | PM Peak |     | AM Peak  |     | PM Peak |     |
|             | In      | Out | In      | Out | In       | Out | In      | Out |
| Cambridge*  | 231     | 240 | 247     | 234 | 223      | 216 | 217     | 219 |
| Warrington* | 291     | 253 | 259     | 258 | 273      | 244 | 259     | 250 |
| Didcot      | 100     | 93  | 75      | 79  | 108      | 101 | 102     | 97  |
| Bedford     | 72      | 71  | 59      | 66  | 72       | 70  | 69      | 62  |

|                  |           |           |           |           |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Sheffield        | 87        | 83        | 79        | 79        | 57        | 60        | 58        | 54        |
| Banbury          | 84        | 72        | 71        | 65        | 104       | 79        | 89        | 110       |
| <b>Average**</b> | <b>86</b> | <b>80</b> | <b>71</b> | <b>72</b> | <b>85</b> | <b>78</b> | <b>80</b> | <b>81</b> |

\*Cambridge & Warrington entry points shared with other uses

\*\*Excludes Cambridge & Warrington

2.3 The table shows the sites at Warrington and Cambridge generate the highest movements on both weekdays and Saturdays. This correlates to the location of the sites, with the Cambridge site in a prominent location on the side of the A428, and the Warrington site situated on a roundabout off the A49, next to a supermarket.

2.4 The correlation between site location and the volume of vehicles is also reflected in the trip generation for the other sites, whereby the sites in less prominent locations, generated less trips.

Table 3 Car Park Peak Hour Traffic Generation

| Site             | Weekday   |           |           |           | Saturday  |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                  | AM Peak   |           | PM Peak   |           | AM Peak   |           | PM Peak   |           |
|                  | In        | Out       | In        | Out       | In        | Out       | In        | Out       |
| Cambridge*       | 183       | 192       | 218       | 205       | 188       | 181       | 190       | 192       |
| Warrington*      | 265       | 227       | 238       | 237       | 232       | 203       | 236       | 227       |
| Didcot           | 68        | 61        | 52        | 56        | 78        | 71        | 72        | 67        |
| Bedford          | 40        | 39        | 42        | 49        | 46        | 44        | 42        | 35        |
| Sheffield        | 71        | 67        | 63        | 63        | 46        | 49        | 47        | 43        |
| Banbury          | 51        | 39        | 45        | 39        | 78        | 53        | 63        | 84        |
| <b>Average**</b> | <b>58</b> | <b>52</b> | <b>49</b> | <b>52</b> | <b>62</b> | <b>54</b> | <b>56</b> | <b>57</b> |

\*Cambridge & Warrington entry points shared with other uses

\*\*Excludes Cambridge & Warrington

2.5 The average number of vehicles using the car park on weekdays is 217 during the AM peak, and 218 trips during the PM peak. This equates to approximately 3.6 vehicles per minute in both the AM and PM peak hours. At weekends, the number of trips during the busiest hours decrease by 5 vehicles during the AM peak, and by 7 vehicles during the PM peak.

Table 4 Drive-Thru Peak Hour Traffic Generation

| Site           | Weekday   |           | Saturday  |           |
|----------------|-----------|-----------|-----------|-----------|
|                | AM Peak   | PM Peak   | AM Peak   | PM Peak   |
| Didcot         | 27        | 23        | 30        | 30        |
| Cambridge      | 48        | 29        | 35        | 27        |
| Bedford        | 32        | 17        | 26        | 27        |
| Warrington     | 26        | 21        | 41        | 23        |
| Sheffield      | 16        | 16        | 11        | 11        |
| Banbury        | 33        | 26        | 26        | 26        |
| <b>Average</b> | <b>30</b> | <b>22</b> | <b>28</b> | <b>24</b> |

- 2.6 The table shows that the number of vehicles using the drive-thru lane ranged from 11 to 48 vehicles during the peak hours across the sites. The site at Cambridge generated the highest number of vehicles using the drive-thru lane, while the site at Sheffield generated the lowest.

#### Pass-by/Diverted Trips

- 2.7 While considering the potential number of vehicular trips to each site during the peak hours, the surveys also ascertained whether the purpose of the trips were to visit Costa only, or whether they were part of a pass-by, or diverted trip while travelling to somewhere else. The survey identified the reasons for visits as 'commuting to/from work', 'on the school run', 'shopping' or 'other'.
- 2.8 The percentages of pass-by/diverted trips for each site, as well as an overall average, is summarised in Table 5.



Table 5 Pass-by and Diverted Trips

| Site           | Pass-by and Diverted Trips (%) |           |
|----------------|--------------------------------|-----------|
|                | Weekday                        | Saturday  |
| Didcot         | 89.59                          | 81.45     |
| Cambridge      | 94.62                          | 89.11     |
| Bedford        | 82.81                          | 95.11     |
| Warrington     | 98.44                          | 93.91     |
| Sheffield      | 79.23                          | 77.94     |
| Banbury        | 98.03                          | 90.10     |
| <b>Average</b> | <b>90</b>                      | <b>88</b> |

- 2.9 The results showed that 98% of trips to the sites located in Warrington and Banbury were pass-by or diverted trips on weekdays. This percentage reduced slightly at both sites on Saturdays, when the percentage of pass-by trips was 94% at Warrington, and 90% at Banbury. In other words, the sites generated little traffic in their own right.
- 2.10 The site at Sheffield generated a higher number of primary purpose trips in comparison with the other sites; 79% of the total number of trips were recorded as pass-by or diverted on weekdays, and 78% were recorded as pass-by on weekends. This site, unlike the sites at Banbury and Warrington, is located opposite a shopping centre, and next to a clothing superstore. With this site also generating the lowest number of vehicles at the drive-thru, as previously mentioned, it is considered that this site's location is more likely to generate primary purpose trips.
- 2.11 The table shows that, as an overall average, approximately 90% of trips to the sites were pass-by, or diverted trips on weekdays, and 88% were pass-by or diverted trips on a Saturday. This suggests that the sites do not generate a significant number of primary purpose trips during the week, and at weekends, when primary trips for leisure purposes are more likely to occur, only up to 12% of visits to the sites were primary purpose trips.

