Powys

Cyngor Castell-nedd Port Talbot
Neath Port Talbot Council

Llywodraeth Cymru
Welsh Government

A Global Centre of Rail Excellence in Wales

Transport assessment

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1 Introduction

1.1 Background

Ove Arup and Partners (Arup) has been commissioned by the Welsh Government (WG) to prepare a Transport Assessment (TA) in support of a planning application for the development of the Global Centre of Rail Excellence (GCRE) at Onllwyn and Nant Helen Open Cast mine in the Swansea Valley, south of the Brecon Beacons National Park in Wales. The GCRE would offer world class rolling stock and infrastructure testing facilities, with additional research and development, maintenance, storage and decommissioning facilities.

The planning application will cover the following 'core facilities' that are likely to be the significant elements of the GCRE development and are listed in Table 1.

Table 1: Proposed GCRE Facilities

Core Facility	Description
Rolling Stock Test Oval	• A 6.9km test oval providing a maximum line speed of 110mph with one track and space provision for a second subject to future market demand • 25kv Overhead Line Equipment (OLE) and 3rd and 4th rail electrification • Tunnel for pressure testing • European Train Control System (ETCS) Level 1 and 2 signalling • 4-road testing maintenance shed • New connection from the Onllwyn branch line
Infrastructure Test Track	• 4.5km high tonnage infrastructure test loop • Platform and station environment
Storage and Maintenance	• Maintenance shed • Warm storage sidings with OLE • Cold storage sidings
Other Facilities	• Research, development, education and training centre including laboratories and office space • Staff facilities and overnight accommodation

Due to the length of rail infrastructure proposed being over 2km the application is subject to the Developments of National significance (Wales) Regulations 2016. This requires a full planning application to be submitted to the Planning Inspectorate (Wales) for a determination to be made on behalf of the Welsh Government.

The red line boundary of the area is shown in Figure 1 and the rail network in the surrounding Swansea Valley area is shown in Figure 2.

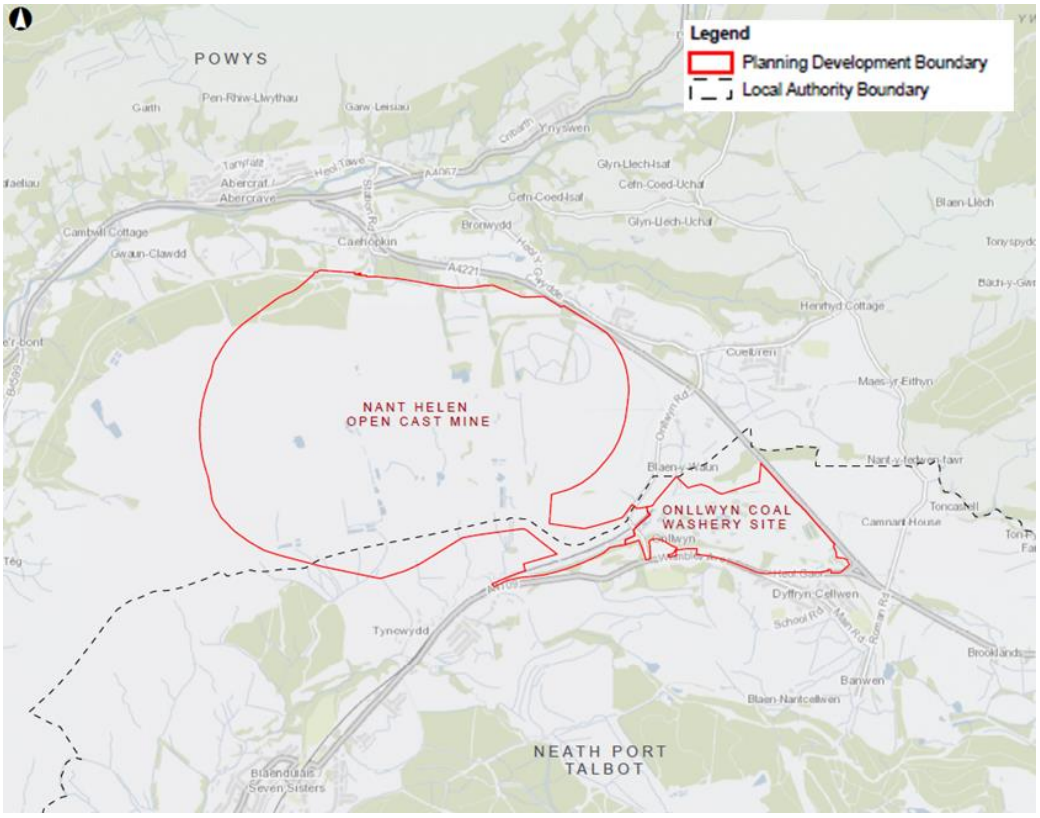


Figure 1: Redline Boundary Plan.

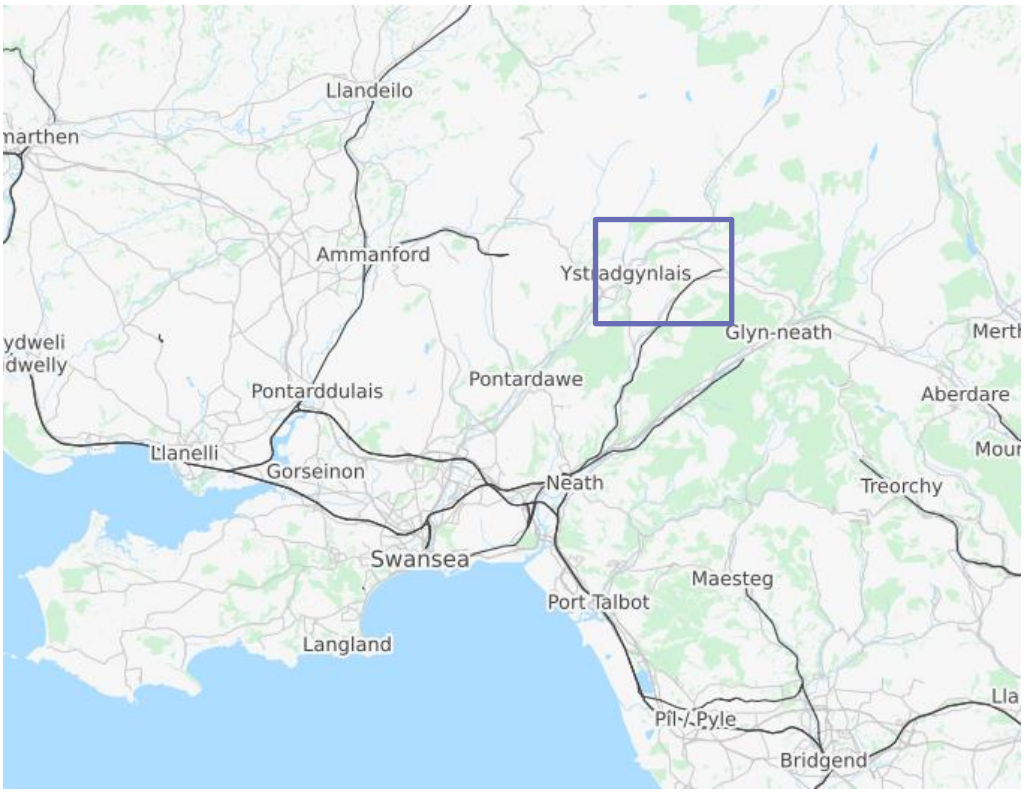


Figure 2: South Wales Railway Network with site area shown © Open Street Map

This TA is one of several documents in support of the Planning Application. The purpose of a TA is to investigate the transportation conditions for all modes,

including the available facilities/routes for pedestrians and cyclists, public transport systems and the highway network. The effects of the redevelopment of the site are then considered including quantifying additional travel demand from both the construction and operation phases of the planned facility, and the range of proposed measures required to mitigate impacts on the local transport network and cater for the increased movement to and from the development site.

Full regard has also been given to the guidance set out within Technical Advice Note 18: Transport as part of ensuring a comprehensive approach to assessment.

1.2 Current Use of the Development Site

The site currently accommodates the Onllwyn Distribution Centre a preparation and washery facility for the mining process undertaken on site. The facility was constructed in 1998 and is operated by Celtic Energy.

In August 2016 opencast mining on the site ceased and the facility was mothballed but in January 2019 opencast mining activities recommenced and it is now anticipated mining activity will continue for around two to two and a half years.

Most of the site ground level varies between 220m and 335m AOD. Large areas of the site have previously been mined and backfilled. The site's topography means that the existing mining operation is not readily visible from the nearby settlements of Onllwyn, Seven Sisters, Ystradgynlais, Caehopkin, Abercrave or Coelbren.

1.3 Report Structure

The report is structured as follows:

- Chapter 2 sets out the policy context for the development;
- Chapter 3 describes the existing conditions and characteristics of the local transport network;
- Chapter 4 describes the development proposals and transport strategy;
- Chapter 5 details the trip generation methodology, and subsequent trip rates;
- Chapter 6 outlines the Transport Implementation Strategy;
- Chapter 7 presents the assessment of the Transport Implementation Strategy for the development;
- Chapter 8 presents a Framework Travel Plan; and
- Chapter 9 presents the findings and recommendations of the report.

2 Legislation and Policy Context

This section reviews national, regional and local planning and transportation policy relevant to the proposed development.

2.1 National Policy

2.1.1 Taking Wales Forward 2016-2021

Taking Wales Forward is the current Programme for Government and sets out how the Welsh Government will deliver more and better jobs through a stronger, fairer economy, improve and reform its public services to build a united, connected and sustainable Wales.

It emphasises that the UK withdrawal from the European Union creates some uncertainty and challenges, but the Welsh Government's mandate is clear: The Welsh Government's relentless focus will be on driving improvement in the economy and public services. To create a prosperous and secure Wales, Welsh Government will support rural transport, and invest in transport to ensure that people can travel easily to jobs.

2.1.2 Well-being of Future Generation (Wales) Act (2015)

The Well-being of Future Generations 2015 Act is about improving the social, economic, environmental and cultural well-being of Wales with an overarching aim of creating a Wales we all want to live in, now and in the future. The Act puts in place seven Well-being Goals as shown in Figure 3.

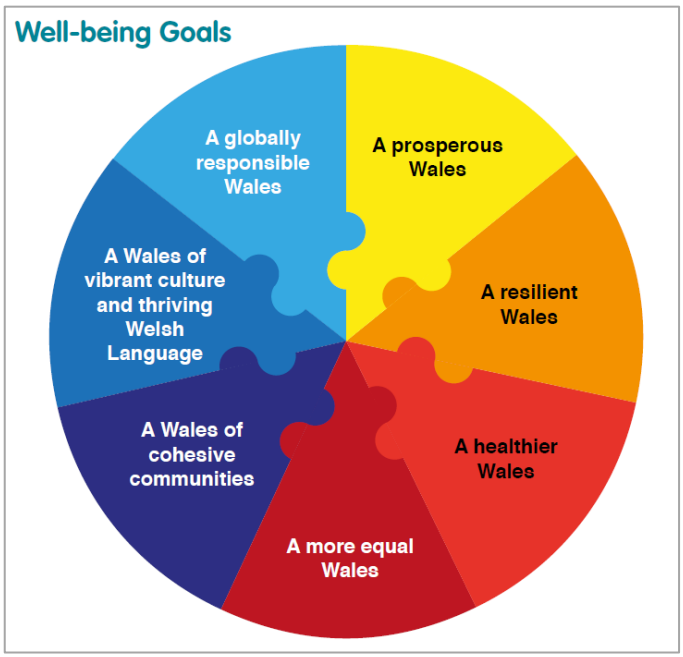


Figure 3: Well-being Goals

The 2015 Act places a duty on public bodies in Wales and those listed in the Act to work to improve the economic, social, environmental and cultural well-being of Wales. To help do this they must set and publish Well-being Objectives and think more about the long term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach.

The Act identifies the following five ways of working that public bodies must act in accordance with (the Sustainable Development Principles):

- **Long term:** The importance of balancing short-term needs with the need to safeguard the ability to also meet long-term needs;
- **Integration:** Considering how the public body's well-being objectives may impact upon each of the well-being goals, on their other objectives, or on the objectives of other public bodies;
- **Involvement:** The importance of involving people with an interest in achieving the well-being goals, and ensuring that those people reflect the diversity of the area which the body serves;
- **Collaboration:** Acting in collaboration with any other person (or different parts of the body itself) that could help the body to meet its well-being objectives; and
- **Prevention:** How acting to prevent problems occurring or getting worse may help public bodies meet their objectives.

2.1.3 Wales Transport Strategy (2008)

Published in 2008 the overarching aim of the Wales Transport Strategy is to promote sustainable transport networks that safeguard the environment whilst strengthening the country's economic and social performance. The strategy has been prepared in the context of the One Wales programme, a progressive agenda for Wales. The strategy sets out several policy outcomes, delivered through strategic priorities. These include;

- Reducing environment impacts from transport;
- Integrating local transport;
- Improving access between key settlements and sites;
- Enhancing international connectivity;
- Increasing safety and security.

Reducing environment impacts from transport

Road schemes can contribute positively to reducing environmental impacts. For example, removing congestion by increasing road capacity and making journeys more reliable by providing better overtaking opportunities can reduce CO2 emissions. In addition, bypassing settlements can remove traffic and improve air quality for existing communities.

Integrating local transport

Tackling congestion and ensuring journey reliability requires an integrated package of solutions that take account of a variety of local factors. This might include improvements to the public transport network, creation of more opportunities for walking and cycling, park and ride facilities and any future potential for road pricing.

Improving safety along transport corridors, by removing heavy traffic flows, can enhance opportunities for sustainable forms of travel, including walking and cycling. This is furthered by the Welsh Government 'Safe Routes in Communities' scheme.

Improving access between key settlements and sites

The most effective way of improving access to essential services will be to improve links within key settlements, links between key settlements and links between employment sites and their hinterland.

In rural areas, bus and car are likely to remain the main modes of transport and therefore priority should be given to improving the reliability of the road system and developing rural public transport including community transport, taxis and innovative services such as demand responsive transport.

2.1.4 Active Travel Act (2013) and Interactive Mapping

The Active Travel (Wales) Act 2013 makes it a legal requirement for Local Authorities in Wales to map and plan for suitable routes for Active Travel and to build and improve their infrastructure for walking and cycling every year. It creates new duties for highways authorities to consider the needs of walkers and cyclists and make better provision for them. It also requires both the Welsh Government and local authorities to promote walking and cycling as a mode of transport so that local communities rely less on cars when making short journeys.

In the context of transport schemes and improvements, there is significant opportunity to reconfigure existing infrastructure so that it better meets the needs of existing and new settlements and facilitates active travel. For example, bypass road schemes can address settlement severance and in doing so provide opportunities for active travel because pedestrians and cyclists would no longer need to compete with significant volumes of vehicular traffic for short journeys in the locality.

2.1.5 Planning Policy Wales Edition 10 (2018)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs). The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

Chapter 3 (Strategic and Spatial Choices) identifies five key aspects of good design, as summarised in Figure 4. It states good design is inclusive design, placing people at the heart of the design process.

It must reduce inequality of access to essential services, education and employment and design measures with design measures improving accessibility by walking, cycling and public transport.

Figure 4: Five Aspects of Good Design (PPW 10)

It is also noted that good design should avoid the creation of car-based developments by maximising opportunities for people to make sustainable and healthy travel choices for their daily journeys. To maximise accessibility by sustainable non-car modes, infrastructure proposed within the site should be integrated with existing infrastructure such as the strategic cycling network.

Chapter 4 (Active and Social Places) discusses the *well-connected cohesive communities' components of placemaking*, covering transport, housing retail and commercial development, community facilities and recreational spaces. With regards to transport, it states people should have access to jobs and services through more efficient and sustainable journeys, by walking, cycling and public transport.

It is also noted that land use and transport planning should be integrated, including:

- Within and between different types of transport;
- Between transport measures and land use planning;

- Between transport measures and policies to protect and improve the environment; and
- Between transport measures and policies for education, health, social inclusion and wealth creation.

The sustainable transport hierarchy in the policy, Figure 5, prioritises walking, cycling and public transport ahead of the private motor vehicles in order to:

- Reduce the need to travel;
- Prevent car-dependent developments in unsustainable locations; and
- Support the delivery of schemes located, designed and supported by infrastructure which prioritises access and movement by active and sustainable transport.

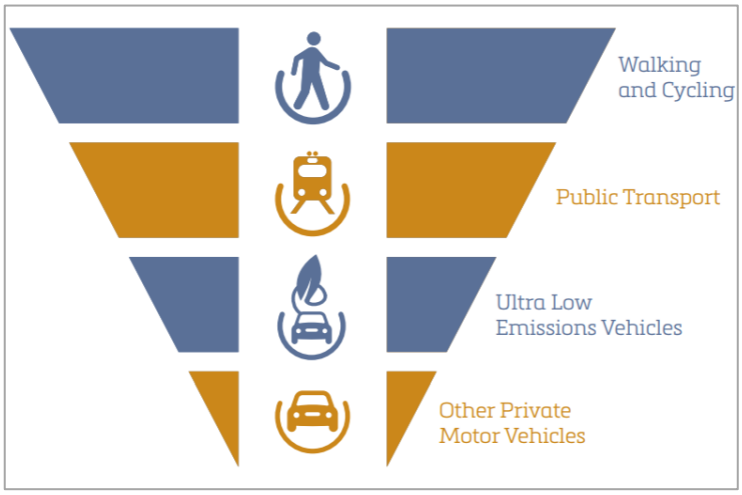


Figure 5: Sustainable Transport Hierarchy (PPW Edition 10)

To encourage the use of Ultra Low Emission Vehicles (ULEVs), PPW 10 states the planning system should support the provision of ULEV charging points as part of new developments. *Where car parking is provided for new non-residential development, planning authorities should seek a minimum of 10% of car parking spaces to have ULEV charging points*. PPW 10 also notes that is may be *appropriate for some to be 'passive', with the necessary underlying infrastructure provided to enable installation and activation in the future'.*

Chapter 5 (Productive and Enterprising Places) considers the economic theme of place-making. It states *the provision of sustainable transport infrastructure is essential in order to build prosperity, tackle climate change, reduce airborne pollution and to improve the social, economic, environmental and cultural well-being of Wales.*

Development plans should support public transport routes, including improved facilities for bus users, park & ride schemes and new railway stations. They should also identify the need for new transport interchange sites.

2.2 Technical Advice Note 18: Transport (March 2007)

The Advice Note elaborates on the relationship between land use planning and transport infrastructure by outlining a range of key principles that should be adopted in ensuring that new development can create a basis for sustainable travel patterns. These include the following:

- ensuring new development is located where there is, or will be, good access by public transport, walking and cycling, thereby minimising the need for travel and fostering social inclusion;
- managing parking provision;
- ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;
- encouraging the location of development near other related uses to encourage multi-purpose trips;
- promoting cycling and walking; and
- supporting the provision of high quality, inclusive public transport.

The advice note sets out that TAs should be secured for developments that generate significant levels of movement or are likely to have a significant effect on patterns of movement.

It is suggested that a development exceeding the land use gross floor area thresholds would trigger the need for a TA unless local planning authorities set out a different scale of development trigger point based on local sensitivities. Currently the GCRE does not fall into the land use categorised within the TAN18.