### Queues

- 2.12 As well as the number of vehicles visiting the site, the maximum queue length at the drive-thru, and time of day that the queue occurred, was also observed. The queues and times that were recorded for each site, as well as the average queue length and time of occurrence for all sites, are set out in the table below.

Table 6 Queue Lengths – Maximum Recorded Queues

| Location       | Weekday  |                           | Saturday |                          |
|----------------|----------|---------------------------|----------|--------------------------|
|                | Max Q.   | Time                      | Max Q.   | Time                     |
| Didcot         | 5        | 07:30-07:45               | 8        | 10:15-10:30              |
| Cambridge      | 9        | 07:45-08:00*              | 9        | 10:30-10:45              |
| Bedford        | 9        | 14:45-15:00               | 7        | 10:15-10:30              |
| Warrington     | 8        | 07:30-07:45               | 10       | 10:15-10:45**            |
| Sheffield      | 6        | 07:45-08:00               | 4        | 08:00-08:15 <sup>+</sup> |
| Banbury        | 3        | 06:45-07:00 <sup>++</sup> | 4        | 12:00-12:15              |
| <b>Average</b> | <b>7</b> |                           | <b>7</b> |                          |

\*Also 09:30-09:45

\*\*10 vehicle max queue recorded in two consecutive periods

<sup>+</sup>Also 09:45-10:00 and 11:15-11:30<sup>++</sup>Also 08:30-08:45

- 2.13 The table shows that the mean maximum queue length was 7 vehicles, occurring on weekdays and Saturdays. The longest queue recorded was 10 vehicles, at Warrington, on the Saturday.
- 2.14 It should be noted that the maximum queue occurring in each 15 minutes was recorded, rather than a 'snapshot' recording. For all six sites, the maximum queue length reduced in the following 15 minute interval on both weekdays and weekends, with the exception of the site at Bedford where the maximum queue length stayed the same during the following 15 minute interval on Saturday. This suggests that queues would have only reached the maximum vehicle length for short periods of time.
- 2.15 For four out of the six sites, the number of vehicles queuing was at a maximum during at least one of the two peak hours on both days. The remaining two sites, located in Cambridge and Sheffield, recorded the maximum queue during the 15 minute period preceding one of the two peak hours.

### Vehicle Occupants

- 2.16 Although not a usual traffic issue, the number of occupants per vehicle was also recorded, and is summarised in Table 7.

Table 7 Vehicle Occupants

| Site No.       | Location   | Average Vehicle Occupants |          |
|----------------|------------|---------------------------|----------|
|                |            | Weekday                   | Saturday |
| 1              | Didcot     | 1                         | 2        |
| 2              | Cambridge  | 1                         | 2        |
| 3              | Bedford    | 1                         | 2        |
| 4              | Warrington | 1                         | 2        |
| 5              | Sheffield  | 1                         | 2        |
| 6              | Banbury    | 1                         | 1        |
| <b>Average</b> |            | <b>1</b>                  | <b>2</b> |

- 2.17 The table above shows that the average number of vehicle occupants across the sites equated to 1 occupant per vehicle on weekdays, and up to 2 at weekends. Results were consistent across all sites, except at the Banbury site, where the average number of vehicle occupants was 1 on a Saturday.

### Age Groups

- 2.18 As well as the number of visitors travelling to the site by car, the survey also obtained the age range of visitors for both weekdays and Saturdays, a summary of which is set out in Table 8.

Table 8 Age Range of Visitors to Costa Sites

| Day                     | Site           | Visitor Age Range (%) |           |           |
|-------------------------|----------------|-----------------------|-----------|-----------|
|                         |                | 18-30                 | 30-50     | 50+       |
| Weekday                 | Didcot         | 43.2                  | 51.4      | 5.5       |
|                         | Cambridge      | 38.5                  | 50.8      | 10.8      |
|                         | Bedford        | 45.7                  | 47.5      | 6.8       |
|                         | Warrington     | 30.5                  | 44.9      | 24.6      |
|                         | Sheffield      | 31.54                 | 61.5      | 6.9       |
|                         | Banbury        | 34.2                  | 42.1      | 23.7      |
| <b>Average Weekday</b>  |                | <b>37</b>             | <b>50</b> | <b>13</b> |
| Saturday                | 1 - Didcot     | 56.1                  | 39.5      | 4.4       |
|                         | 2 - Cambridge  | 36.7                  | 54        | 9.3       |
|                         | 3 - Bedford    | 41.3                  | 51.6      | 7.1       |
|                         | 4 - Warrington | 31.3                  | 49.6      | 19.1      |
|                         | 5 - Sheffield  | 36                    | 58.8      | 5.2       |
|                         | 6 - Banbury    | 41.1                  | 44.1      | 14.9      |
| <b>Average Saturday</b> |                | <b>40</b>             | <b>50</b> | <b>10</b> |
| <b>Average (Total)</b>  |                | <b>39</b>             | <b>50</b> | <b>11</b> |

- 2.19 The results from the survey suggest that the majority of visitors were aged 30-50, with 50% of survey participants in this category. By a difference of 11% overall, the 18-30 age range also made a significant contribution to the overall number of visitors.
- 2.20 Across all sites, the 50+ age group contributed to less than 25% of trips to the site, while the other two categories varied slightly as the most common age group. The difference between these two groups ranged from 3% to 30% across both weekdays and weekend.
- 2.21 Five out of the six sites showed that the 30-50 group was the most common age range of visitors across both days, with the one exception at Site 1, Didcot, where 56% of the visitors on the Saturday were aged 18-30, while 40% of the visitors were aged 30-50.