With regards to traffic impact, the traffic impacts of a development are considered to be material where any turning movement at a junction is anticipated to increase by 5% or more. However, if the capacity of the junction is near to being exceeded, a smaller material increase would normally be considered material.

2.2.1 Network Rail Welsh Route Study (March 2016)

The Network Rail Welsh Route Study examines options to build a better railway for Wales and the borders. The study sets out the strategic vision for the railway between 2019 and 2043 and assesses demand for passenger and freight services in order to identify the long-term priorities for rail. This long term planning is intended to enable economic growth, reduce carbon and the transports sector's impact on the environment, improve the quality of life for communities and individuals, and improve the affordability and value of money of the railway.

The study identifies key corridors and highlights expected increases in passenger and freight flows. The Freight Market Study identifies freight service requirements and includes consideration of the Onllwyn Branch which is currently

a freight only line. The study forecasts that freight paths along the Onllwyn Branch could increase to 1-6 trains per day in 2043 as illustrated in Figure 6 an extract from the Route Study.

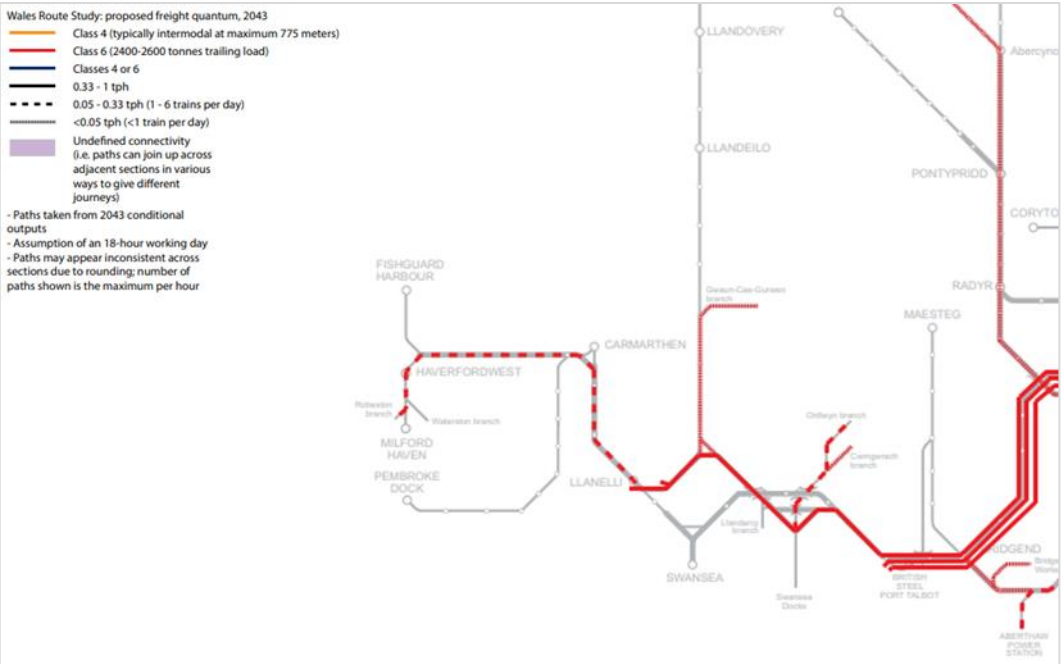


Figure 6: Welsh Route Study forecasted freight paths in 2043 (Source: Network Rail Welsh Route Study, 2016)

The South Wales Main Line (SWML) from Swansea to the Severn Tunnel is the primary freight route in Wales. This section of line is double tracked throughout, with freight passing loops. The SWML accommodates a limited mix of long-distance high speed, regional and local passenger services alongside freight trains. The line serves a number of stations of varying sizes, with more notable stations including Bridgend (which provides links to the Vale of Glamorgan line, and Maesteg branch line), Port Talbot Parkway and Neath. Peak passenger demand into Swansea from the east is forecast to be close to capacity by 2043. However additional services identified in the 2043 Indicative Train Service Specification (ITSS) will accommodate the increased demand.

The ITSS is a list of possible or proposed train services including characteristics such as origin, destination and routeing. This is further illustrated in Figure 7. Although the ITSS does not directly include the Onllwyn branch as it is not a passenger service, the increase in demand of passenger services along the South Wales Main line will affect the remaining rail capacity for movements to the GCRE site.

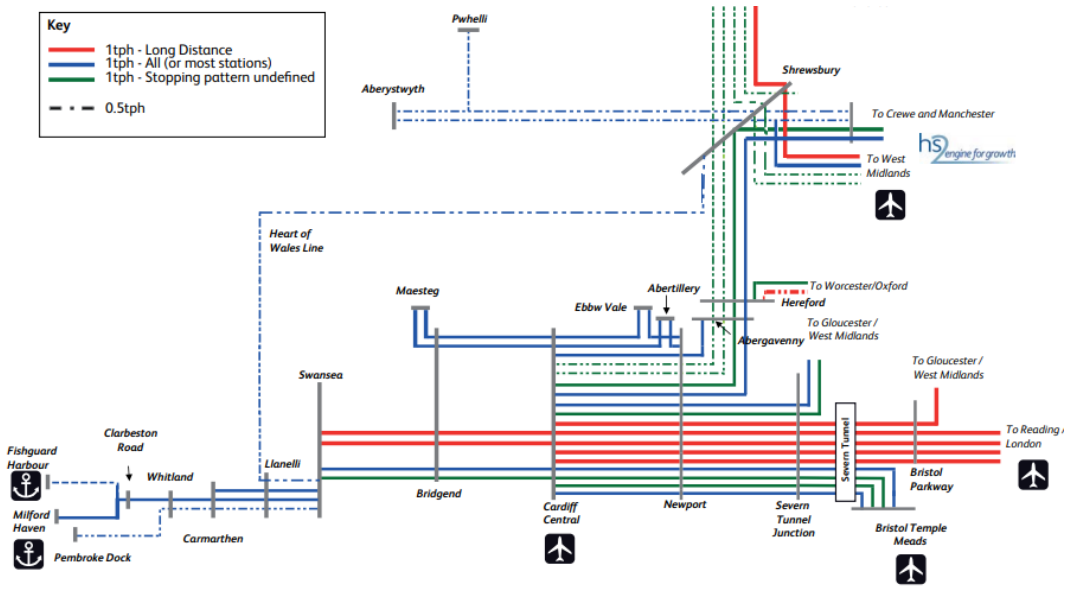


Figure 7: The indicative Train Service Specification (ITSS) for 2043 - Wales Route (excluding the Valley lines)

2.3 Regional Policy

2.3.1 Joint transport plan for South West Wales (2015-2020)

The joint Transport Plan for South West Wales (JTP) is between four local authorities comprising of Carmarthenshire, Neath Port Talbot, Swansea and Pembroke. The Plan influences transport policy in the region for the period 2015-2020 and beyond.

The vision of the JTP is to improve transport and access within and beyond the region to facilitate economic regeneration, reduce deprivation and support the development and use of more sustainable and healthier mode of transport.

The majority of proposals set out in the document are located within Swansea and Neath Port Talbot town centres and do not directly impact or affect the GCRE site.

2.4 Local Policy

The site location lies in both the Neath Port Talbot, and Powys boundary and therefore, both local authority policies will be taken into consideration.

2.4.1 Neath Port Talbot Local Development Plan 2011-2026, (Adopted 2016)

The Local Development Plan (LDP) guides future development in the Neath Port Talbot area providing a clear vision setting out where, when and how much new development can take place between 2011-2026. The overarching policies relate to matters considered to be of primary importance for the whole of the County Borough.

Strategic Policy SP20 Transport Network states that '*transport systems and infrastructure will be developed in safe, efficient and sustainable manner through the following measures:*

1. *Implementing key transport projects and supporting schemes identified in the JTP;*
2. *Promoting connectivity and access to public transport through improving bus and rail facilities;*
3. *Supporting enhancements to the walking and cycling network;*
4. *Promoting park and share schemes along key highway routes;*
5. *Promoting efficient use and links to the transport network through the identification of a road hierarchy;*
6. *Restricting development which would have an unacceptable impact on highway safety;*
7. *Requiring development proposals to be designed to provide safe and efficient access and promote sustainable transport*
8. *Requiring appropriate parking provisions;*
9. *Facilitating movement of freight by means other than road.'*

Policy TR2 Design and Access of New Development state that to permit development proposals the following criteria should be satisfied where relevant:

10. *'The development does not compromise the safe, effective and efficient use of the highway network and does not have an adverse impact on the highway safety or create unacceptable levels of traffic generation;*
11. *Appropriate levels of parking and cycling facilities are provided and the access arrangements for the site allow for the safe manoeuvring of any service vehicles associated with the planning use;*
12. *The development is accessible by a range of travel means, including public transport and safe cycle and pedestrian routes;*
13. *Transport Assessments and Travel Plans are provided for developments that are likely to create significant traffic generation.'*

2.4.2 Neath Port Talbot Local Development Plan 2011-2026, Parking Standards, Supplementary Planning Guidance (Adopted 2016)

This supplementary planning guidance (SPG) sets out guidance on the provision of car and cycle parking within Neath Port Talbot including standards for different land uses. This guidance will be used in determine the adequacy and design of proposed car and cycle parking arrangements for GCRE.

2.4.3 Powys County Council Local Development Plan 2011-2026 (Adopted 2018)

This Local Development Plan (LDP) sets out the Council's vision, objectives, policies and proposals for the sustainable development and use of land in Powys for the period 2011-2026.

The Planning Policy T1 Travel, Traffic and Transport Infrastructure states that transport in development proposals should incorporate the following principal requirement:

1. Safe and efficient flow of traffic for all transport users, including more *vulnerable users, and especially those making 'Active Travel' journeys by walking and cycling;*
2. *Manage any impacts to the network and the local environment to acceptable levels and mitigate and adverse impacts; and*
3. *Minimise demand for travel by private transport and encourage, promote and improve sustainable forms of travel including Active Travel opportunities in all areas*

Transport infrastructure improvements that support sustainable growth, maximise the efficiency and safety of the transport systems, improve public and private transport integration and encourage passenger and freight rail operations will be supported.

Policy T2 Safeguarding of disused transport infrastructure prevents the developments proposal from restricting future reuse for transport purposes.

2.4.4 Powys County Council Local Development Plan 2011-2026, Supplementary Planning Guidance (Adopted 2018)

The SPG states that '*all developments are expected to meet highway standards to ensure safe and efficient transport network. Developments should in particular promote pedestrian and cycle friendly access. Schemes that generate significant amounts of traffic or travel may be required to demonstrate sustainability through satisfactory travel plans and/or transport assessments.*

Enhancement and improvements to provide new or upgrade existing transport infrastructure (including Public Right of Way (PROW), pedestrian and cycling facilities and Active Travel routes and related facilities) may be sought through planning obligations.'

The type of planning obligation is assessed on the developments individual merits and there are no set thresholds. Developments may be subject to planning obligations where there is a requirement to mitigate the identified development impacts in respect to transport or traffic requirements

2.5 Summary

The chapter has set out the policy context against which this TA should be considered. Key policy documents have been found to be relevant to the proposed development are likely to influence the way people access the site in future. The main points and relevance are:

- The site must plan for successful transport by public transport, walking and cycling and prioritise design for these modes over the needs of the private car.
- The development should lead to an improvement in accessibility to key facilities.
- The development should consider the rail movements to the site with the potential increased frequency of the Onllwyn freight line anticipated for 2043, to reduce the need for future highway deliveries.
- The development should encourage the use of ULEVs and the provision of charging points.
- The development should accord with the Neath Port Talbot and Powys County Council SPG for car and cycle parking.
- The TA should consider measures required for all modes to minimise and mitigate the effects of development.

3 Transport Evaluation

3.1 Introduction

Nant Helen is in the Swansea Valley, south of the Brecon Beacons National Park. It is bordered to the north and west by woodlands and to the south by marshy grasslands and farmland. The site currently comprises an opencast coal mine and two previously restored mines.

The sites regional context is shown in Figure 8

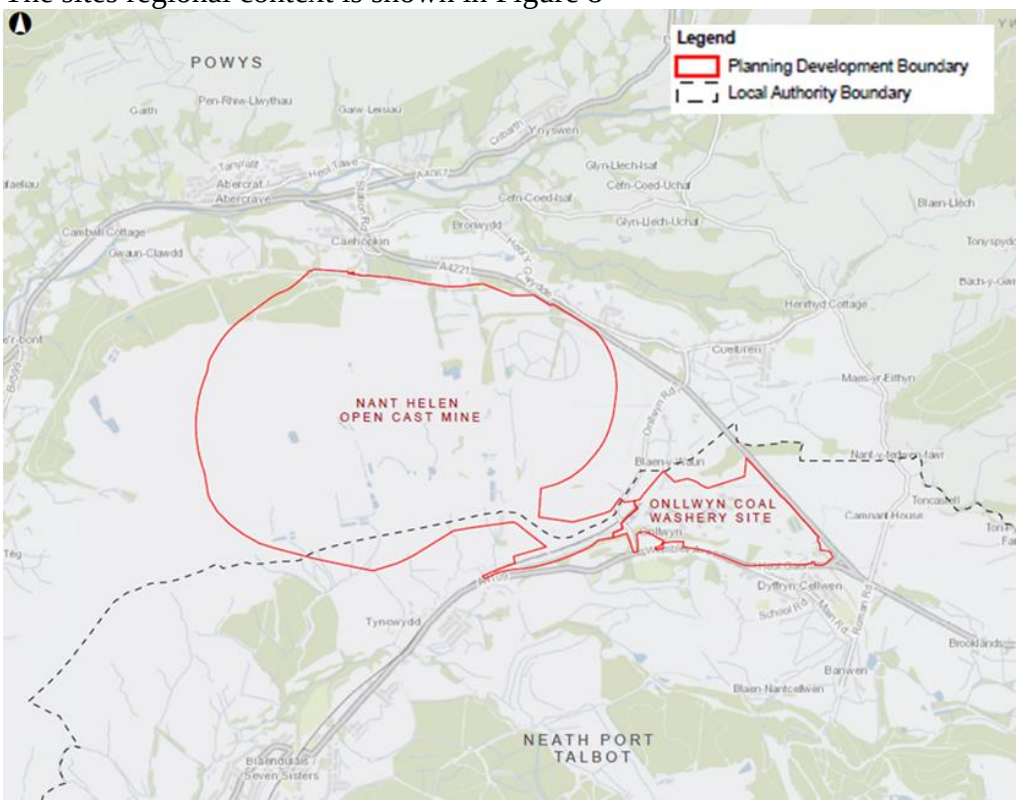


Figure 9 and the planning application site boundary is shown on shown in Figure 9. For the purposes of this TA, the elements of the GCRE are referred to as ‘the project’.

Figure 8: Regional Context

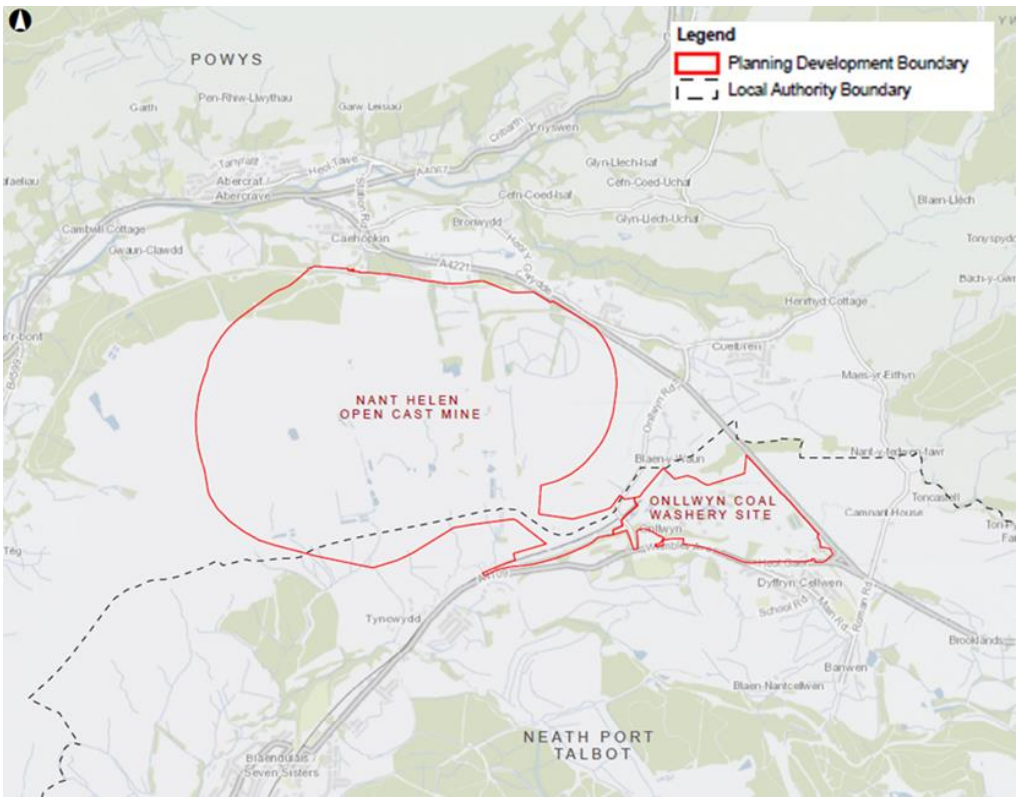


Figure 9: Site Boundary

The study area for the TA is proposed to encompass all highways, walking and cycling routes that surround the site. The study area includes following junctions and the links between them:

- A4109/Heol Gaer and Main Road priority junction;
- A4109/unnamed off-slip;
- A4109/Onllwyn Road priority junction;
- A4109/B4242 priority junction;
- A4109 and A4465 junction; and
- A4067 and A4221 priority junction.

These junctions are illustrated in Figure 16 of section 3.5.2.

3.2 Active Travel

3.2.1 Walking

From the A4109/Onllwyn Road junction a continuous footway (part of the highway) is present adjacent to the eastern side of carriageway of the A4019 southbound towards Severn Sisters. Footways are also adjacent to both carriageways to the north of the A4109/Onllwyn Road junction towards Banwen.

At the priority T junction with Main Road and A4109, approximately 750m northeast from A4109/Onllwyn Rd junction, the footway continues on the eastern side of the carriageway into Banwen and on the western side of the carriageway towards the A4221 which terminates at the A4109/ Heol Gaer overbridge.

There are several Public Rights of Way (PRoW) which pass through the site. These PRoW's link east to west connecting several villages including Penrhos and Onllwyn onto Banwen and north to south between Caehopkin and Severn Sisters. The PROW through and near the proposed site are shown in Figure 10.

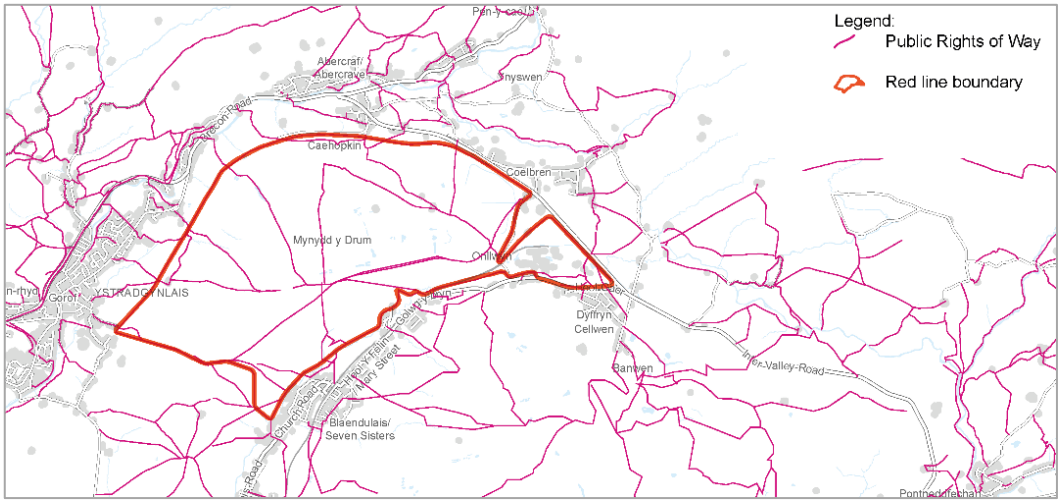


Figure 10: Public Right of Way (PRoW)

3.2.2 Cycling

National Cycle Network (NCN) 43 connects the site to Swansea via a mix of on carriageway and traffic free cycle route. The route runs along the north and western boundary of the study area and through Ystalyfera, Cilmaengwyn, Pontardawe, Clydach and along the River Tawe through Swansea where it connects with NCN 4, as illustrated in Figure 11.

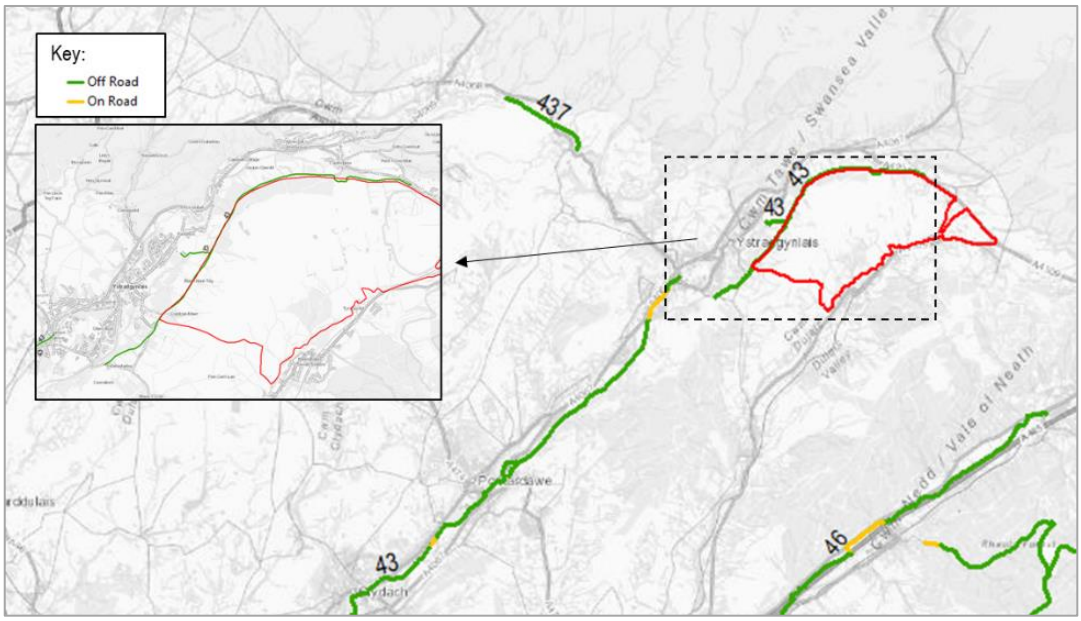


Figure 11: National Cycle Network (NCN)

3.3 Public Transport

3.3.1 Bus

There are two bus stops known as Coelbren Turn on either side of A4019 at the Onllwyn Rd T junction located within 400m of the existing washery southern site access from Onllwyn Road. Each bus stop includes a waiting shelter but there is no timetable information present.

Four bus services serve these bus stops as illustrated in Figure 12 and are detailed in Table 2. Figure 12 shows the services provide access to Crynant, Seven Sisters, Neath and Swansea that stop at the Coelbren Turn and other services that do not serve the site directly.

There are currently no buses providing an east-west cross valley route operating within vicinity of Onllwyn Road Junction.

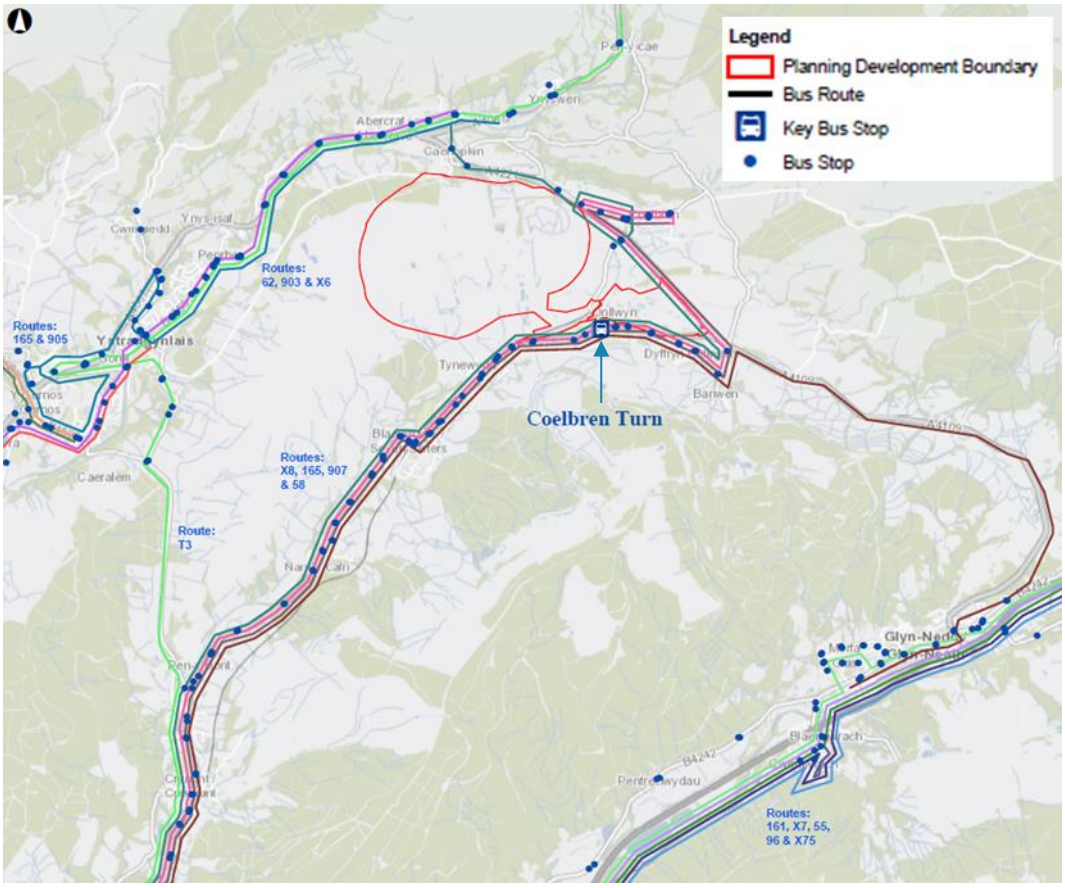


Figure 12: Bus services and bus stop locations

Table 2: Bus services calling at bus stops located close to development site

Operator	Service	Destination	Buses per hour service frequency (service period)	
			Weekday	Saturday
NAT	58	Swansea | Banwen	1 (10:43 - 15:03)	1 (10:43 - 15:03)
First Group	907	Coelbren | Neath via Seven Sisters, Crynant, Nath College	Two daily one way services (07:43 and 17:19)	None
First Group	X8	Swansea | Banwen via Neath	1 (06:44 - 19:24)	1 (06:44-19:24)
DANSA	165	Min yr Awel | Crynant	One daily (17:13)	None

3.3.2 Rail

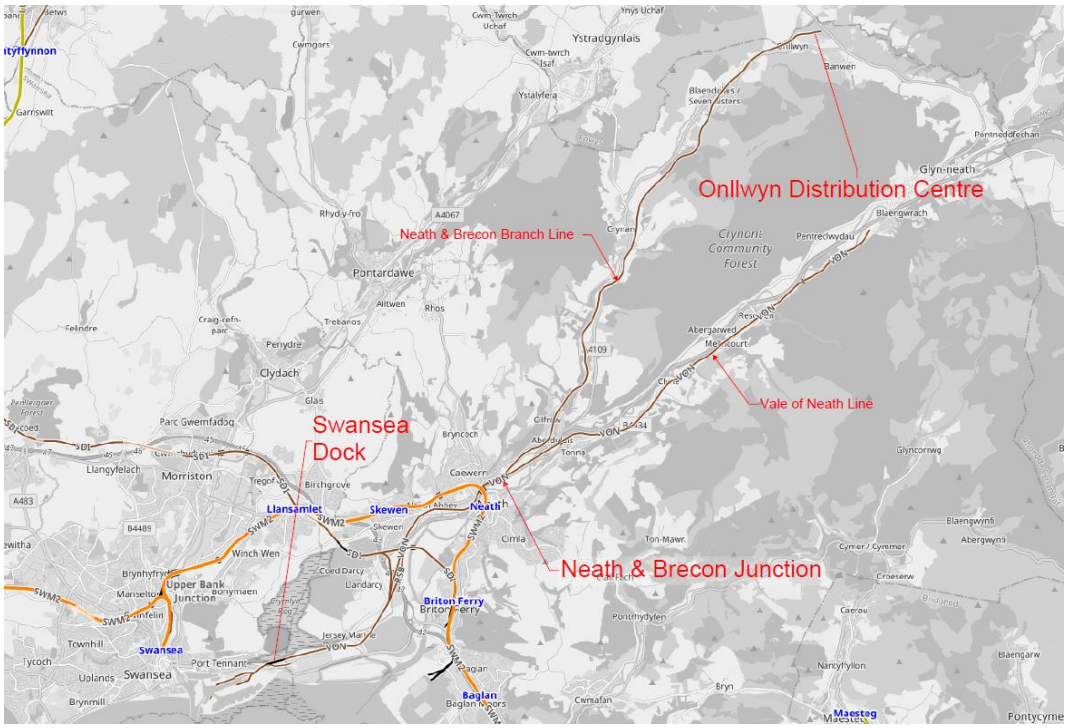


Figure 13: Railway Network

The Neath and Brecon branch line connecting to the Onllwyn Distribution Centre remains open to freight trains with access via Neath and Brecon Junction, there are no passenger services. Trains accessing the branch line are currently required to travel to Swansea docks and shunt to the Neath and Brecon Junction or travel to Swansea Burrows sidings to turn around.

The single-line branch line route operates using a physical token-block signalling system up-chainage from Neath & Brecon Junction.

3.4 Local Highway Network

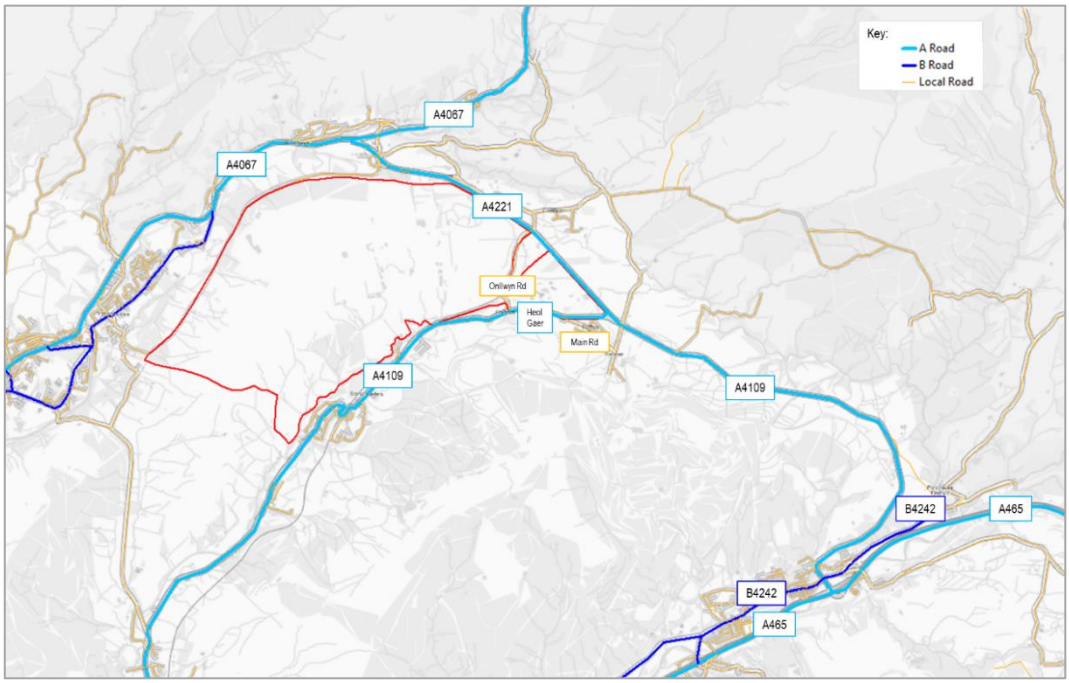


Figure 14: Highway Network

The north of the site is bounded by the A4221 with a posted speed limit of 40mph. To the west, the A4221 joins the A4067 at a priority junction near Caehopkin. The A4067 runs roughly parallel to western site boundary separated by woodland and connects south to Swansea and the M4 at Junction 45, and north to the Brecon Beacons.

The A4221 continues east of the site meeting the A4109 to the north of Banwen, with a posted speed limit of 30mph. From this point the A4109 to the southeast passes the primary site access at Onllwyn Road and 15km to the south connects to the A465 at Tonna providing an onward route to Junction 43 of the M4. The A4109 is crossed by a rail link with an underbridge vehicle height limit of 4.6m north of the Onllwyn Road junction. Onllwyn Road has a 7.5 tonne weight restriction north of the washery site access and several minor junctions connecting to private entries.

To the southwest of the junction at Banwen the A4109 connects to the A465 at Glyneath from where the A465 provides an onward route to destinations towards Merthyr Tydfil.

3.4.1 Road Traffic Collision

Basic records of Personal Injury Accidents (PIA) that occurred in the study area between 2014 and 2018 (the most recent five-year period which data is available) have been obtained from DfT road safety data (STATS19), as compiled by Crashmap.

The term ‘Accident’ is defined by the Department for Transport (DfT) as: *‘personal injury occurring on the public highway (including footways) in which at*

least one road vehicle or a vehicle in collision with a pedestrian is involved and which becomes known to the police within 30 days of its occurrence. The vehicle need not be moving and accidents involving stationary vehicles and pedestrians, or users are included. One accident may give rise to several casualties. "Damage only" accidents are not included in this publication'.

A 'Slight Accident' is defined as: '*one in which at least one person is slightly injured but no person is killed or seriously injured*', a 'Serious Accident' is defined as: '*one in which at least one person is seriously injured but no person (other than a confirmed suicide) is kille*d', and a Fatal Accident is defined as *"an accident in which at least one person is killed'.*

Accidents that have occurred during the 2014 to 2018 period are listed in Table 3, and shown in Figure 15. Most accidents that have been of a slight severity along the various A roads. Three serious accidents and two fatal accidents have occurred along the A4109.

There is no evidence to suggest that the highway design, traffic conditions, or capacity were the main cause of the accidents.

Table 3: Personal Injury Accidents within the study area 2014-2018

Incident Severity	Number of Incidents	Location
Slight	7	A4221 and A4067 Junction
Slight	4	Various points along the A4221
Slight	1	Heol Gaer and A4221/A4109 T Junction
Slight	8	Along the A4109
Slight	2	Along A465 slip road westbound
Slight	1	Along A465 off slip road to A4109
Slight	2	A4109 in Onllwyn residential area
Serious	3	Along the A4109
Fatal	1	Along the A4109, near proximity to private farm junction
Fatal	1	Along the A4109

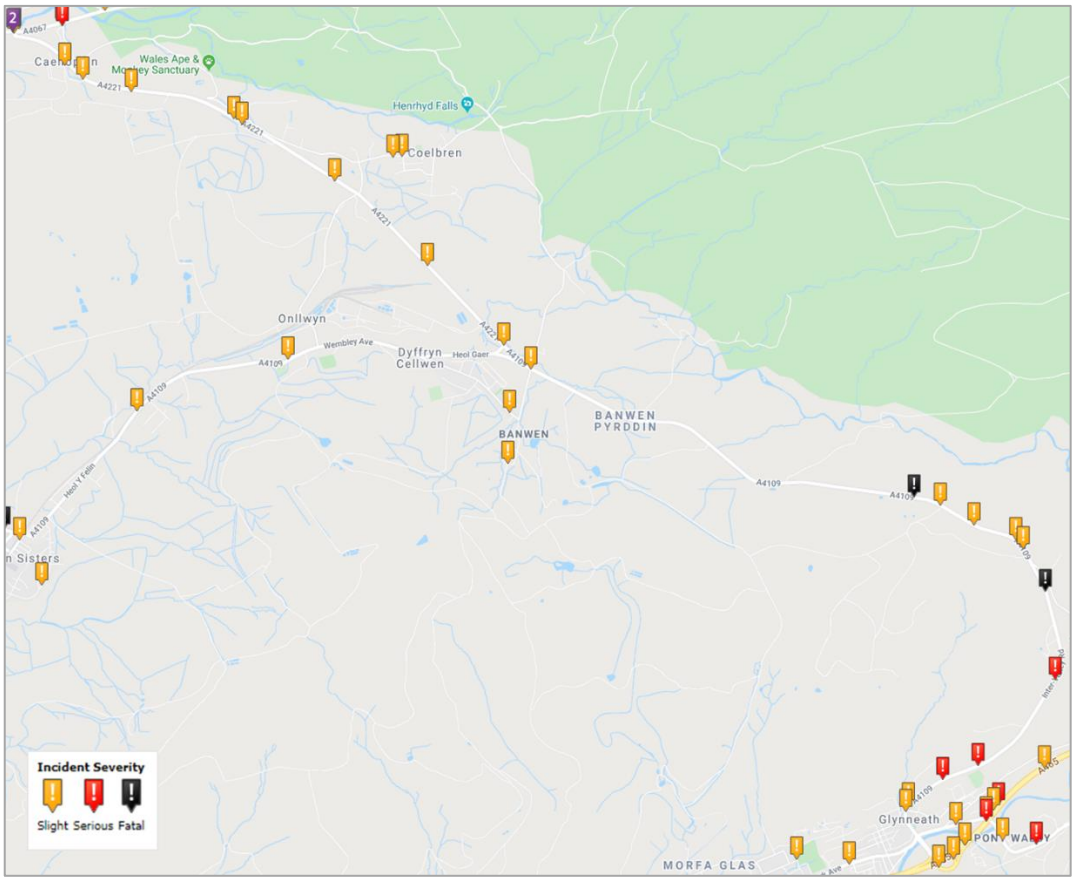


Figure 15: Traffic accident locations 2014-2018 ©Crashmap

3.4.2 Traffic Surveys

To understand the pattern of existing traffic movements on the network, traffic surveys were carried out on Tuesday 7th January 2020. The type and location of counts were agreed in advance with NPTCBC and are illustrated in Figure 16.