## Car Park Demand

- 2.22 Car park demand has been calculated from the entry and exit profile, at the four sites with dedicated vehicle access. Table 9

Table 9 Site Locations

| Site Location | Peak Car Park Demand |          | Car Park Capacity |
|---------------|----------------------|----------|-------------------|
|               | Weekday              | Saturday |                   |
| Didcot        | 22                   | 30       | 36                |
| Bedford       | 13                   | 12       | 20                |
| Sheffield     | 30*                  | 23       | 24                |
| Banbury       | 22                   | 34       | 34                |

\*Car park full with 6 vehicles in DT lane / circulating

- 2.23 The parking demand results show that most of the parking areas were well utilised, with Sheffield and Banbury being full during peak hours. Survey staff indicated that the Cambridge and Warrington car parks also filled during peak hours, with the Cambridge site being particularly busy, for extended periods of the day.

## 3 SUMMARY

- 3.1 The surveys showed that the average number of peak hour vehicle arrivals at the four sites with separate car parks was 86 on weekday mornings and 71 during the weekday PM peaks. On Saturdays, the mean average of vehicles entering the sites was 85 vehicles in the AM peak and 80 during the PM peak. Of these trips, the majority (90%) were pass-by or diverted, with a slight increase in primary purpose trips on weekends.
- 3.2 The surveys also showed that the location of sites correlated to the traffic attraction, and the purpose of visit to each site. In terms of pass-by/diverted trips, the sites at Warrington and Banbury generated the highest number of trips, and the site at Sheffield generated the lowest.
- 3.3 In terms of queues, the average maximum queue length across the sites was 7 vehicles.

The surveys also obtained the number of occupants per vehicle, as well as the age range of visitors to the site. The results showed that the average number of occupants was 1 on weekdays, and up to 2 at weekends, and also that the most common age range of visitors was between 30 and 50, across both weekdays and weekends.

## **APPENDIX 4**

### **Junctions 9 Output – A4871 Pwllheli Road/Site Access**

|  |
|--|
| <b>Junctions 9</b>   |
| <b>PICADY 9 - Priority Intersection Module</b>   |
| Version: 9.5.2.1013<br>© Copyright TRL Limited, 2019   |
| For sales and distribution information, program advice and maintenance, contact TRL:<br>+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk              |
| The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution |

Filename: A4871 Pwllneli Road-Site Access.j9  
 Path: Z:\projects\3406 Ffordd Bont Saint, Caernarfon\Picady  
 Report generation date: 23/06/2023 14:14:17

»2033 With Development Flows, AM  
 »2033 With Development Flows, PM

Summary of junction performance

|                                    | AM     |             |           |      |     | PM     |             |           |      |     |
|------------------------------------|--------|-------------|-----------|------|-----|--------|-------------|-----------|------|-----|
|                                    | Set ID | Queue (PCU) | Delay (s) | RFC  | LOS | Set ID | Queue (PCU) | Delay (s) | RFC  | LOS |
| <b>2033 With Development Flows</b> |        |             |           |      |     |        |             |           |      |     |
| Stream B-C                         | D1     | 0.1         | 7.05      | 0.06 | A   | D2     | 0.1         | 7.22      | 0.06 | A   |
| Stream B-A                         |        | 0.4         | 11.81     | 0.27 | B   |        | 0.5         | 16.70     | 0.35 | C   |
| Stream C-AB                        |        | 0.0         | 7.40      | 0.05 | A   |        | 0.4         | 9.61      | 0.27 | A   |

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

|             |  |
|-------------|--|
| Title       | A4871 Pwllneli Road A4871 Pwllneli Road/Site Acces |
| Location    | Caernarfon   |
| Site number |  |
| Date        | 23/06/2023   |
| Version     |  |
| Status      | TIA  |
| Identifier  | Eddisons   |
| Client      | Liberty  |
| Jobnumber   | 3406   |
| Enumerator  | EDD\Tom.Bentley                                    |
| Description |  |

Units

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

Analysis Options

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

### Demand Set Summary

| ID | Scenario name               | Time Period name | Traffic profile type | Start time (HH:mm) | Finish time (HH:mm) | Time segment length (min) | Run automatically |
|----|-----------------------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2033 With Development Flows | AM               | ONE HOUR             | 08:00              | 09:30               | 15                        | ✓                 |
| D2 | 2033 With Development Flows | PM               | ONE HOUR             | 16:00              | 17:30               | 15                        | ✓                 |

### Analysis Set Details

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



# 2033 With Development Flows, AM

## Data Errors and Warnings

No errors or warnings

## Junction Network

### Junctions

| Junction | Name     | Junction type | Major road direction | Use circulating lanes | Junction Delay (s) | Junction LOS |
|----------|----------|---------------|----------------------|-----------------------|--------------------|--------------|
| 1        | untitled | T-Junction    | Two-way              |                       | 1.57               | A            |

### Junction Network Options

| Driving side | Lighting       |
|--------------|----------------|
| Left         | Normal/unknown |

## Arms

### Arms

| Arm | Name                    | Description | Arm type |
|-----|-------------------------|-------------|----------|
| A   | A4871 Pwllnell Road (S) |             | Major    |
| B   | Site Access             |             | Minor    |
| C   | A4871 Pwllnell Road (N) |             | Major    |

### Major Arm Geometry

| Arm | Width of carriageway (m) | Has kerbed central reserve | Has right turn bay | Width for right turn (m) | Visibility for right turn (m) | Blocks? | Blocking queue (PCU) |
|-----|--------------------------|----------------------------|--------------------|--------------------------|-------------------------------|---------|----------------------|
| C   | 7.20                     |                            | ✓                  | 3.80                     | 0.0                           | ✓       | 90.00                |

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

### Minor Arm Geometry

| Arm | Minor arm type      | Width at give-way (m) | Width at 5m (m) | Width at 10m (m) | Width at 15m (m) | Width at 20m (m) | Estimate flare length | Flare length (PCU) | Visibility to left (m) | Visibility to right (m) |
|-----|---------------------|-----------------------|-----------------|------------------|------------------|------------------|-----------------------|--------------------|------------------------|-------------------------|
| B   | One lane plus flare | 9.00                  | 9.00            | 9.00             | 9.00             | 9.00             | ✓                     | 3.00               | 60                     | 85                      |

## Slope / Intercept / Capacity

### Priority Intersection Slopes and Intercepts

| Stream | Intercept (PCU/hr) | Slope for A-B | Slope for A-C | Slope for C-A | Slope for C-B |
|--------|--------------------|---------------|---------------|---------------|---------------|
| B-A    | 647                | 0.112         | 0.282         | 0.178         | 0.404         |
| B-C    | 745                | 0.108         | 0.274         | -             | -             |
| C-B    | 674                | 0.247         | 0.247         | -             | -             |

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

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

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

## Traffic Demand

### Demand Set Details

| ID | Scenario name               | Time Period name | Traffic profile type | Start time (HH:mm) | Finish time (HH:mm) | Time segment length (min) | Run automatically                   |
|----|-----------------------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------------------------|
| D1 | 2033 With Development Flows | AM               | ONE HOUR             | 08:00              | 09:30               | 15                        | <input checked="" type="checkbox"/> |

| Vehicle mix varies over turn        | Vehicle mix varies over entry       | Vehicle mix source | PCU Factor for a HV (PCU) |
|-------------------------------------|-------------------------------------|--------------------|---------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | HV Percentages     | 2.00                      |

### Demand overview (Traffic)

| Arm | Linked arm | Profile type | Use O-D data                        | Average Demand (PCU/hr) | Scaling Factor (%) |
|-----|------------|--------------|-------------------------------------|-------------------------|--------------------|
| A   |            | ONE HOUR     | <input checked="" type="checkbox"/> | 603                     | 100.000            |
| B   |            | ONE HOUR     | <input checked="" type="checkbox"/> | 136                     | 100.000            |
| C   |            | ONE HOUR     | <input checked="" type="checkbox"/> | 292                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      | To |     |     |     |
|------|----|-----|-----|-----|
|      | A  | B   | C   |     |
| From | A  | 0   | 123 | 480 |
|      | B  | 105 | 0   | 31  |
|      | C  | 271 | 21  | 0   |

## Vehicle Mix

### Heavy Vehicle Percentages

|      | To |   |   |   |
|------|----|---|---|---|
|      | A  | B | C |   |
| From | A  | 0 | 0 | 0 |
|      | B  | 0 | 0 | 0 |
|      | C  | 0 | 0 | 0 |

## Results

### Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|--------|---------|---------------|-----------------|---------|-------------------------|-------------------------------|
| B-C    | 0.06    | 7.05          | 0.1             | A       | 28                      | 43                            |
| B-A    | 0.27    | 11.81         | 0.4             | B       | 96                      | 145                           |
| C-AB   | 0.05    | 7.40          | 0.0             | A       | 19                      | 29                            |
| C-A    |         |               |                 |         | 249                     | 373                           |
| A-B    |         |               |                 |         | 113                     | 169                           |
| A-C    |         |               |                 |         | 440                     | 661                           |

### Main Results for each time segment

#### 08:00 - 08:15

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 23                    | 6                       | 611               | 0.038 | 23                  | 0.0               | 0.0             | 6.125     | A                             |
| B-A    | 79                    | 20                      | 492               | 0.161 | 78                  | 0.0               | 0.2             | 8.680     | A                             |
| C-AB   | 16                    | 4                       | 562               | 0.028 | 16                  | 0.0               | 0.0             | 6.593     | A                             |
| C-A    | 204                   | 51                      |                   |       | 204                 |                   |                 |           |                               |
| A-B    | 93                    | 23                      |                   |       | 93                  |                   |                 |           |                               |
| A-C    | 361                   | 90                      |                   |       | 361                 |                   |                 |           |                               |

#### 08:15 - 08:30

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 28                    | 7                       | 583               | 0.048 | 28                  | 0.0               | 0.0             | 6.479     | A                             |
| B-A    | 94                    | 24                      | 462               | 0.204 | 94                  | 0.2               | 0.3             | 9.775     | A                             |
| C-AB   | 19                    | 5                       | 540               | 0.035 | 19                  | 0.0               | 0.0             | 6.910     | A                             |
| C-A    | 244                   | 61                      |                   |       | 244                 |                   |                 |           |                               |
| A-B    | 111                   | 28                      |                   |       | 111                 |                   |                 |           |                               |
| A-C    | 432                   | 108                     |                   |       | 432                 |                   |                 |           |                               |