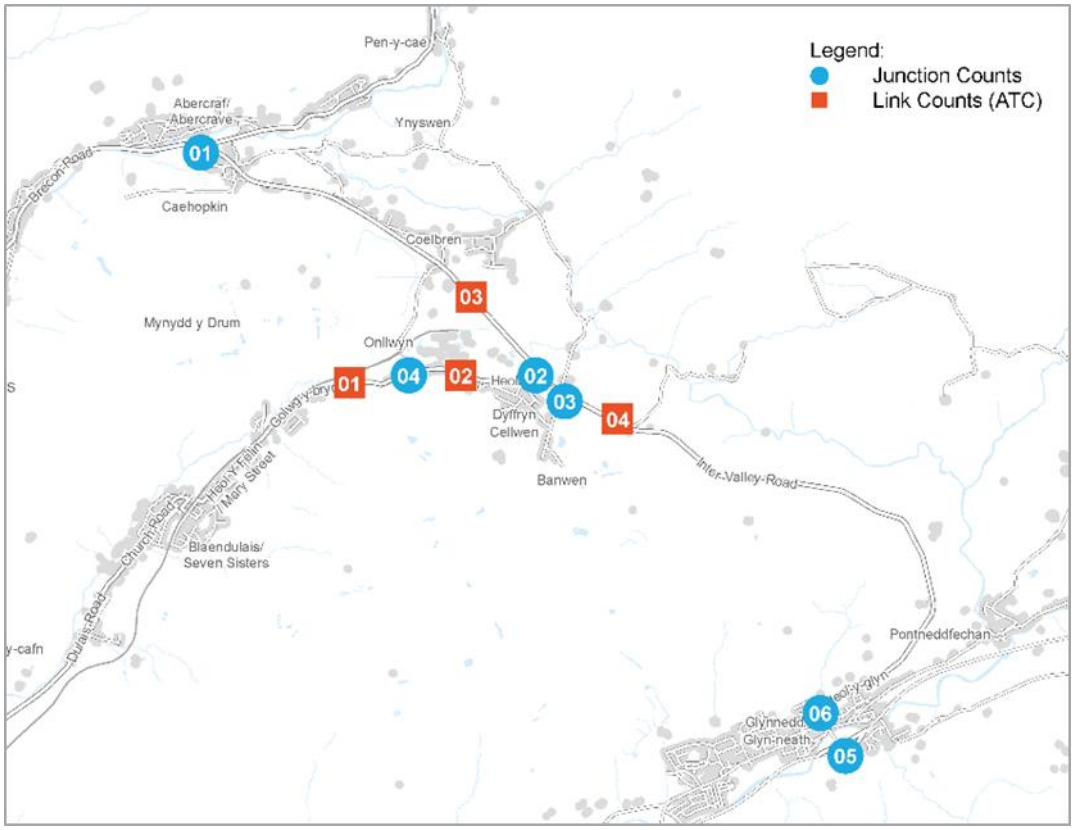


Figure 16: Traffic Count Survey Locations

Automatic Traffic Count (ATC) were carried out over a 24-hour period at the following locations:

- ATC 1: A4109, west of Onllwyn Road;
- ATC 2: A4109 Main Road, west of Heol Bryn Seion;
- ATC 2: A4221, south of Onllwyn Road; and
- ATC 3: A4109 Inter-Valley Road, east of Roman Road.

Junction Turning Counts (JTC) and Queue Length surveys were also carried out for the time period 07:00-19:00 on at the following locations:

- JTC 1: A4067 and A4221 priority-controlled T-Junction;
- JTC 2: A4221 and CPL South Wales Coal priority-controlled T-Junction;
- JTC 3: A4221 and A4109/Heol Gaer priority-controlled T-Junction;
- JTC 4: Onllwyn Road and A4109 priority-controlled T-Junction;
- JTC 5: A4109 and A465 priority-controlled T-Junction; and
- JTC 6: A4109 and B4242 signalised junction.

Surveyed traffic flows for the identified AM (08:00-09:00) and PM (15:00-16:00) peak hours as well as 24-hour AADT are illustrated spatially within Figures A1-A4 of Appendix A. Corresponding figures showing the percentage HGVs are presented as Figures A5-A6. A high proportion of HGV movements were

recorded which might be anticipated as a result of the extant land use in the study area.

3.4.3 Traffic Flow Seasonality

WebTAG[1] sets out neutral months most likely to be representative of daily traffic. The timescales associated with data processing and preparation of this TA have dictated the need to complete traffic surveys within a non-neutral month. To adjust for this a seasonality factor has been applied to correct the assumed traffic volumes.

The adjustment factor is presented in Table 4, and is based on a comparison of ATC data collected on the A4221 during the survey period, and a permanent count site on the A4221 in a similar location[2].

Table 4: Traffic Count Seasonality Adjustment Factor

Count Source	**Two-Way Traffic Flow**
ATC 3 (January 2020 GCRE Survey)	3,366 (A)
DfT Count Site (2018)	4,039 (B)
2018 - 2020 TEMPro Regional Growth Factor	1.0237 (C)
DfT Count Site (Growthed to 2020): B×C	4,135 (D)
Seasonality Factor (to factor January counts to neutral month)	**(D/A) = 1.23**

The calculation indicated that the traffic network flows during the January surveys were 23% lower than the Annual Average Daily Flow. This seasonality factor has been used to uplift base and future traffic flows to account for this seasonality difference.

[1] WebTAG Unit M1.2 Data Sources and Surveys, para. 3.3.6
[2] DfT Road Traffic Statistics, Site number: 74082

4 Development Proposals

4.1 Masterplan

The proposed site for the scheme includes rolling stock and infrastructure testing facilities and storage facilities, which will consist of the components outlined in Table 5.

Table 5: Proposed GCRE Facilities

Core Facility	Description
Rolling Stock Test Oval	• A 6.9km test oval providing a maximum line speed of 110mph with one track and space provision for a second subject to future market demand • 25kv Overhead Line Equipment (OLE) and 3rd and 4th rail electrification • Tunnel for pressure testing • European Train Control System (ETCS) Level 1 and 2 signalling • 4-road testing maintenance shed • New connection from the Onllwyn branch line
Infrastructure Test Track	• 4.5km high tonnage infrastructure test loop • Platform and station environment
Storage and Maintenance	• Maintenance shed • Warm storage sidings with OLE • Cold storage sidings
Other Facilities	• Research, development, education and training centre including laboratories and office space • Staff facilities and overnight accommodation

Figure 17 illustrates the preliminary location of the proposed layout and a further detailed drawing can be found in Appendix B. Both the illustration and detailed drawing should be treated as an indicative as elements of the Masterplan are subject to change.

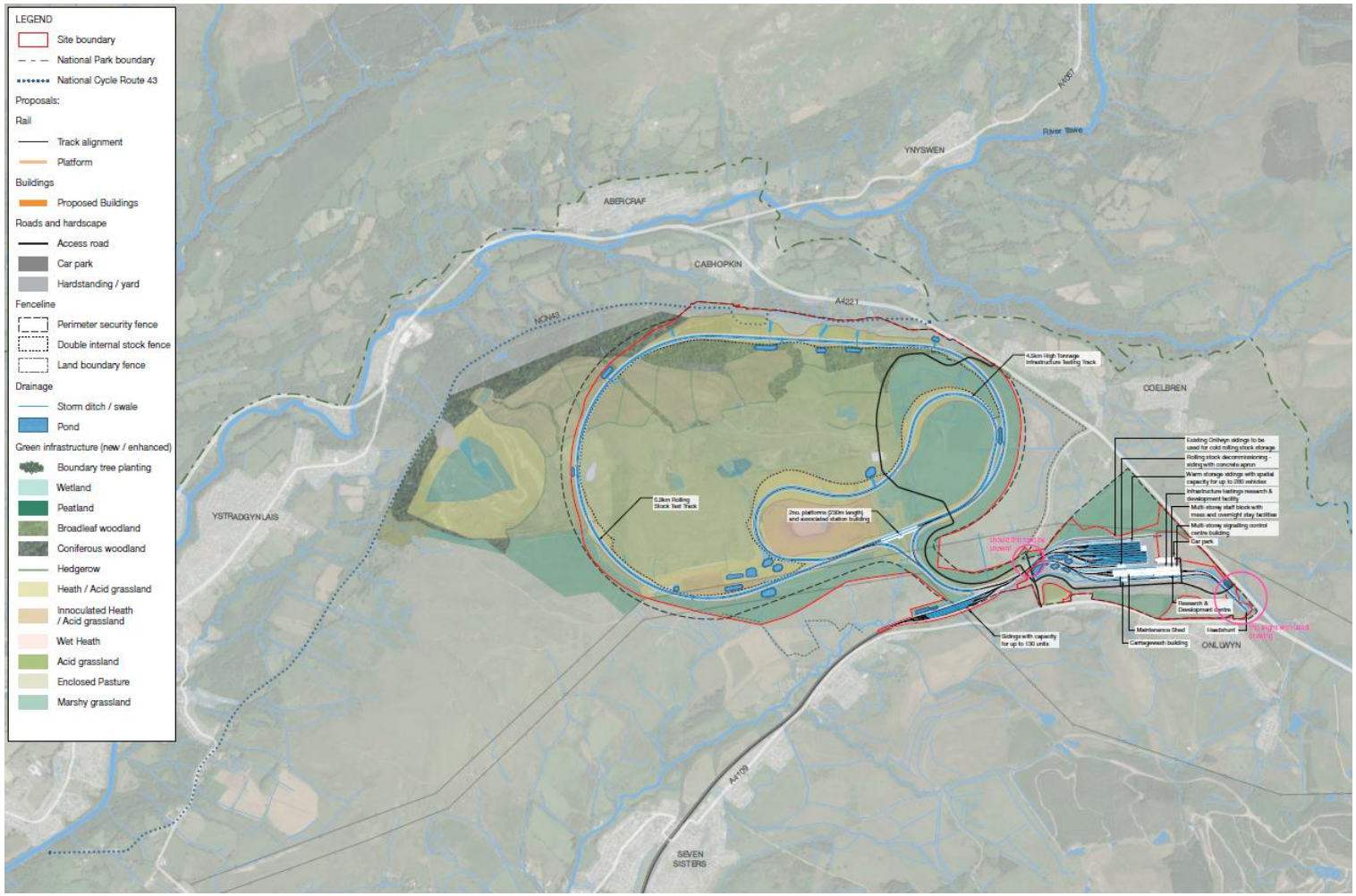


Figure 17: Proposed site layout (preliminary)

4.1.1 Site Access

It is proposed to provide access from the external highway network at three locations:

- The existing junction of the A4109 Wembley Avenue with Onllwyn Road;
- The existing A4221 Celtic Energy – Nant Helen access road; and
- The existing A4221 Washery and Distribution centre access (HGVs only).

The three access points are shown in Figure 18.

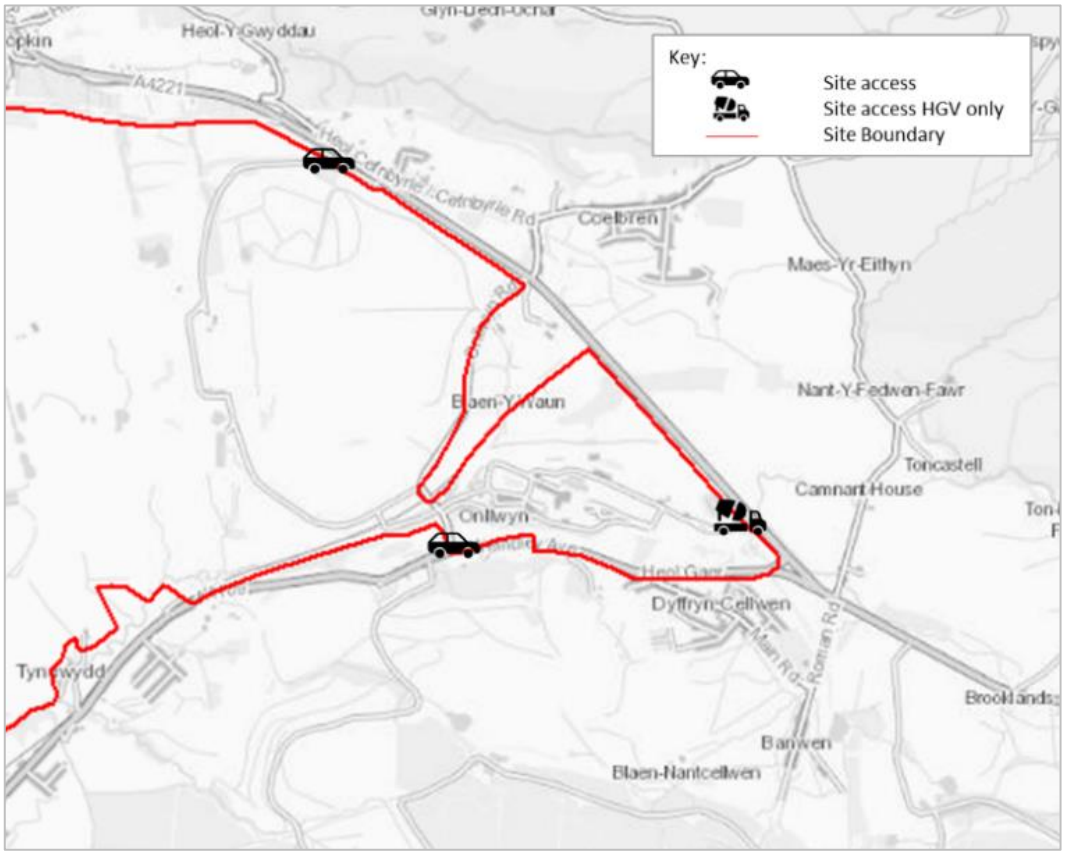


Figure 18: Proposed Site Access (Preliminary)

4.2 Committed Development

Scoping with NPTCBC and PCC has been carried out and there are no committed developments within the study area to be considered.

4.3 Phasing

The GCRE site is a major development and a range of options for development phasing have been considered. It is envisaged that development will take place over three main phases:

- *Phase One*: The opening of a 4.5km test loop, largely for testing infrastructure and some stabling facilities, in 2023.
- *Phase Two*: The addition of a 6.9km test loop primarily for testing passenger rolling stock, in 2024.
- *Phase Three:* The addition of expanded stabling facilities and research facilities in 2025.

The development of subsequent phases will depend on the success of earlier phases, availability of funding and commercial decisions. As a result several development options comprising of the three phases have been considered:

- Option A: Develop Phase 1 only;
- Option B: Develop Phase 1 and 2 only; and
- Option C: Develop Phase 1, 2 and 3.

It is assumed that during each development phase, all construction staff travel to/from site each day during peak hours with an average vehicle occupancy of two construction staff per vehicle. All delivery vehicles are assumed to be HGVs, 50% of which will arrive/depart from site within the peak hour.

Phase Three would generate the highest volume of daily construction traffic movements for a construction scenario. As a result, this has been used to represent a worst-case construction scenario in relation to additional traffic movements.

Development Option C would generate the highest volume of daily operational traffic for a development scenario. As a result, this has been used to represent a worst-case operational scenario in relation to additional traffic movements.

5 Future Travel Demand

5.1 Introduction

This chapter presents a forecast of the future travel demand expected to be generated by the proposed development during the construction and operational stages of the development. These form the basis for understanding how demand will be distributed across the transport networks. Vehicular trip forecasts will also enable the impact of the proposed development to be quantified at each of the junctions to be assessed.

5.2 Key Methodology Assumptions

The methodology for projecting travel demand has been the subject of scoping dialogue with NPTCBC to determine and agree overarching assumptions. Given the outline nature of the planning application, and potential for change to the proposed masterplan at subsequent planning stages, a robust approach has been taken in forecasting development related vehicular trips to determine a worst-case scenario for junction assessment. The key assumptions include:

- AM and PM peak hours correspond with surrounding highway network peak hours of 08:00-09:00 and 15:00-16:00 respectively;
- Deliveries of construction materials will be primarily undertaken by road, with typical rail infrastructure delivered by train;
- Staff mode share and distribution calculated by reference to 2011 Census Travel to Work Data for the Neath Port Talbot 002 MSOA. An upper estimate of 118 operational staff has been used;
- Extant trips associated with the Celtic Energy site have been removed from the network based on closure of this facility;
- No committed development sites within the study area;
- Seasonality factor of +23% applied to observed January 2020 traffic counts to account for difference in traffic flows during January survey period; and
- Traffic flows for with and without development scenarios calculated for the following future year scenarios using TEMPro traffic growth factors:
    - 2020 Base Year;
    - 2024 Construction Phase;
    - 2026 Opening Year; and
    - 2031 Future Year Assessment.

5.3 Construction

5.3.1 Construction Phasing, Workforce and Deliveries

Vehicular trips associated with staff and delivery of construction materials have been estimated for each of the three construction phases outlined in section 4. A breakdown of estimated delivery and staffing requirements for each construction element is provided in Appendix C and summarised in Table 6. Assumptions on translating overall staff and delivery estimates into daily trip generation is discussed further in Section 5.3.2.

Table 6: Summary of construction workforce and associated deliveries

Phase	Construction Element	Workforce (Personnel)	One-way Vehicle Deliveries	One-way Train Deliveries
Phase 1	Earthworks (for Track)	10	0	0
	Power	15	15	0
	Staff Facilities	10	10	0
	Train Storage	48	39	12
	High Tonnage Infrastructure Test Loop	60	51	10
	Signalling	6	8	0
	Infrastructure, Access Roads and Rail Crossings	6	8	0
	Miscellaneous	35	3093	0
Phase 2	Earthworks (for proposed trackwork)	10	0	0
	Power	5	6	0
	Rolling Stock and Infrastructure Testing	60	276	0
	Large Railroad Test Loop	133	358	27
	Carriage Wash Facility	5	7	0
	Central Control Centre	6	7	0
	Staff Facilities	5	8	0
	Additional Track - Testing Facilities	20	14	2
	Train Storage	46	37	11
	Access Roads and Rail Crossings	47	21	0
Phase 3	Earthworks (for proposed trackwork)	10	0	0
	Switches and Crossings Upgrades	5	6	0
	Additional Infrastructure	16	38	0
	Rolling Stock Decommissioning	6	21	0
	Train Storage	55	431	12

Deliveries to the site are likely to be made via a mix of road and rail vehicle movements. Whilst the exact split of deliveries is not known at this stage, a logical approach has been taken to generate assumptions around the split of vehicles. It has been assumed that equipment associated with the track works (formation, ballast, sleepers, rails, clips etc.) and other rail infrastructure

(overhead line equipment, switches and crossings etc.) will primarily be delivered by rail. This is commonplace for typical rail maintenance and upgrade works, and as such wider infrastructure and storage is in place to make such deliveries to the site possible via the existing rail freight network.

As noted in Table 6, around 22 deliveries by rail are estimated in Phase 1 of construction, with a further 40 trains estimated in Phase 2 and 12 trains in Phase 2. Delivery trains are likely to vary in length, depending on the quantity and timings of construction materials required. The frequency of deliveries by rail is estimated to be much lower than by road, and each train will be scheduled according to the operational capacity of the branch line, thus a maximum of one rail vehicle delivery per day

There may be opportunities for the appointed contractor(s) to explore the potential for the delivery of other construction materials for buildings and civils works to also be delivered by rail, but for the purposes of generating a worst-case scenario for of highway junction capacity assessment, it is assumed that these construction materials will be delivered by road. Phase 2 has been used to assess construction trips, as it represents the construction phase with the greatest number of construction workforce required and highest number of construction vehicle deliveries.