#### 08:30 - 08:45

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 34                    | 9                       | 545               | 0.063 | 34                  | 0.0               | 0.1             | 7.050     | A                             |
| B-A    | 116                   | 29                      | 421               | 0.275 | 115                 | 0.3               | 0.4             | 11.766    | B                             |
| C-AB   | 23                    | 6                       | 510               | 0.045 | 23                  | 0.0               | 0.0             | 7.399     | A                             |
| C-A    | 298                   | 75                      |                   |       | 298                 |                   |                 |           |                               |
| A-B    | 135                   | 34                      |                   |       | 135                 |                   |                 |           |                               |
| A-C    | 528                   | 132                     |                   |       | 528                 |                   |                 |           |                               |

#### 08:45 - 09:00

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 34                    | 9                       | 544               | 0.063 | 34                  | 0.1               | 0.1             | 7.053     | A                             |
| B-A    | 116                   | 29                      | 421               | 0.275 | 116                 | 0.4               | 0.4             | 11.806    | B                             |
| C-AB   | 23                    | 6                       | 510               | 0.045 | 23                  | 0.0               | 0.0             | 7.399     | A                             |
| C-A    | 298                   | 75                      |                   |       | 298                 |                   |                 |           |                               |
| A-B    | 135                   | 34                      |                   |       | 135                 |                   |                 |           |                               |
| A-C    | 528                   | 132                     |                   |       | 528                 |                   |                 |           |                               |

#### 09:00 - 09:15

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 28                    | 7                       | 583               | 0.048 | 28                  | 0.1               | 0.1             | 6.484     | A                             |
| B-A    | 94                    | 24                      | 462               | 0.204 | 95                  | 0.4               | 0.3             | 9.813     | A                             |
| C-AB   | 19                    | 5                       | 540               | 0.035 | 19                  | 0.0               | 0.0             | 6.914     | A                             |
| C-A    | 244                   | 61                      |                   |       | 244                 |                   |                 |           |                               |
| A-B    | 111                   | 28                      |                   |       | 111                 |                   |                 |           |                               |
| A-C    | 432                   | 108                     |                   |       | 432                 |                   |                 |           |                               |

09:15 - 09:30

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 23                    | 8                       | 610               | 0.038 | 23                  | 0.1               | 0.0             | 6.134     | A                             |
| B-A    | 79                    | 20                      | 492               | 0.161 | 79                  | 0.3               | 0.2             | 8.725     | A                             |
| C-AB   | 18                    | 4                       | 562               | 0.028 | 18                  | 0.0               | 0.0             | 6.596     | A                             |
| C-A    | 204                   | 51                      |                   |       | 204                 |                   |                 |           |                               |
| A-B    | 93                    | 23                      |                   |       | 93                  |                   |                 |           |                               |
| A-C    | 361                   | 90                      |                   |       | 361                 |                   |                 |           |                               |



# 2033 With Development Flows, PM

## Data Errors and Warnings

No errors or warnings

## Junction Network

### Junctions

| Junction | Name     | Junction type | Major road direction | Use circulating lanes | Junction Delay (s) | Junction LOS |
|----------|----------|---------------|----------------------|-----------------------|--------------------|--------------|
| 1        | untitled | T-Junction    | Two-way              |                       | 2.33               | A            |

### Junction Network Options

| Driving side | Lighting       |
|--------------|----------------|
| Left         | Normal/unknown |

## Traffic Demand

### Demand Set Details

| ID | Scenario name               | Time Period name | Traffic profile type | Start time (HH:mm) | Finish time (HH:mm) | Time segment length (min) | Run automatically |
|----|-----------------------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D2 | 2033 With Development Flows | PM               | ONE HOUR             | 16:00              | 17:30               | 15                        | ✓                 |

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

### Demand overview (Traffic)

| Arm | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-----|------------|--------------|--------------|-------------------------|--------------------|
| A   |            | ONE HOUR     | ✓            | 601                     | 100.000            |
| B   |            | ONE HOUR     | ✓            | 131                     | 100.000            |
| C   |            | ONE HOUR     | ✓            | 603                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      |   | To  |     |     |
|------|---|-----|-----|-----|
|      |   | A   | B   | C   |
| From | A | 0   | 99  | 502 |
|      | B | 104 | 0   | 27  |
|      | C | 480 | 123 | 0   |

## Vehicle Mix

### Heavy Vehicle Percentages

|      |   | To |   |   |
|------|---|----|---|---|
|      |   | A  | B | C |
| From | A | 0  | 0 | 0 |
|      | B | 0  | 0 | 0 |
|      | C | 0  | 0 | 0 |

## Results

### Results Summary for whole modelled period

| Stream | Max RFC | Max Delay (s) | Max Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|--------|---------|---------------|-----------------|---------|-------------------------|-------------------------------|
| B-C    | 0.06    | 7.22          | 0.1             | A       | 25                      | 37                            |
| B-A    | 0.35    | 16.70         | 0.5             | C       | 95                      | 143                           |
| C-AB   | 0.27    | 9.61          | 0.4             | A       | 113                     | 169                           |
| C-A    |         |               |                 |         | 440                     | 661                           |
| A-B    |         |               |                 |         | 91                      | 136                           |
| A-C    |         |               |                 |         | 461                     | 691                           |

### Main Results for each time segment

#### 16:00 - 16:15

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 20                    | 5                       | 605               | 0.034 | 20                  | 0.0               | 0.0             | 6.155     | A                             |
| B-A    | 78                    | 20                      | 431               | 0.182 | 77                  | 0.0               | 0.2             | 10.165    | B                             |
| C-AB   | 93                    | 23                      | 562               | 0.165 | 92                  | 0.0               | 0.2             | 7.645     | A                             |
| C-A    | 361                   | 90                      |                   |       | 361                 |                   |                 |           |                               |
| A-B    | 75                    | 19                      |                   |       | 75                  |                   |                 |           |                               |
| A-C    | 378                   | 94                      |                   |       | 378                 |                   |                 |           |                               |

#### 16:15 - 16:30

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 24                    | 6                       | 575               | 0.042 | 24                  | 0.0               | 0.0             | 6.541     | A                             |
| B-A    | 93                    | 23                      | 388               | 0.241 | 93                  | 0.2               | 0.3             | 12.178    | B                             |
| C-AB   | 111                   | 28                      | 540               | 0.205 | 110                 | 0.2               | 0.3             | 8.370     | A                             |
| C-A    | 432                   | 108                     |                   |       | 432                 |                   |                 |           |                               |
| A-B    | 89                    | 22                      |                   |       | 89                  |                   |                 |           |                               |
| A-C    | 451                   | 113                     |                   |       | 451                 |                   |                 |           |                               |

#### 16:30 - 16:45

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 30                    | 7                       | 529               | 0.056 | 30                  | 0.0               | 0.1             | 7.212     | A                             |
| B-A    | 115                   | 29                      | 330               | 0.347 | 114                 | 0.3               | 0.5             | 16.572    | C                             |
| C-AB   | 135                   | 34                      | 510               | 0.265 | 135                 | 0.3               | 0.4             | 9.585     | A                             |
| C-A    | 528                   | 132                     |                   |       | 528                 |                   |                 |           |                               |
| A-B    | 109                   | 27                      |                   |       | 109                 |                   |                 |           |                               |
| A-C    | 553                   | 138                     |                   |       | 553                 |                   |                 |           |                               |

#### 16:45 - 17:00

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 30                    | 7                       | 528               | 0.056 | 30                  | 0.1               | 0.1             | 7.219     | A                             |
| B-A    | 115                   | 29                      | 330               | 0.347 | 114                 | 0.5               | 0.5             | 16.703    | C                             |
| C-AB   | 135                   | 34                      | 510               | 0.265 | 135                 | 0.4               | 0.4             | 9.606     | A                             |
| C-A    | 528                   | 132                     |                   |       | 528                 |                   |                 |           |                               |
| A-B    | 109                   | 27                      |                   |       | 109                 |                   |                 |           |                               |
| A-C    | 553                   | 138                     |                   |       | 553                 |                   |                 |           |                               |

17:00 - 17:15

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 24                    | 6                       | 574               | 0.042 | 24                  | 0.1               | 0.0             | 6.549     | A                             |
| B-A    | 93                    | 23                      | 388               | 0.241 | 94                  | 0.5               | 0.3             | 12.289    | B                             |
| C-AB   | 111                   | 28                      | 540               | 0.205 | 111                 | 0.4               | 0.3             | 8.394     | A                             |
| C-A    | 432                   | 108                     |                   |       | 432                 |                   |                 |           |                               |
| A-B    | 89                    | 22                      |                   |       | 89                  |                   |                 |           |                               |
| A-C    | 451                   | 113                     |                   |       | 451                 |                   |                 |           |                               |

17:15 - 17:30

| Stream | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|--------|-----------------------|-------------------------|-------------------|-------|---------------------|-------------------|-----------------|-----------|-------------------------------|
| B-C    | 20                    | 5                       | 604               | 0.034 | 20                  | 0.0               | 0.0             | 6.164     | A                             |
| B-A    | 78                    | 20                      | 430               | 0.182 | 79                  | 0.3               | 0.2             | 10.252    | B                             |
| C-AB   | 93                    | 23                      | 562               | 0.165 | 93                  | 0.3               | 0.2             | 7.680     | A                             |
| C-A    | 361                   | 90                      |                   |       | 361                 |                   |                 |           |                               |
| A-B    | 75                    | 19                      |                   |       | 75                  |                   |                 |           |                               |
| A-C    | 378                   | 94                      |                   |       | 378                 |                   |                 |           |                               |

## **APPENDIX 5**

**Junctions 9 Output – A487 Caernarfon Road/A4871  
Pwllheli Road**



|  |
|--|
| <b>Junctions 9</b>   |
| <b>ARCADY 9 - Roundabout Module</b>  |
| Version: 9.5.2.1013<br>© Copyright TRL Limited, 2019   |
| For sales and distribution information, program advice and maintenance, contact TRL:<br>+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk              |
| The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution |

Filename: A4871-A487-Pwllheli Road Roundabout.j9  
 Path: Z:\projects\3406 Ffordd Bont Saint, Caernarfon\Arcady  
 Report generation date: 23/06/2023 14:19:17

«2023 Surveyed Flows , AM

- »Junction Network
- »Arms
- »Traffic Demand
- »Origin-Destination Data
- »Vehicle Mix
- »Results

Summary of junction performance

|                                    | AM          |           |      |     | PM          |           |      |     |
|------------------------------------|-------------|-----------|------|-----|-------------|-----------|------|-----|
|                                    | Queue (PCU) | Delay (s) | RFC  | LOS | Queue (PCU) | Delay (s) | RFC  | LOS |
| <b>2023 Surveyed Flows</b>         |             |           |      |     |             |           |      |     |
| Arm 1                              | 0.6         | 6.75      | 0.38 | A   | 4.4         | 24.57     | 0.82 | C   |
| Arm 2                              | 0.8         | 4.48      | 0.45 | A   | 2.1         | 9.08      | 0.68 | A   |
| Arm 3                              | 2.4         | 21.82     | 0.71 | C   | 1.5         | 23.73     | 0.61 | C   |
| Arm 4                              | 1.1         | 4.88      | 0.52 | A   | 1.3         | 5.00      | 0.57 | A   |
| <b>2023 Base Flows</b>             |             |           |      |     |             |           |      |     |
| Arm 1                              | 0.6         | 7.20      | 0.39 | A   | 6.2         | 33.74     | 0.88 | D   |
| Arm 2                              | 0.9         | 4.73      | 0.48 | A   | 2.5         | 10.46     | 0.72 | B   |
| Arm 3                              | 3.3         | 29.45     | 0.78 | D   | 2.0         | 30.62     | 0.68 | D   |
| Arm 4                              | 1.2         | 5.32      | 0.56 | A   | 2.0         | 6.46      | 0.67 | A   |
| <b>2023 With Development Flows</b> |             |           |      |     |             |           |      |     |
| Arm 1                              | 1.0         | 8.48      | 0.49 | A   | 13.5        | 64.84     | 0.96 | F   |
| Arm 2                              | 1.0         | 4.98      | 0.50 | A   | 2.7         | 11.47     | 0.74 | B   |
| Arm 3                              | 4.3         | 38.21     | 0.83 | E   | 2.5         | 38.40     | 0.74 | E   |
| Arm 4                              | 1.3         | 5.66      | 0.57 | A   | 2.2         | 6.93      | 0.69 | A   |