5.3.2 Construction Vehicle Trip Generation

Translating overall staff and delivery estimates into daily trip generation requires several assumptions. Conservative assumptions have been used to ensure that construction traffic is not underestimated and so it is considered the assessment represents a worst-case scenario in traffic terms. The relevant assumptions are summarised as follows:

- Phase 2 of construction used for assessment as this is likely to generate highest construction related traffic;
- Peaks for arrivals and departures to the site correspond with the existing AM and PM network peak hours;
- All phase 2 construction elements take place at the same time, and 50% of deliveries arrive and depart within each of the AM and PM peak hours;
- Rather than averaging the number of daily deliveries across the whole construction phase, the frequency of delivery vehicles has been condensed over a quarter of the construction element duration – i.e. four times more intense than averaging deliveries over the full construction period. This accounts for more intense peaks in delivery of materials, such as the delivery of materials at the start of the construction element;
- The vast majority (80%) of construction staff travel to site each day in the AM peak hour and leave in the PM peak hour with an average occupancy of 3.0 persons per vehicle;
- all delivery vehicles are OGV2 for purposes of PCU conversion.

The resultant vehicular trips associated with Phase 2 of construction are presented in Table 7.

Table 7: Phase 2 Daily Construction Vehicle Trip Generation

Time Period	Construction Staff		Deliveries (PCUs)	
	Arrivals	Departures	Arrivals	Departures
AM Peak Hour (08:00-09:00)	95	0	76	76
PM Peak Hour (15:00-16:00)	0	95	76	76

5.4 Operation

5.4.1 Assessment of Employment Potential

An assessment of the employment potential of GCRE has been made within the Outline Business Case (OBC) for the proposed development. This considers the direct on-site employment that the various options could support.

For the purposes of the vehicular trip generation, the upper estimate of 118 staff has been used which represents a robust worst-case assessment of the impact of the facility on surrounding transport networks.

Table 8: OBC On-site Operational Staff Estimation

Staff Category	Staff Estimate		
	Option A	Option B	Option C
Support Staff	29	29	29
R&D/Technical Staff	32	72	89
Total	**61**	**101**	**118**

5.4.2 Mode Share

The mode split breakdown for the site has been derived through reference to 2011 Census Travel to Work Data for the Neath Port Talbot 002 Mid-layer Super Output Area (MSOA), consistent with the distribution calculations discussed in Section 5.5. The existing Celtic Energy Site is located within this MSOA and will ensure that the mode split is representative of existing travel patterns in the immediate local area to best represent future mode share at GCRE.

Modal split data for the Neath Port Talbot 013 MSOA is presented in Table 9, along with the likely number of employees by mode, based on a total of 118 staff.

Table 9: Existing Mode Split - Neath Port Talbot 002 MSOA

Travel Mode	Existing Mode Share	GCRE Person Trips
Driving a car or van	80.1%	95
Passenger in a car or van	8.1%	10
On foot	5.7%	7
Bus, minibus or coach	3.7%	4
Bicycle	0.8%	1
Motorcycle, scooter or moped	0.8%	1
Train	0.6%	1
Taxi	0.2%	0
Total	**100.0%**	**118**

5.4.3 Operational Vehicle Trip Generation

Whilst the private vehicular mode share is likely to be around 20% lower based on the mode share analysis above, for the purposes of junction assessment it is assumed that all staff trips will be made by car, representing a worst-case for junction assessment.

The operational phase of the development will also generate delivery vehicle trips on an ad-hoc basis, such as the delivery of rolling stock vehicles for testing. Whilst it is not possible to quantify these deliveries in detail at this stage of the project, a high-level assumption of 30 HGV delivery vehicles per day is assumed, with 10 arrivals and 10 departures during each of the AM and PM peak hours. HGVs are converted to Passenger Car Units (PCUs) using a factor of 2.3. Again, this represents a robust worst-case assessment of the impact of the facility on surrounding transport networks. If deemed necessary, an update of the assessment can be provided once an end operator is in place.

Table 10 presents a summary of the worst-case vehicular trip generation during the GCRE operational phase.

Table 10: Operational Vehicular Trip Generation

Operational	Staff		Deliveries (PCUs)	
	Arrivals	Departures	Arrivals	Departures
AM	106	12	23	23
PM	12	106	23	23
AADT	118	118	69	69

5.5 Trip Distribution and Assignment

In order to inform the highway capacity assessment, the additional vehicle trips generated by the proposed development need to be distributed onto the local highway network in a manner which is likely to represent the movement patterns from the site. The distribution and assignment of staff and deliveries have been assessed separately, as discussed in the following sections.

5.5.1 Delivery Vehicle Trip Distribution and Assignment

The distribution of delivery vehicles during the construction phase has been estimated based on the likely geographical spread of construction materials. During the operational phase of the development, it is assumed that delivery vehicles will primarily be routed via the M4 and A465. The delivery vehicle distributions are summarised in Table 11 and illustrated spatially in Figures A9-A10 in Appendix A.

Table 11: Construction and Operational Delivery Trip Distribution and Assignment Summary

	Route	Construction	Operation
1	Via A4109 South to/from Seven Sisters/Neath	20%	-
2	Via A4067 South to/from Ystradgynlais	-	-
3	Via A4067 North to/from Mid-Wales	10%	-
4	Via B4242 North to/from Pontneddfechan/Rhigos	-	-
5	Via B4242 South to/from Glynneath	-	-
6	Via A465 North to/from Heads of the Valleys/A470	30%	-
7	Via A465 South to/from Neath/Swansea and M4	40%	100%

5.5.2 Staff Vehicle Trip Distribution and Assignment

Assumptions on the distribution of construction and operational staff have been determined through reference to 2011 origin/destination census data from the *WU03EW Location of usual residence and place of work by method of travel to work* census category, with place of work set to Neath Port Talbot 002 MSOA.

The assignment of development traffic has been determined by examination of the highway network. This exercise has been undertaken by attributing each set of trips to the destination via the most likely route. Where several feasible routes could be used, the development trips have been split accordingly. The staff vehicle distribution calculations are summarised in Table 12 and illustrated spatially in Figure A9 in Appendix A.

Table 12: Staff Vehicle Trip Distribution and Assignment Summary

	Route	Percentage
1	Via A4109 South to/from Seven Sisters/Neath	62%
2	Via A4067 South to/from Ystradgynlais	5%
3	Via A4067 North to/from Mid-Wales	20%
4	Via B4242 North to/from Pontneddfechan/Rhigos	1%
5	Via B4242 South to/from Glynneath	5%
6	Via A465 North to/from Heads of the Valleys/A470	7%
7	Via A465 South to/from Neath/Swansea and M4	0%

5.6 Background Traffic Growth

In order to generate traffic flows for the future assessment years of 2024, 2026 and 2031, background traffic growth factors have been derived from the DfT' s Trip End Model Presentation Program (TEMPro) version 7.2b.

The geographical area has been set at the Neath Port Talbot local authority area. Origin/Destination growth rates for Car Driver trips have been obtained for the AM and PM peak hours and the adjusted local growth figure for NPTCBC has been calculated. The resultant traffic growth factors are presented in Table 13.

Table 13: TEMPro Future Year 2024, 2026 and 2031 Traffic Growth Factors

Base Year	Future Year	AM	PM	AADT
2020	2024	1.0329	1.0325	1.0349
2020	2026	1.0490	1.0485	1.0518
2020	2031	1.0877	1.0879	1.0932

5.7 Committed Development

It has been agreed with NPTCBC that there are no committed development sites within the study area to be included within the assessment.

Extant trips associated with the Celtic Energy site (i.e. those entering/exiting via the Washeries site access) which is due to close have been removed from the network based on the existing turning proportions at each junction. These trips are shown in Figures A12-A15 in Appendix A.

5.8 Development Trips

Resultant development trips for the construction phase are illustrated spatially in Appendix A Figures A16-A21.

Resultant development trips for the operational phase are illustrated spatially in Appendix A Figures A22-A27.

5.9 2020 Base Year Traffic Flows

The network traffic flows for the 2024 future year scenarios have been derived by applying the seasonality factor set out in Table 13 to the 2020 traffic count data. The resultant 2020 base year traffic flows are shown in Figures A28-A31 in Appendix A. The seasonality factor is included within all future year scenarios.

5.10 2024 Construction Year Traffic Flows

The network traffic flows for the 2024 future year scenarios have been derived by applying the growth factors set out in Table 13 to the 2020 traffic count data. The resultant 2024 traffic flows with and without construction trips are shown in Figures A36-A39 in Appendix A.

5.11 2026 Opening Year Traffic Flows

The network traffic flows for the 2026 future year scenarios have been calculated by applying the growth factors set out in Table 13 to the 2020 traffic count data. The resultant 2026 traffic flows for with and without operational trips are shown in Figures A44-A47 in Appendix A.

5.12 2031 Future Year Traffic Flows

The network traffic flows for the 2031 future year scenarios have been calculated by applying the growth factors set out in Table 13 to the 2020 traffic count data. The resultant 2031 traffic flows for with and without operational trips are shown in Figures A52-A55 in Appendix A.

6 Transport Implementation Strategy

6.1 Introduction

In accordance with TAN 18, this chapter is intended to draw together the elements of a Transport Implementation Strategy as part of demonstrating how the development will contribute to overarching policy objectives.

The policy context in Chapter 2 highlighted the importance of sustainability in national, regional and local policy guidance. The GCRE site should therefore be aligned with policy in order to maximise the benefits for the area.

6.2 Objectives

This TA has described the development and resulting trip generation. These proposals are relevant to a range of overarching objectives, ranging from the day-to-day efficiency of the development to broader planning and transport aspirations to encourage more sustainable travel patterns. The Transport Implementation Strategy is therefore underpinned by the following over-arching objectives:

Objective 1	Provision and management of infrastructure to minimise disruption during construction and support operation of the proposed development.
Objective 2	To enable walking, cycling and public transport trips to GCRE where feasible, given the rural location of the proposed development.
Objective 3	To facilitate continued safe access along PRoWs.
Objective 4	To ensure level crossing facilities along the existing rail line are of a suitable standard to provide safe crossings.

6.3 Measures of Mitigation

This section sets out the mitigation measures that will be implemented for each mode of transport.

The transport related measures proposed in relation to the GCRE are:

- integration of the existing walking and cycling links within the proposed Masterplan;
- provision of pedestrian access points and internal traffic-free routes contributing to a high-quality public realm;
- provision of cycle parking spaces around the site and at a level that meets both Neath Port Talbot County Council and Powys County Council SPG guidance;

- provision of improved bus stops providing direct access to the site, and potential to improve bus frequency to make bus travel an option to the site;
- development and high-quality passenger facilities; and
- a travel plan to provide employees sustainable options of travel.

6.3.1 Construction: Active Travel

Walking

All PROWs will be protected from all construction activity and potential conflict will be minimised. Alternative walking routes will be provided with appropriate signage and crossings where necessary to ensure safe accessibility. The provision of facilities for pedestrians should be specified within the Construction Traffic Management Plan (CTMP) to minimise disruption during construction of the GCRE and enable safe walking within and surrounding the development.

Cycling

The NCN 43 runs along the western perimeter of the site boundary and therefore should not conflict with any construction work. Traffic management will be in place to further ensure the free running if the cycle route.

Temporary cycle storage facilities should be provided for construction workers who live within cycling distance. The provision of facilities for cyclists should be specified within the CTMP to encourage active travel accessibility to/from the development.

6.3.2 Operational: Active Travel

Walking

There are a mix of footpaths and bridleways within and surrounding the site. These PROW do not currently conform to the active travel infrastructure standards given the terrain and topography that they cross. The development will not affect existing PROWs which will be clearly signed and will provide safe pedestrian infrastructure if there is conflict between the PROWs and the proposed development/rail alignment.

Pedestrian access to the site will be provided from Onllwyn Road by provision of a surfaced footway and the requirement for an improved crossing at the Wembley Avenue priority T junction will be reviewed.

The provision of facilities for pedestrians should be specified within the Travel Plan to promote Active Travel to/from the GCRE.

Cycling

The development will connect with the existing NCN 43 and the local network of cycling routes to enable better cycling accessibility. A direct shared pedestrian/cycle route from Ystradgynlais to Onllwyn should be provided, making use of the existing PROWs within the site area, and be designed to Welsh Government Active Travel design standards. Safe pedestrian/cycling

infrastructure will be provided if there is conflict between the proposed rail alignment.

The site will provide cycle parking at all points of pedestrian access excluding the existing A4221 Washery and Distribution centre access which will be used by HGVs only. The number of cycle stands should be determined by NPTCBC parking standard guidance as a minimum which is included in Table 14. Cycle parking will include covered shelters, appropriate lighting and CCTV to cater for long and short stay parking requirements. Staff lockers, changing, and showering facilities will be provided as part of the project.

The provision of facilities for cyclists should be specified within the Travel Plan to encourage active travel to/from the GCRE.

6.3.3 Construction: Public Transport

Bus

GCRE should collaborate where possible with existing bus operators, NPTCBC and PCC to provide a service that benefits construction workers in key neighbouring towns if existing services do not satisfy demand to encourage use of public transport.

The provision of bus services for construction workers should be explored in more detail and specified within the CTMP. The CTMP will co-ordinate with the existing bus service timetable to minimise disruption during construction of the GCRE, and the existing bus operations.

6.3.4 Operational: Public Transport

Bus

Access to the site by bus will remain at the existing Coelbren Turn bus stop located on the T-junction of Onllwyn Road and Wembley Avenue/A4109.

The existing bus waiting facilities which consist of a shelter will be improved to provide a timetable board, bus flag, and real time information for improved waiting facilities for users. Other infrastructure may also include a bus border kerb and a bus layby to improve bus boarding/alighting facilities and encourage use of public transport.

GCRE will collaborate with existing bus operators and NPTCBC to provide a service that benefits employers in key neighbouring towns if existing services do not satisfy demand. This will be detailed within the Travel Plan that will also specify the provision of facilities for bus users to enable better public transport accessibility to/from the GCRE.

Rail

Although not part of this project, future consideration should be given to opening the rail line to passenger services if a suitable business case could be identified.

6.3.5 Construction: Vehicular Access

Primary vehicular access to site will remain the same as that described in section 4.1.1 for the construction period. The A4221 Washery and Distribution centre access will be used by HGV only. The provision of wayfinding signage should be specified within the CTMP and aim to minimise conflict with other users and delivery disruptions during the construction of the GCRE project.

6.3.6 Operational: Vehicular Access

Primary vehicular access to the site will remain the same as that described in section 4.1.1 for operation of GCRE. The A4221 Washery and Distribution centre access will be used by HGVs only. The provision of facilities to include clear way finding signage should be specified within the Travel Plan to support the operation of the proposed development given its semi-rural location and distance from the main strategic motorway network.

6.3.7 Construction: Car Parking

During construction of the development, a temporary car park and compound will be made available to support the operation of construction. This will be detailed in the CTMP to minimise any disruption this may cause.

6.3.8 Operation: Car Parking

The development will provide a car park within the site boundary of a capacity determined by applying local parking standards to the nature and location of the development. NPTCBC Parking Standards use a designated zone derived from the six zones set out in the Wales Parking Standards 2014. Each zone has differing designated levels of parking for development management purposes. Looking at the current washery site, the designated zone is *Zone 5 – Countryside.* A countryside area is an area *including small villages, with a few local facilities within walking distance. Motorised travel is required for most journeys, although there is some local employment.*

Car parking standards are assessed on land use of the proposed development as specified within the Town and Country Planning (use classes) Order 1987. Since GCRE will have a research and development multi storey building which is assumed to be larger than 1,000 m^2, the land use falls under *Class B1 Business: Offices.*

Table 14: Wales Parking Standards (2014) for Use Class B1 and A2 for Zone 4 to 6.

Mode	Development	Requirement
Car	Offices (>1000m^2)	1 space per 20m^2
Cycle	Short Stay	1 stand per 200 m^2
Cycle	Long Stay	1 stand per 1000 m^2

Disabled parking spaces sized to meet guidance will be positioned within 50 metres of the facility served by the car park. As the development will be a new employment premises, the recommended proportion is that a minimum of 5% of the total car park capacity should be dedicated for blue badge holders.

The level of car parking to be provided will be discussed and agreed as part of the reserved matters process.

The car park facilities will encourage the use of Ultra Low Emission Vehicles (ULEVs) by provision of a minimum of 10% of car parking spaces with charging points as encouraged by PPW Edition 10.

7 Assessment of Transport Implementation Strategy

The assessment measures of the transport impact strategy and the key objectives are set out in detail in Sections 6. The mitigation measures are taken forward for appraisal against the baseline conditions of current infrastructure for the operation of GCRE, and the baseline conditions including the additional construction traffic generated by the construction of GCRE.

A qualitative assessment using a seven-point assessment scale presented in chapter 7.1 has been used to assess the impact for public transport, active travel and car parking.

A quantitative assessment has been carried out for highways based on junction capacity using modelling software and is presented in chapter 7.2.

7.1 Public Transport, Active Travel and Car Parking

The mitigation measures for walking, cycling, bus, rail and car parking are taken forward for appraisal against the baseline conditions of current infrastructure for the operation and construction of GCRE.

The impact of measures against the objectives has been assessed according to a seven-point scale as set out in Figure 19.