*There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.*

*Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.*

## File summary

### File Description

|             |                                     |
|-------------|-------------------------------------|
| Title       | A4871-A487-Pwllheli Road Roundabout |
| Location    | Caernarfon                          |
| Site number | 3406                                |
| Date        | 19/06/2023                          |
| Version     |                                     |
| Status      | (new file)                          |
| Identifier  | George Monks                        |
| Client      |                                     |
| Jobnumber   | 3406                                |
| Enumerator  | EDD\George.Monks                    |
| Description |                                     |

### Units

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

### Analysis Options

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

### Analysis Set Details

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

### Demand Set Details

| ID | Scenario name       | Time Period name | Traffic profile type | Start time (HH:mm) | Finish time (HH:mm) | Time segment length (min) | Run automatically |
|----|---------------------|------------------|----------------------|--------------------|---------------------|---------------------------|-------------------|
| D1 | 2023 Surveyed Flows | AM               | ONE HOUR             | 08:00              | 09:30               | 15                        | ✓                 |

# 2023 Surveyed Flows , AM

## Data Errors and Warnings

| Severity | Area     | Item                        | Description  |
|----------|----------|-----------------------------|--|
| Warning  | Geometry | Arm 3 - Roundabout Geometry | Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution. |

## Junction Network

### Junctions

| Junction | Name     | Junction type       | Use circulating lanes | Arm order  | Junction Delay (s) | Junction LOS |
|----------|----------|---------------------|-----------------------|------------|--------------------|--------------|
| 1        | untitled | Standard Roundabout |                       | 1, 2, 3, 4 | 8.16               | A            |

### Junction Network Options

| Driving side | Lighting       |
|--------------|----------------|
| Left         | Normal/unknown |

## Arms

### Arms

| Arm | Name                       | Description |
|-----|----------------------------|-------------|
| 1   | A4871 Pwllheli Road (N)    |             |
| 2   | A487 Caernarfon Bypass (E) |             |
| 3   | A4871 Pwllheli Road (N)    |             |
| 4   | A487 Caernarfon Bypass (W) |             |

### Roundabout Geometry

| Arm | V - Approach road half-width (m) | E - Entry width (m) | I' - Effective flare length (m) | R - Entry radius (m) | D - Inscribed circle diameter (m) | PHI - Conflict (entry) angle (deg) | Exit only |
|-----|----------------------------------|---------------------|---------------------------------|----------------------|-----------------------------------|------------------------------------|-----------|
| 1   | 3.70                             | 5.70                | 4.7                             | 28.0                 | 69.0                              | 26.0                               |           |
| 2   | 7.40                             | 9.20                | 4.3                             | 45.0                 | 69.0                              | 22.0                               |           |
| 3   | 3.60                             | 5.20                | 36.0                            | 18.0                 | 69.0                              | 0.0                                |           |
| 4   | 8.00                             | 9.80                | 5.6                             | 75.0                 | 69.0                              | 24.0                               |           |

### Slope / Intercept / Capacity

#### Roundabout Slope and Intercept used in model

| Arm | Final slope | Final intercept (PCU/hr) |
|-----|-------------|--------------------------|
| 1   | 0.472       | 1416                     |
| 2   | 0.668       | 2611                     |
| 3   | 0.528       | 1665                     |
| 4   | 0.705       | 2845                     |

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

#### Arm Capacity Adjustments

| Arm | Type   | Reason    | Direct capacity adjustment (PCU/hr) |
|-----|--------|-----------|-------------------------------------|
| 1   | Direct | Queue Obs | -250                                |
| 2   | Direct | Queue Obs | -950                                |
| 3   | Direct | Queue Obs | -690                                |
| 4   | Direct | Queue Obs | -1000                               |

## Traffic Demand

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

### Demand overview (Traffic)

| Arm | Linked arm | Profile type | Use O-D data | Average Demand (PCU/hr) | Scaling Factor (%) |
|-----|------------|--------------|--------------|-------------------------|--------------------|
| 1   |            | ONE HOUR     | ✓            | 274                     | 100.000            |
| 2   |            | ONE HOUR     | ✓            | 607                     | 100.000            |
| 3   |            | ONE HOUR     | ✓            | 388                     | 100.000            |
| 4   |            | ONE HOUR     | ✓            | 729                     | 100.000            |

## Origin-Destination Data

### Demand (PCU/hr)

|      |   | To  |     |    |     |
|------|---|-----|-----|----|-----|
|      |   | 1   | 2   | 3  | 4   |
| From | 1 | 0   | 24  | 96 | 154 |
|      | 2 | 29  | 0   | 63 | 515 |
|      | 3 | 223 | 141 | 0  | 4   |
|      | 4 | 232 | 493 | 4  | 0   |

## Vehicle Mix

### Heavy Vehicle Percentages

|      |   | To |   |   |   |
|------|---|----|---|---|---|
|      |   | 1  | 2 | 3 | 4 |
| From | 1 | 0  | 0 | 0 | 0 |
|      | 2 | 0  | 0 | 0 | 0 |
|      | 3 | 0  | 0 | 0 | 0 |
|      | 4 | 0  | 0 | 0 | 0 |

## Results

### Results Summary for whole modelled period

| Arm | Max RFC | Max Delay (s) | Max Queue (PCU) | Max LOS | Average Demand (PCU/hr) | Total Junction Arrivals (PCU) |
|-----|---------|---------------|-----------------|---------|-------------------------|-------------------------------|
| 1   | 0.36    | 6.75          | 0.6             | A       | 251                     | 377                           |
| 2   | 0.45    | 4.46          | 0.8             | A       | 557                     | 835                           |
| 3   | 0.71    | 21.82         | 2.4             | C       | 338                     | 507                           |
| 4   | 0.52    | 4.88          | 1.1             | A       | 669                     | 1003                          |

14/07/2023 10:00:00 AM



## Main Results for each time segment

### 08:00 - 08:15

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 206                   | 52                      | 478                       | 941               | 0.219 | 205                 | 362                             | 0.0               | 0.3             | 4.888     | A                             |
| 2   | 457                   | 114                     | 190                       | 1534              | 0.298 | 455                 | 493                             | 0.0               | 0.4             | 3.333     | A                             |
| 3   | 277                   | 69                      | 523                       | 698               | 0.397 | 274                 | 122                             | 0.0               | 0.6             | 8.443     | A                             |
| 4   | 549                   | 137                     | 293                       | 1639              | 0.335 | 547                 | 505                             | 0.0               | 0.5             | 3.292     | A                             |

### 08:15 - 08:30

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 246                   | 62                      | 572                       | 896               | 0.275 | 246                 | 434                             | 0.3               | 0.4             | 5.533     | A                             |
| 2   | 546                   | 136                     | 228                       | 1509              | 0.362 | 545                 | 590                             | 0.4               | 0.8             | 3.733     | A                             |
| 3   | 331                   | 83                      | 627                       | 644               | 0.514 | 329                 | 146                             | 0.6               | 1.0             | 11.393    | B                             |
| 4   | 655                   | 164                     | 352                       | 1597              | 0.410 | 655                 | 604                             | 0.5               | 0.7             | 3.814     | A                             |

### 08:30 - 08:45

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 302                   | 75                      | 699                       | 836               | 0.361 | 301                 | 529                             | 0.4               | 0.6             | 6.716     | A                             |
| 2   | 668                   | 167                     | 279                       | 1475              | 0.453 | 667                 | 721                             | 0.6               | 0.8             | 4.452     | A                             |
| 3   | 405                   | 101                     | 767                       | 570               | 0.711 | 400                 | 179                             | 1.0               | 2.3             | 20.659    | C                             |
| 4   | 803                   | 201                     | 428                       | 1544              | 0.520 | 801                 | 740                             | 0.7               | 1.1             | 4.837     | A                             |

### 08:45 - 09:00

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 302                   | 75                      | 702                       | 835               | 0.361 | 302                 | 533                             | 0.6               | 0.6             | 6.751     | A                             |
| 2   | 668                   | 167                     | 280                       | 1475              | 0.453 | 668                 | 724                             | 0.8               | 0.8             | 4.464     | A                             |
| 3   | 405                   | 101                     | 768                       | 569               | 0.712 | 405                 | 179                             | 2.3               | 2.4             | 21.825    | C                             |
| 4   | 803                   | 201                     | 432                       | 1541              | 0.521 | 803                 | 741                             | 1.1               | 1.1             | 4.878     | A                             |

### 09:00 - 09:15

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 246                   | 62                      | 577                       | 894               | 0.275 | 247                 | 439                             | 0.6               | 0.4             | 5.569     | A                             |
| 2   | 546                   | 136                     | 229                       | 1508              | 0.362 | 547                 | 595                             | 0.8               | 0.6             | 3.746     | A                             |
| 3   | 331                   | 83                      | 629                       | 643               | 0.515 | 336                 | 147                             | 2.4               | 1.1             | 11.929    | B                             |
| 4   | 655                   | 164                     | 358                       | 1593              | 0.411 | 657                 | 608                             | 1.1               | 0.7             | 3.852     | A                             |

### 09:15 - 09:30

| Arm | Total Demand (PCU/hr) | Junction Arrivals (PCU) | Circulating flow (PCU/hr) | Capacity (PCU/hr) | RFC   | Throughput (PCU/hr) | Throughput (exit side) (PCU/hr) | Start queue (PCU) | End queue (PCU) | Delay (s) | Unsignalised level of service |
|-----|-----------------------|-------------------------|---------------------------|-------------------|-------|---------------------|---------------------------------|-------------------|-----------------|-----------|-------------------------------|
| 1   | 206                   | 52                      | 481                       | 939               | 0.220 | 207                 | 366                             | 0.4               | 0.3             | 4.918     | A                             |
| 2   | 457                   | 114                     | 192                       | 1533              | 0.298 | 458                 | 497                             | 0.6               | 0.4             | 3.347     | A                             |
| 3   | 277                   | 69                      | 526                       | 697               | 0.398 | 279                 | 123                             | 1.1               | 0.7             | 8.646     | A                             |
| 4   | 549                   | 137                     | 298                       | 1636              | 0.336 | 550                 | 507                             | 0.7               | 0.5             | 3.319     | A                             |



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