Figure 19: Seven Point Assessment Scale of Transport Implementation Strategy Impact

Large Beneficial Impact	+++
Moderate Beneficial Impact	++
Slight Beneficial Impact	+
Neutral	0
Slight Adverse Impact	-
Moderate Adverse Impact	- -
Large Adverse Impact	- - -

Table 15: Assessment summary for Transport Implementation Strategy – Construction

Transport Implementation Strategy: Mitigation Measures		**Objective 1** Provision and management of infrastructure to minimise disruption during construction and support operation of the proposed development.	**Objective 2** To enable walking, cycling and public transport trips to GCRE where feasible, given the rural location of the proposed development.	**Objective 3** To facilitate continued safe access along PRoWs.	**Objective 4** To ensure level crossing facilities along the existing rail line are of a suitable standard to provide safe crossings.
Construction					
Walking	CTMP to minimise disruption during construction of the GCRE and enable safe walking within and surrounding the development.	+++	+++	+++	+++
	CTMP to ensure the safety of pedestrians at all existing level crossings and aim to minimise disruption during construction of the GCRE	+++	0	++	+++
Cycle	Temporary cycle storage facilities for construction workers	0	+++	0	0
	The provision of facilities for cyclists should be specified within the CTMP to encourage active travel accessibility to/from the development.	+++	+++	+	0
Bus	Ensure a bus service for construction workers is provided.	0	+++	0	0
	The CTMP will co-ordinate with the existing bus service timetable to minimise disruption during construction of the	+++	+++	0	0

	GCRE, and the existing bus operations.				
Temp Car Park	During construction of the development, a temporary car park will be made available on site and of suitable size as deemed necessary within the CTMP to support the operation of construction. This will be detailed in the CTMP to minimise any disruption this may cause.	+++	-	-	0

Table 16: Assessment summary for Transport Implementation Strategy - Operation

Transport Implementation Strategy: Mitigation Measures		**Objective 1** Provision and management of infrastructure to minimise disruption during construction and support operation of the proposed development.	**Objective 2** To enable walking, cycling and public transport trips to GCRE where feasible, given the rural location of the proposed development.	**Objective 3** To facilitate continued safe access along PRoWs.	**Objective 4** To ensure level crossing facilities along the existing rail line are of a suitable standard to provide safe crossings.
Operation					
Walking	Travel Plan to enforce safe pedestrian infrastructure and to promote Active Travel to/from the GCRE.	0	+++	++	0
	Integration of existing walking footpaths in Onllwyn, into the proposed masterplan.	0	+++	+++	0
	Onllwyn Road junction improvements to create safe pedestrian crossings.	0	+++	+++	0
	Provide safe pedestrian infrastructure where proposed rail alignment creates conflict with existing PROWs.	0	+++	+++	+++

	Pedestrian wayfinding signs within site.	0	++	+	0
	Footpaths to be kept separate from road and rail network within site.	0	+++	+++	0
	All public level crossing within the site, and along the existing rail alignment will be upgraded to provide a safe pedestrian crossing.	0	0	+++	+++
	Private level crossing will also be upgraded where necessary and discussed with residents and NPTCBC.	0	0	+++	+++
	All footbridges will be assessed for structural and active travel standards and upgraded where appropriate.	0	0	+++	+++
Cycle	Integration of existing NCN 43 into the proposed masterplan.	0	+	++	0
	Cycle parking at all points of pedestrian access. High quality cycle parking facilities including shelter, lighting and CCTV.	0	++	0	0
	Direct cycle route from Ystradgynlais to Onllwyn, making use of existing PROWs to be included in the masterplan.	0	++	+++	0
	Travel Plan to enforce safe cycle infrastructure.	0	+++	++	0
Bus	To update existing bus stop to include bus shelter, timetable, lighting, and real time information.	0	+++	0	0
	To improve bus boarding/alighting facilities by	0	++	0	0

	including a bus border kerb and bus layby.				
	Travel Plan to enforce bus service for employees.	0	+++	0	0
Car parking	Safe pedestrian access routes will be provided within all new car parks	0	+++	+	0
	The car park facilities will encourage the use of Ultra Low Emission Vehicles (ULEWs) and will have a minimum of 10% of car parking spaces to have ULEV charging points as encourages by PPW Edition 10	0	-	0	0
	Disabled parking spaces will be positioned within 50 metres of the facility served by the car park and which are adequate in size and number.	0	-	0	0

The appraisal assesses all mitigation measures that are identified to ensure that the GCRE aligns with TAN18, as defined in the TIS. The impact of these measures range from having a neutral to large beneficial impact against the objectives set out in the TIS, with the exception of car parking facilities which has a slight adverse impact. Although the objectives of the GCRE are to enable travel options via sustainable modes of transport, car parking facilities will need to be provided given the rural location of the site and the expectation that workforce and visitors may change over time and not all be locally based.

The number of available parking spaces should be determined by applying local parking standards to the nature of the proposed facilities within the site and ensure there is enough provision for the construction and operation purposes of the GCRE only. These should be reviewed on a regular basis as part of the GCRE Travel Plan.

7.2 Highways

Junction capacity assessment has been undertaken using forecast vehicle movements to assess the impact of the proposed development on six key junctions surrounding the site. The trip generation forecast is detailed in Chapter 5 and the six junctions are:

1. A4067 and A4221 priority junction;
2. A4221 and CPL South Wales Coal entrance priority junction;
3. A4221 and A4109/Heol Gaer junction;

4. Onllwyn Road and A4109 priority junction;
5. A4109 and B4242 signalised junction; and
6. A4109 and A465 junction.

Junction assessment was undertaken using Junctions 9 and LinSig modelling software. The software uses junction geometries and traffic volumes to calculate junction capacity including traffic queues, and delays that may be affected by the additional traffic generated by the GCRE.

Two time periods representing the weekday AM and PM peak hours assessed for seven scenarios (as set out in section 5):

A. 2020 existing situation;
B. 2024 Future traffic flow;
C. 2024 Future traffic flow with Phase Two Construction Traffic;
D. 2026 Future traffic flow;
E. 2026 Future traffic flow with Operational Development Trips;
F. 2031 Future traffic flow; and
G. 2031 Future traffic flow with Operational Development Trips.

The percentage impact from the predicted construction traffic at these junctions is summarised in Table 17 with detailed analysis presented in Appendix D and summarised in Table 18.

Despite representing a significant percentage increase in some scenarios (particularly 4) with predicted traffic growth and traffic resulting from both construction and operational movements all six junctions continue to operate within capacity and without any material queues. The predicted increase in traffic volumes has a negligible impact on the junction capacity for all scenarios assessed.

Table 17: Junction impact by traffic flow with development traffic

	Percentage Impact by Junction					
	1	2	3	4	5	6
Figure A25 - 2024 With Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00)	0%	23%	24%	38%	11%	17%
Figure A26 - 2024 With Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00)	3%	29%	22%	31%	9%	16%
Figure A27 - 2024 With Phase 2 Construction Traffic Flows, 24hr AADT	-1%	-2%	-1%	5%	0%	0%
Figure A31 - 2026 With Operational Development Trips, AM Peak Hour (08:00-09:00)	-2%	7%	10%	31%	4%	7%
Figure A32 - 2026 With Operational Development Trips, PM Peak Hour (15:00-16:00)	2%	12%	8%	25%	3%	6%
Figure A33 - 2026 With Operational Development Trips, 24hr AADT	-1%	-3%	-1%	5%	0%	0%
Figure A37 - 2031 With Operational Development Trips, AM Peak Hour (08:00-09:00)	-1%	7%	10%	29%	4%	7%
Figure A38 - 2031 With Operational Development Trips, PM Peak Hour (15:00-16:00)	2%	11%	8%	24%	3%	6%
Figure A39 - 2031 With Operational Development Trips, 24hr AADT	-1%	-3%	-1%	5%	0%	0%

Note: Trips associated with the current mining and washery operation have been removed from the forecast scenarios. As a result, some junctions indicate reduced traffic volumes (shown as negative figures) despite the addition of traffic associated with GCRE construction and/or operation.

Table 18: Summary of Junction Analysis

Scenario Name	1. A4067 and A422			2. A4221 and CPL entrance			3. A4221 and Heol Gaer			4. Onllwyn Road and A4109			5. A4109 and B4242				6. A4109 and A465		
	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	LOS	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	DoS	PRC	Queue	Delay s/pcu	RFC
Figure A19 - 2020 Base, AM Peak Hour (08:00-09:00)	0.8	10.0	0.39	0.1	10.5	0.06	0.1	6.8	A	0.10	8.06	0.07	3.9	32.9	51.5%	74.9%	0.4	8.3	0.23
Figure A20 - 2020 Base, PM Peak Hour (15:00-16:00)	0.5	8.7	0.31	0.0	13.3	0.02	0.2	7.5	A	0.10	9.13	0.11	4.4	35.5	59.9%	50.2%	0.8	10.4	0.39
Figure A22 - 2024 Base, AM Peak Hour (08:00-09:00)	0.8	10.2	0.4	0.2	10.6	0.06	0.1	6.8	A	0.10	8.11	0.08	3.9	33.2	52.2%	72.5%	0.4	8.4	0.24
Figure A23 - 2024 Base, PM Peak Hour (15:00-16:00)	0.5	8.8	0.32	0.0	13.3	0.02	0.2	7.5	A	0.10	9.41	0.12	4.5	36.0	60.8%	48.1%	0.8	10.6	0.40
Figure A25 - 2024 With Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00)	0.7	10.1	0.37	0.2	11.6	0.12	0.1	7.3	A	0.10	8.65	0.11	4.9	33.5	57.9%	55.4%	0.5	9.1	0.30
Figure A26 - 2024 With Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00)	0.5	9.2	0.32	0.3	14.8	0.15	0.3	8.1	A	0.50	11.98	0.31	5.5	41.8	66.3%	35.8%	1.0	11.7	0.45

Scenario Name	1. A4067 and A422			2. A4221 and CPL entrance			3. A4221 and Heol Gaer			4. Onllwyn Road and A4109			5. A4109 and B4242				6. A4109 and A465		
	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	LOS	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	DoS	PRC	Queue	Delay s/pcu	RFC
Figure A28 - 2026 Base, AM Peak Hour (08:00-09:00)	0.8	10.2	0.41	0.2	10.6	0.06	0.1	6.5	A	0.10	8.20	0.08	4.0	33.5	53.7%	67.7%	0.4	8.4	0.24
Figure A29 - 2026 Base, PM Peak Hour (15:00-16:00)	0.5	8.8	0.33	0.0	13.4	0.02	0.2	7.6	A	0.20	9.45	0.12	4.7	36.6	62.2%	44.7%	0.8	10.8	0.40
Figure A31 - 2026 With Operational Development Trips, AM Peak Hour (08:00-09:00)	0.7	10.1	0.38	0.2	11.2	0.08	0.2	6.9	A	0.10	8.49	0.10	4.7	33.0	56.9%	58.1%	0.5	8.9	0.28
Figure A32 - 2026 With Operational Development Trips, PM Peak Hour (15:00-16:00)	0.5	9.1	0.32	0.2	14.0	0.09	0.3	8.0	A	0.40	11.65	0.29	5.4	39.9	66.2%	36.0%	0.9	11.4	0.44
Figure A34 - 2031 Base, AM Peak Hour (08:00-09:00)	0.9	10.5	0.43	0.2	10.6	0.06	0.1	6.8	A	0.10	8.25	0.08	4.3	33.9	55.6%	61.9%	0.4	8.5	0.25
Figure A35 - 2031 Base, PM Peak Hour (15:00-16:00)	0.6	9.0	0.34	0.0	13.5	0.03	0.2	7.8	A	0.20	9.56	0.13	4.9	37.5	64.8%	38.8%	0.9	11.1	0.42

Scenario Name	1. A4067 and A422			2. A4221 and CPL entrance			3. A4221 and Heol Gaer			4. Onllwyn Road and A4109			5. A4109 and B4242				6. A4109 and A465		
	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	LOS	Queue	Delay s/pcu	RFC	Queue	Delay s/pcu	DoS	PRC	Queue	Delay s/pcu	RFC
Figure A37 - 2031 With Operational Development Trips, AM Peak Hour (08:00-09:00)	0.8	10.3	0.4	0.2	11.2	0.08	0.2	7.1	A	0.10	8.54	0.10	4.9	33.4	58.8%	53.1%	0.5	9.0	0.29
Figure A38 - 2031 With Operational Development Trips, PM Peak Hour (15:00-16:00)	0.6	9.3	0.33	0.2	14.1	0.09	0.3	8.0	A	0.40	11.80	0.30	5.5	41.3	68.0%	32.3%	1.0	11.7	0.45

8 Framework Travel Plan

8.1 Introduction

This section of the Transport Assessment sets out a Framework Travel Plan (FTP) for the proposed GCRE project. This section is intended to act as guide for the development of a full Travel Plan once an operator has been established. The purpose of a Travel Plan is to set out commitments, initiatives and monitoring to encourage modal shift towards sustainable transport through commitment to measures by setting time bounded targets.

Travel Plans should be managed as a live document which evolves with the development and in which stakeholders including the developer, management company, visitors, and importantly local authorities have a role in developing and monitoring.

This FTP has been produced in accordance with local and national planning requirements, in particular the Well-being of Future Generation (Wales Act (2015), Active Travel Act (2013) and Technical Advice Note 18: Transport (2007). All policies are outlined in Chapter 2.

A travel survey will be completed once GCRE opens. Until this survey is completed it is not possible to define the appropriate Travel Plan targets and timescales, hence the targets outlined in this FTP represent a consideration of the potential levels expected.

8.2 Benefits of Travel Plans

Travel Plans aim to benefit employers, employees, visitors, the wider community and the environment by supporting national and regional policy in the objective to provide sustainable development.

Modal shift away from the reliance on the private car would result in a reduction in road traffic accidents, congestion on the wider road network, reduced stress, healthier lifestyles, greater work productivity, environmental protection, improved access for employees/visitors/deliveries and the reduction of social exclusion through the provision of choice between modes of transport. The everyday function of the GCRE is to research, develop and test rail infrastructure and rolling stock. Therefore, this FTP will focus on the employees and visitors that could arrive by sustainable transport modes.

Benefits include:

- Health improvements from increased cycling and walking by staff working at the site;
- Improved, and better utilised, pedestrian and cycling environments from potential measures to improve access and ease for those who walk and cycle from the site;

- Cleaner air for the local community through a reduction in CO2 emissions generated by the transport to and from the site;
- Convenience from improved transport choices for all employees and visitors;
- Reduced congestion on the wider highway network beyond the assessed junctions; and
- Improved quality of life for employees: time savings, reduced stress and improved health can all lead to lifestyle improvements.

8.3 Objectives and Goals of the Travel Plan

The overall objectives of the Travel Plan for GCRE should be to achieve a situation where employees and visitors can make informed travel decisions based on comprehensive information about a range of transport modes. The Travel Plan objectives can be summarised as follows:

- To minimise the environmental impact of the travel demand generated by the development through raising travel awareness amongst employees and providing information to visitors, encouraging them to use sustainable modes of transport;
- To manage site deliveries so that conflicts with pedestrians and other vehicles can be minimised;
- Encouraging multi-occupancy car usage; and
- Maximising accessibility for walking, cycling and public transport as sustainable transport modes.

8.4 Measures

To achieve the targets, it will be necessary to implement Travel Plan measures to ensure employees and visitors to the site are informed about their travel options and encouraged to consider sustainable modes. It is not possible at this stage to fully define which measures are most appropriate for the site, as the measures need to be tailored to the needs and aspirations of future employees and visitors.

The most appropriate measures will be selected following the initial Travel Plan survey, although the following outlines some potential measures which are likely to be appropriate:

- Raising awareness of the health benefits of walking on public notice boards and by providing employees with transport information;
- Providing clear pedestrian and cycle wayfinding in and around the site;
- Ensuring that all walking routes near the site are lit and well-maintained;
- The promotion of Bike2Work days and other local/national initiatives designed to raise cycling levels;
- The provision of staff lockers, changing and clothes storage facilities to encourage staff to cycle to work;

- Advertising the benefits of public transport, such as not needing to own a car/second car;
- Advertising public transport routes on staff information boards and any visitor websites;
- The circulation of a bi-annual newsletter to all site employees via email etc., which would detail Travel (Plan) information and updates; and
- The provision of a welcome pack for each new employee in conjunction with local/green travel recruitment policy, which will detail the various travel options available to them and highlight the Travel Plan's measures and targets will be introduced at the site to encourage staff to travel by sustainable modes.

8.5 Travel Plan Coordinator

Quantitative, realistic and achievable targets should be outlined in the Framework Travel Plan and a Travel Plan Coordinator (TPC) should be appointed for the development. The TPC should develop these initial targets, which should be subject to periodic reviews and should reflect the targets set out in relevant planning policy guidance. The TPC would be responsible for:

- Implementation and day-to-day running of the Travel Plan(s), demonstrating full commitment and enthusiasm towards them;
- Undertake monitoring consistent with the agreed framework, assisted by the individual phase/building travel plan representatives (where appropriate), and ensure that the results are communicated to NPTCBC and PCC;
- Communicating the travel plan across the entire site, acting as a point of contact for staff based at the site requiring information, and updating the website as required;
- Periodically reviewing and updating the Travel Plan; and
- Organising meetings of the various working groups.

The role will be in place prior to the facility becoming operational, ensuring that sustainable travel information is available from the outset. On appointment, the travel plan coordinator will contact NPTCBC and PCC to advise that work has commenced on delivering the travel plan. Subsequent changes in contact details will be passed to NPTCBC and PCC within two weeks of any change.

8.6 Targets

To meet the overarching aim of reducing unsustainable travel to and from the GCRE, a set of targets should be developed for the occupants of the development. These targets should be derived from the trip generation information found in Section 5. It should be recognised that the targets to be effective in reducing unsustainable travel they need to be 'SMART':

- **S**pecific
- **M**easurable

- **A**chievable
- **R**ealistic
- **T**ime-bound

The TPC for the site should endeavour to develop initial targets, which would be subject to periodic reviews and should reflect the targets set out in policy guidance.

8.7 Monitoring, Reporting and Review

Monitoring of the Travel Plan will show how well it is performing in meeting the target mode shares and any other targets. Monitoring will also assist in enabling the resources used to implement the Travel Plan to be allocated against appropriate travel plan measures.

The Monitoring Framework for GCRE will include the following:

- Undertake travel questionnaire surveys for all those covered by targets, including employees and visitors;
- Visual surveys on an annual basis to assess the use of cycle parking and inform any change in provision (quantity or facilities);
- Record comments made by management and employees on the Travel Plan;
- Record uptake of funded travel plan measures; and
- Produce annual monitoring reports.

8.8 Conclusions

The site should include measures to encourage walking and cycling with the upgrading of active travel infrastructure such as pedestrian crossings surrounding the site and provision of covered cycle parking spaces, allowing for the proposed facilities to be integrated within the existing local infrastructure.

A list of measures has been identified from which a Travel Plan Coordinator for the site can develop a full Travel Plan, to be delivered within six months of occupancy/opening.

9 Summary

This Transport Assessment has considered the transport implications of the Global Centre of Rail Excellence project site, a proposed development in Onllwyn and Nant Helen located in the Swansea Valley. The development will occupy an existing preparation and washery facility and an open cast mine site.

As a result of the existing use of the site the local highway network is well placed to accommodate HGV movements and associated site traffic. Assessment of key junctions in the local highway network indicates that the junctions have sufficient spare capacity to cater for additional demand without detriment to the assessed network. This assessment has included both construction and operational scenarios. The development will include a car park for proposed research/office space to be determined in accordance with local car parking standards as part of the reserved matters planning process. Provision will be made within the car park for Ultra Low Emission Vehicles charging points.

There is a regular bus service which calls at nearby bus stops and provides north-south connectivity. There are long distance Active Travel routes at the periphery of the site and further PRoWs both within the site and across the local area.

The site is connected to the national rail network by an operational freight only railway line which is an important asset given the intended use of the site as a rail testing facility. It is also anticipated that the railway line can be used to transport rail related construction materials to the site during the construction phases. The line does not however have any passenger services but introduction of passenger services may warrant further investigation as part of a regional transport solution.

A key measure of success for the GCRE site will therefore be the integration of the development with the facilities in order to make sustainable travel attractive to the site particularly for employees based at the site.

The GCRE site will adopt a site wide Travel Plan and use this as a means of monitoring the transport conditions and encouraging sustainable transport. This Transport Assessment includes a Framework Travel Plan that can be taken forward and developed into an agreed document for the proposed development once an agreed operator is established.

The GCRE site will also be required to implement a site wide Construction Traffic Management Plan to establish protocols during construction and to be used a means of monitoring during the construction programme to ensure health and safety at the site and impacted area accords with best practice.

Appendix A

Traffic Flow Diagrams

Contents

Figure A1: Existing Traffic Flows, AM Peak Hour (08:00-09:00)

Figure A2: Existing Traffic Flows, PM Peak Hour (15:00-16:00)

Figure A3: Existing Traffic Flows, 24hr AADT

Figure A4: Existing Traffic Flows, 24hr AAWT

Figure A5: Existing Traffic Flows, AM Peak Hour (08:00-09:00), Percentage HGVs

Figure A6: Existing Traffic Flows, PM Peak Hour (15:00-16:00), Percentage HGVs

Figure A7: Existing Traffic Flows, 24hr AADT, Percentage HGVs

Figure A8: Existing Traffic Flows, 24hr AAWT, Percentage HGVs

Figure A9: Construction Delivery Vehicles Trip Distribution

Figure A10: Operational Delivery Vehicles Trip Distribution

Figure A11: Staff Trip Distribution

Figure A12: Existing Washeries Traffic Flows, AM Peak Hour (08:00-09:00)

Figure A13: Existing Washeries Traffic Flows, PM Peak Hour (15:00-16:00)

Figure A14: Existing Washeries Traffic Flows, 24hr AADT

Figure A15: Existing Washeries Traffic Flows, 12hr AAWT

Figure A16: Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00)

Figure A17: Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00)

Figure A18: Phase 2 Construction Traffic Flows, 24hr AADT

Figure A19: Phase 2 Construction Traffic Flows, 12hr AAWT

Figure A20: Phase 2 Construction Traffic Flows, 24hr AADT HGV Vehs

Figure A21: Phase 2 Construction Traffic Flows, 12hr AAWT HGV Vehs

Figure A22: Operational Phase Development Trips, AM Peak Hour (08:00-09:00)

Figure A23: Operational Phase Development Trips, PM Peak Hour (15:00-16:00)

Figure A24: Operational Phase Development Trips, 24hr AADT

Figure A25: Operational Phase Development Trips, 12hr AAWT

Figure A26: Operational Phase Development Trips, 24hr AADT HGV Vehs

Figure A27: Operational Phase Development Trips, 12hr AAWT HGV Vehs

Figure A28: 2020 Base, AM Peak Hour (08:00-09:00)

Figure A29: 2020 Base, PM Peak Hour (15:00-16:00)

Figure A30: 2020 Base, 24hr AADT

Figure A31: 2020 Base, 12hr AAWT

Figure A32: 2024 Base, AM Peak Hour (08:00-09:00)

Figure A33: 2024 Base, PM Peak Hour (15:00-16:00)

Figure A34: 2024 Base, 24hr AADT

Figure A35: 2024 Base, 12hr AAWT

Figure A36: 2024 With Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00)

Figure A37: 2024 With Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00)

Figure A38: 2024 With Phase 2 Construction Traffic Flows, 24hr AADT

Figure A39: 2024 With Phase 2 Construction Traffic Flows, 12hr AAWT

Figure A40: 2026 Base, AM Peak Hour (08:00-09:00)

Figure A41: 2026 Base, PM Peak Hour (15:00-16:00)

Figure A42: 2026 Base, 24hr AADT

Figure A43: 2026 Base, 12hr AAWT

Figure A44: 2026 With Operational Development Trips, AM Peak Hour (08:00-09:00)

Figure A45: 2026 With Operational Development Trips, PM Peak Hour (15:00-16:00)

Figure A46: 2026 With Operational Development Trips, 24hr AADT

Figure A47: 2026 With Operational Development Trips, 12hr AAWT

Figure A48: 2031 Base, AM Peak Hour (08:00-09:00)

Figure A49: 2031 Base, PM Peak Hour (15:00-16:00)

Figure A50: 2031 Base, 24hr AADT

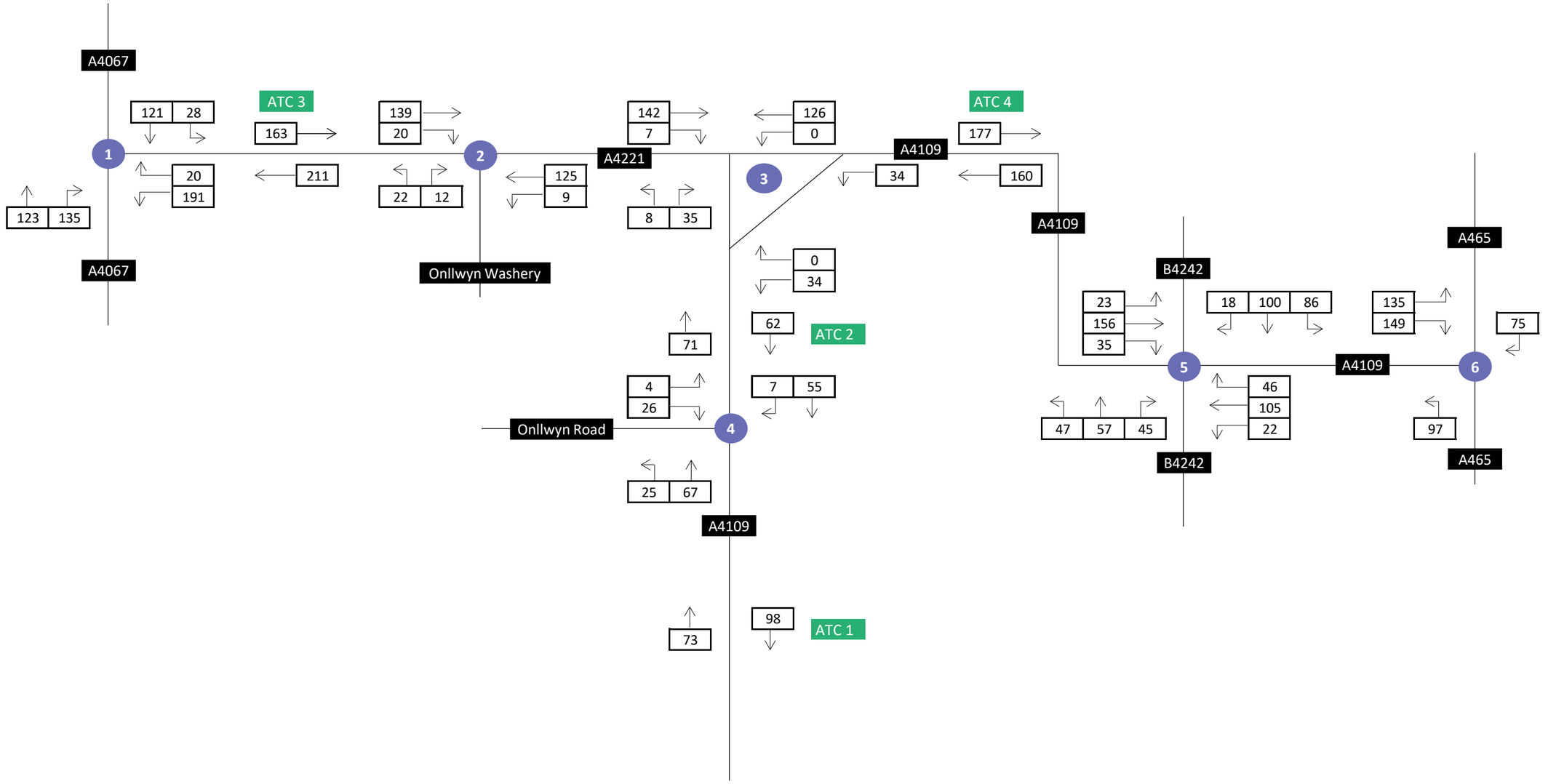
Figure A51: 2031 Base, 12hr AAWT

Figure A52: 2031 With Operational Development Trips, AM Peak Hour (08:00-09:00)

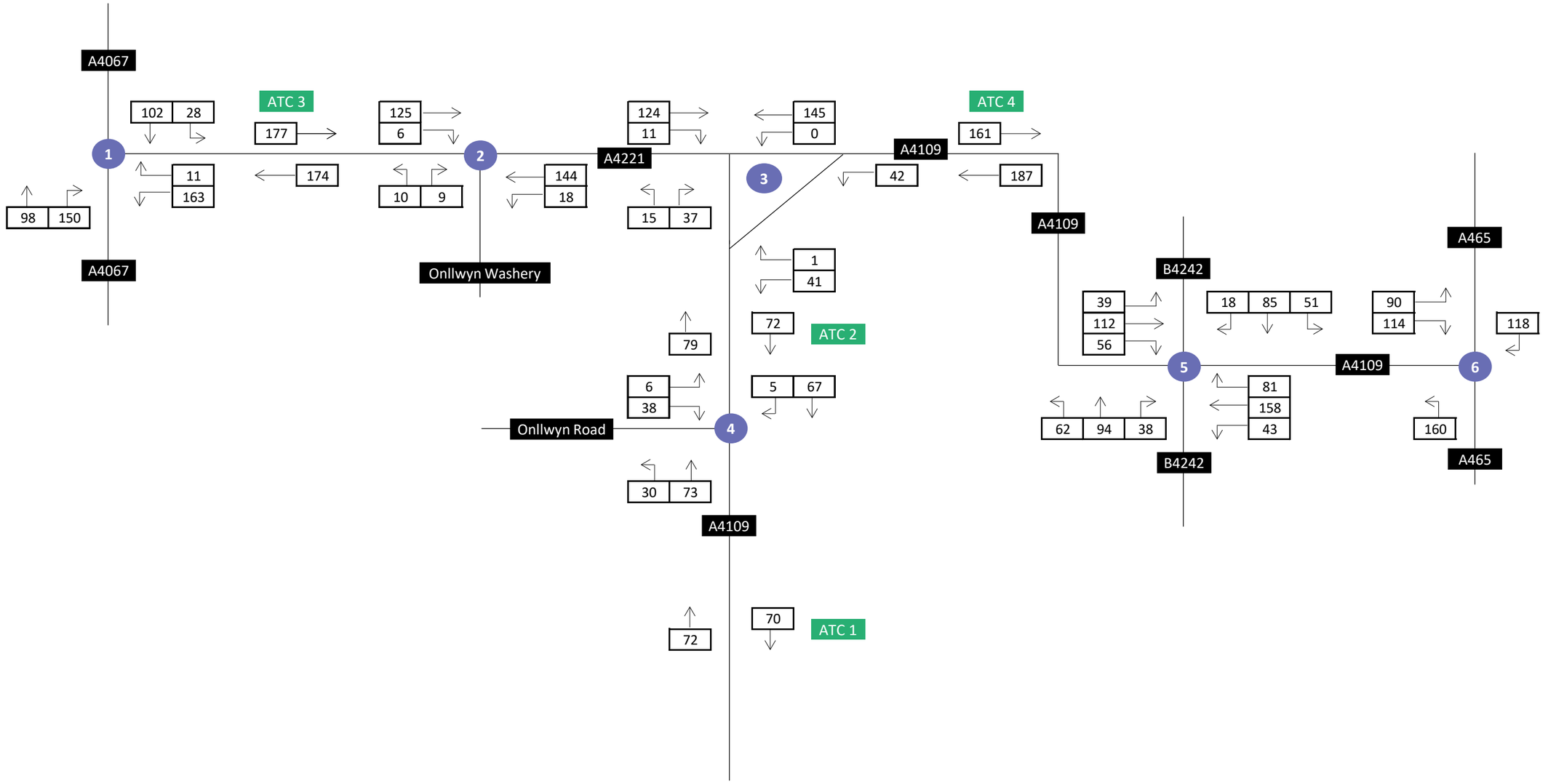
Figure A53: 2031 With Operational Development Trips, PM Peak Hour (15:00-16:00)

Figure A54: 2031 With Operational Development Trips, 24hr AADT

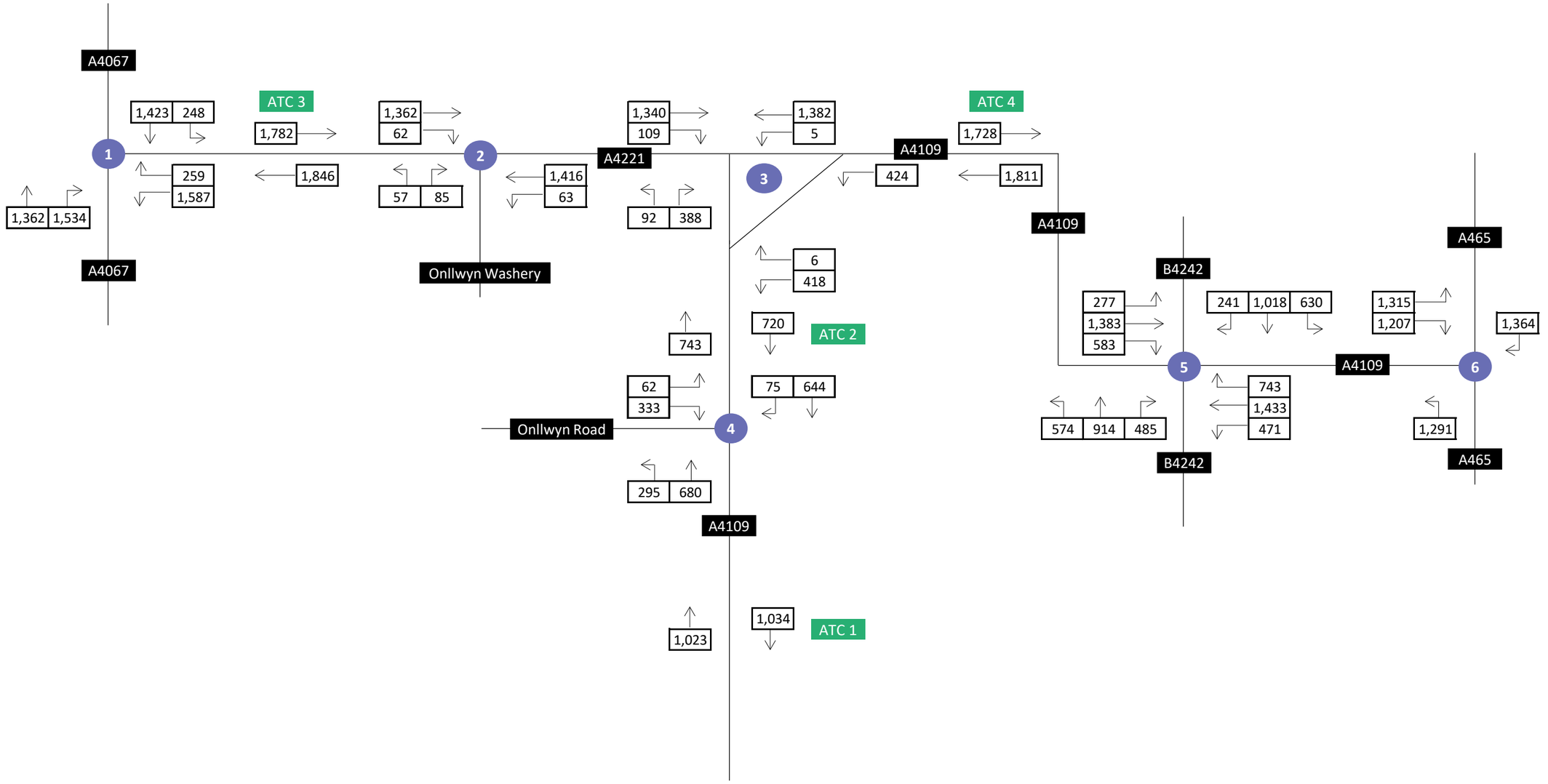
Figure A55: 2031 With Operational Development Trips, 12hr AAWT



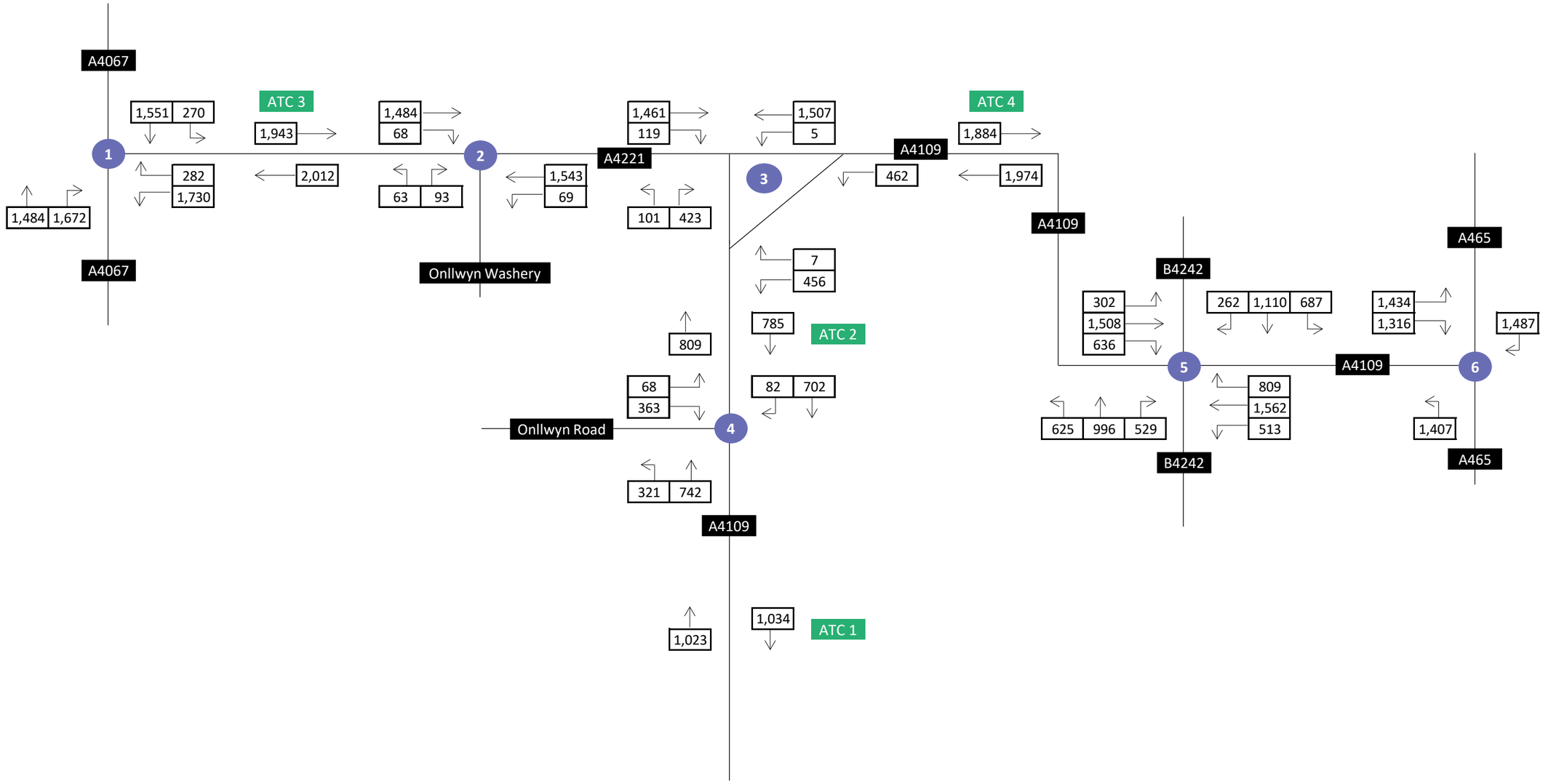
Global Centre of Rail Excellence	
Figure A1 - Existing Traffic Flows, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



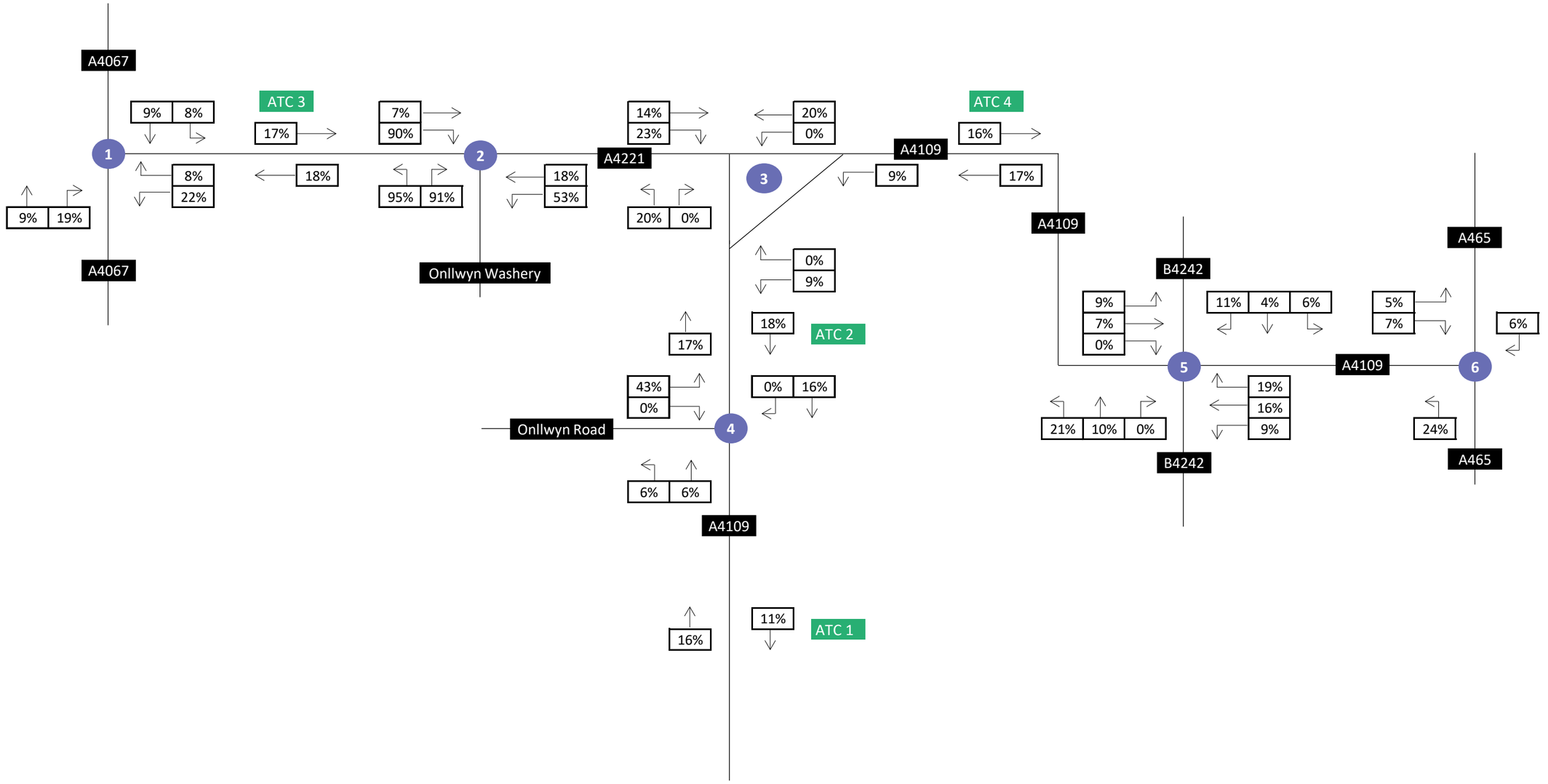
Global Centre of Rail Excellence	
Figure A2 - Existing Traffic Flows, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



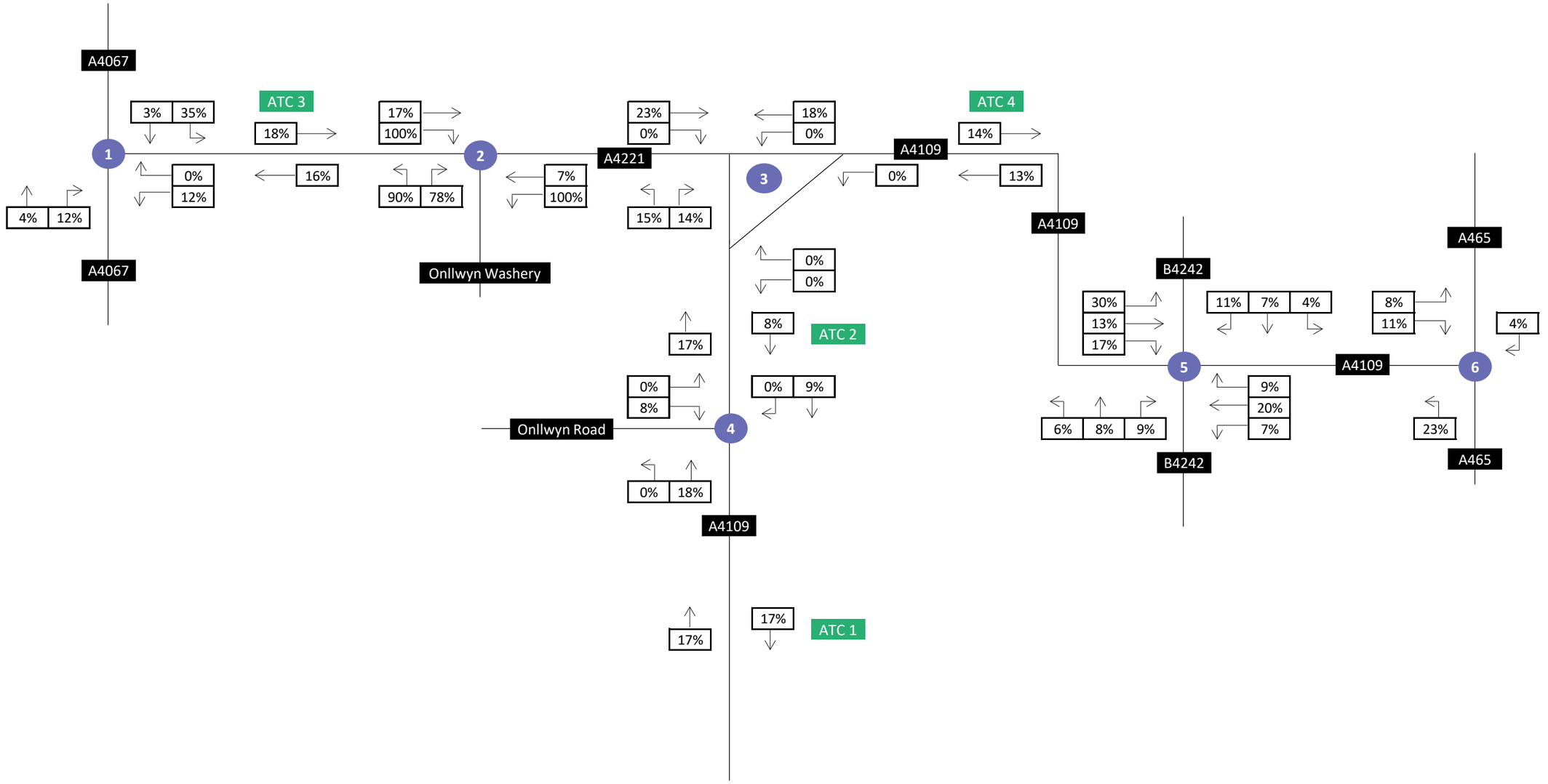
Global Centre of Rail Excellence	
Figure A3 - Existing Traffic Flows, 24hr AADT Vehs	
264904-00	ARUP



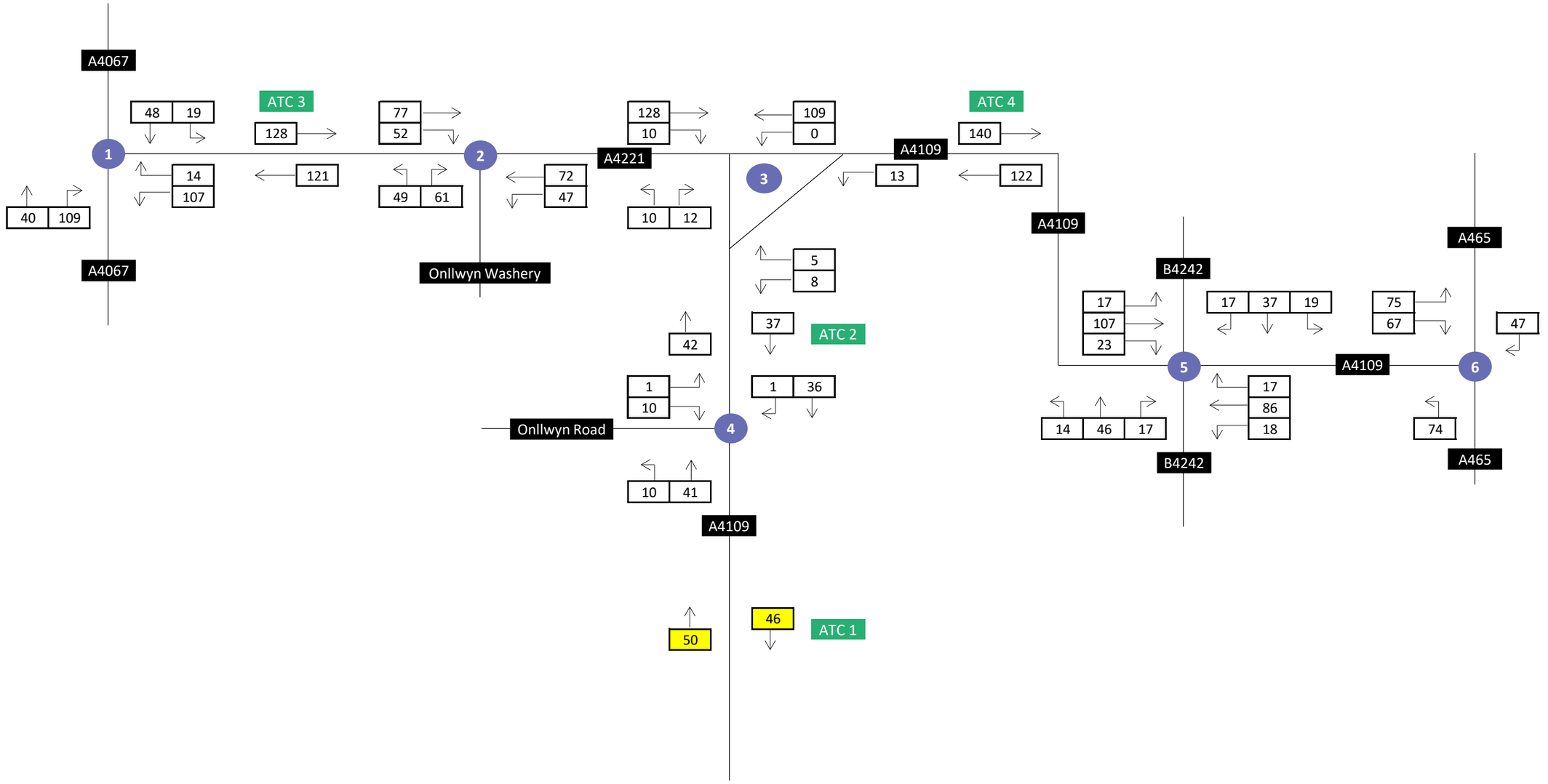
Global Centre of Rail Excellence	
Figure A4 - Existing Traffic Flows, 12hr AAWT Vehs	
264904-00	ARUP



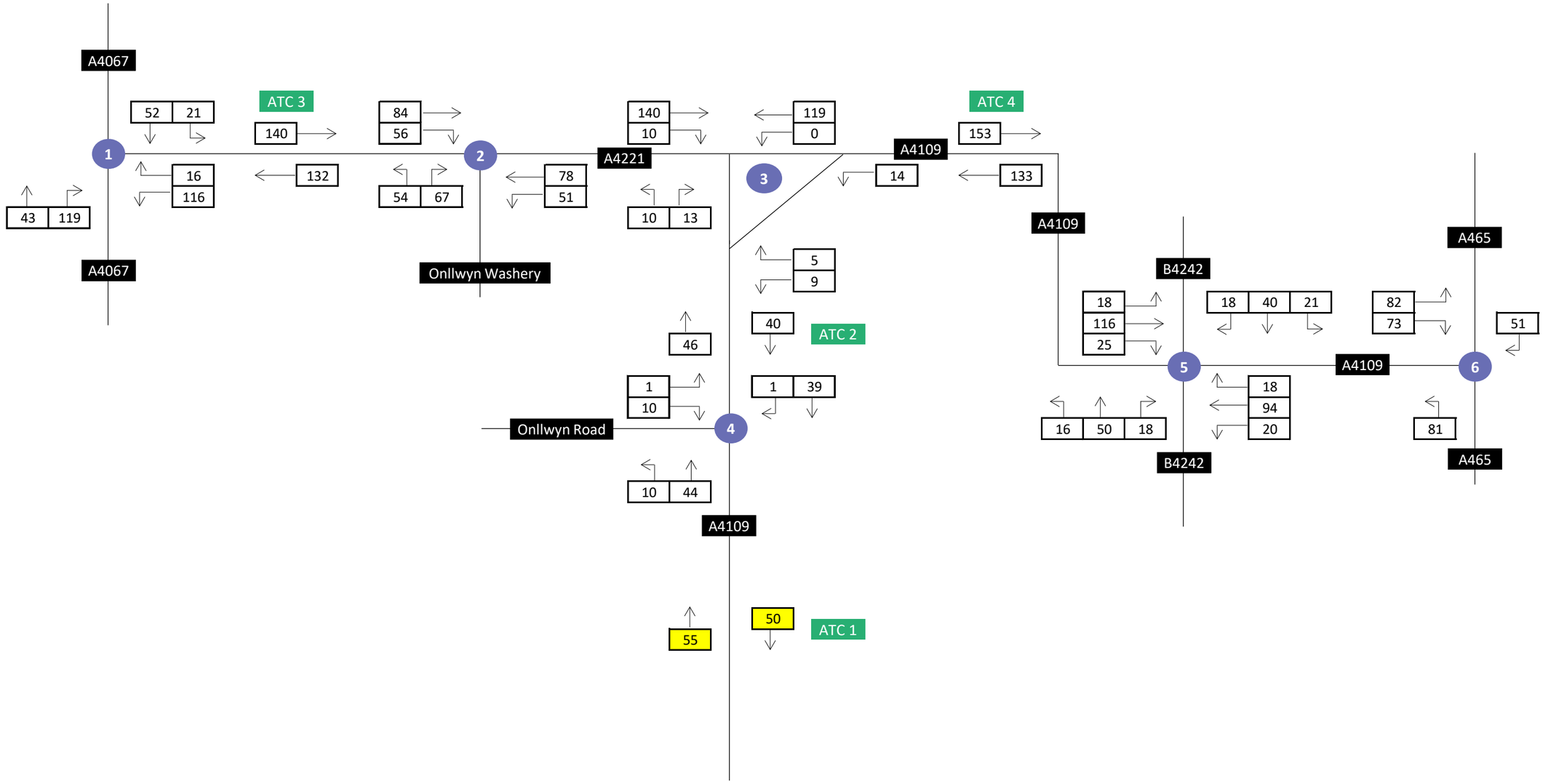
Global Centre of Rail Excellence	
Figure A5 - Existing Traffic Flows, AM Peak Hour (08:00-09:00), Percentage HGVs	
264904-00	ARUP



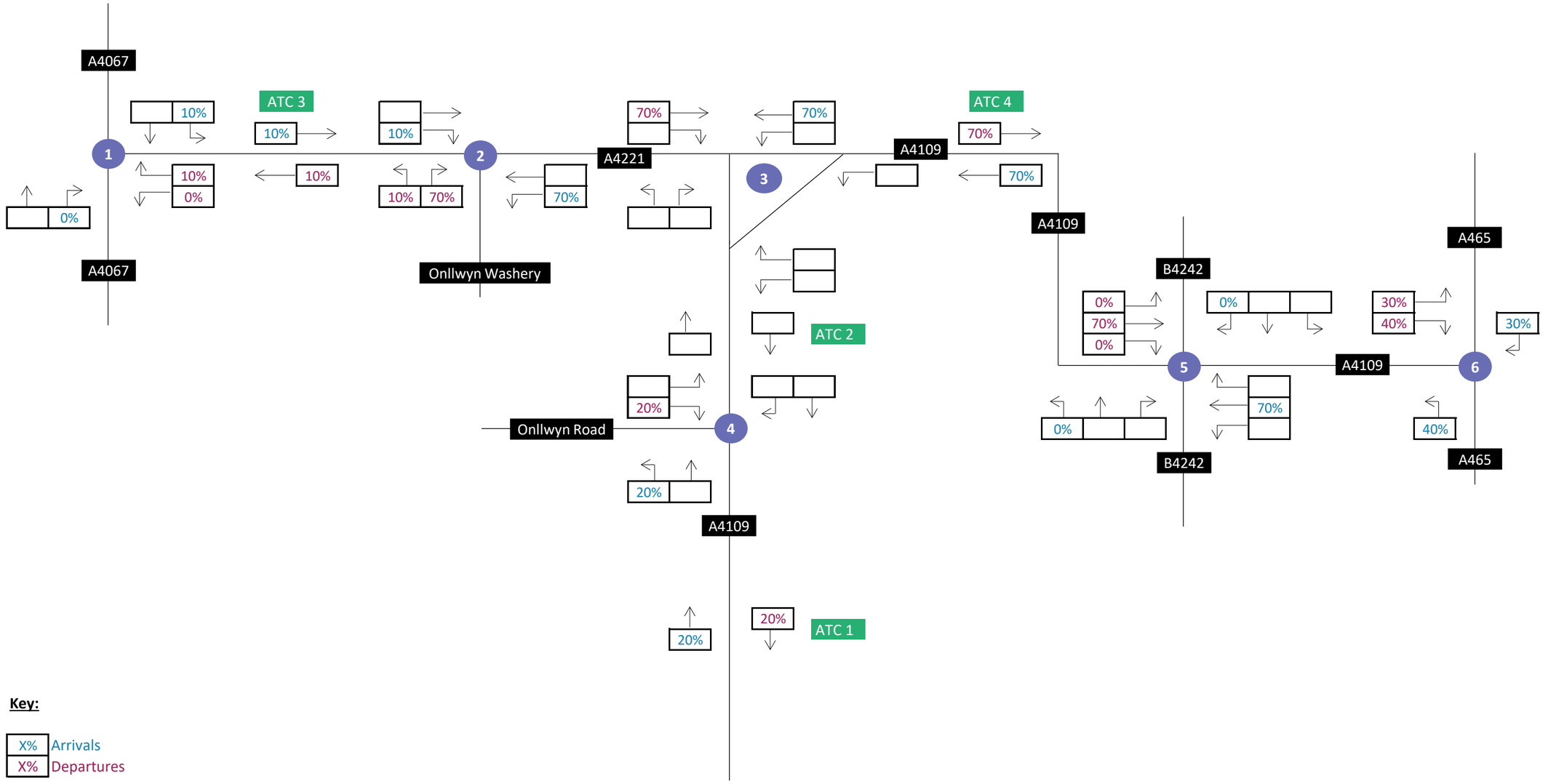
Global Centre of Rail Excellence	
Figure A6 - Existing Traffic Flows, PM Peak Hour (15:00-16:00), Percentage HGVs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A7 - Existing Traffic Flows, 24hr AADT HGVs	
264904-00	ARUP



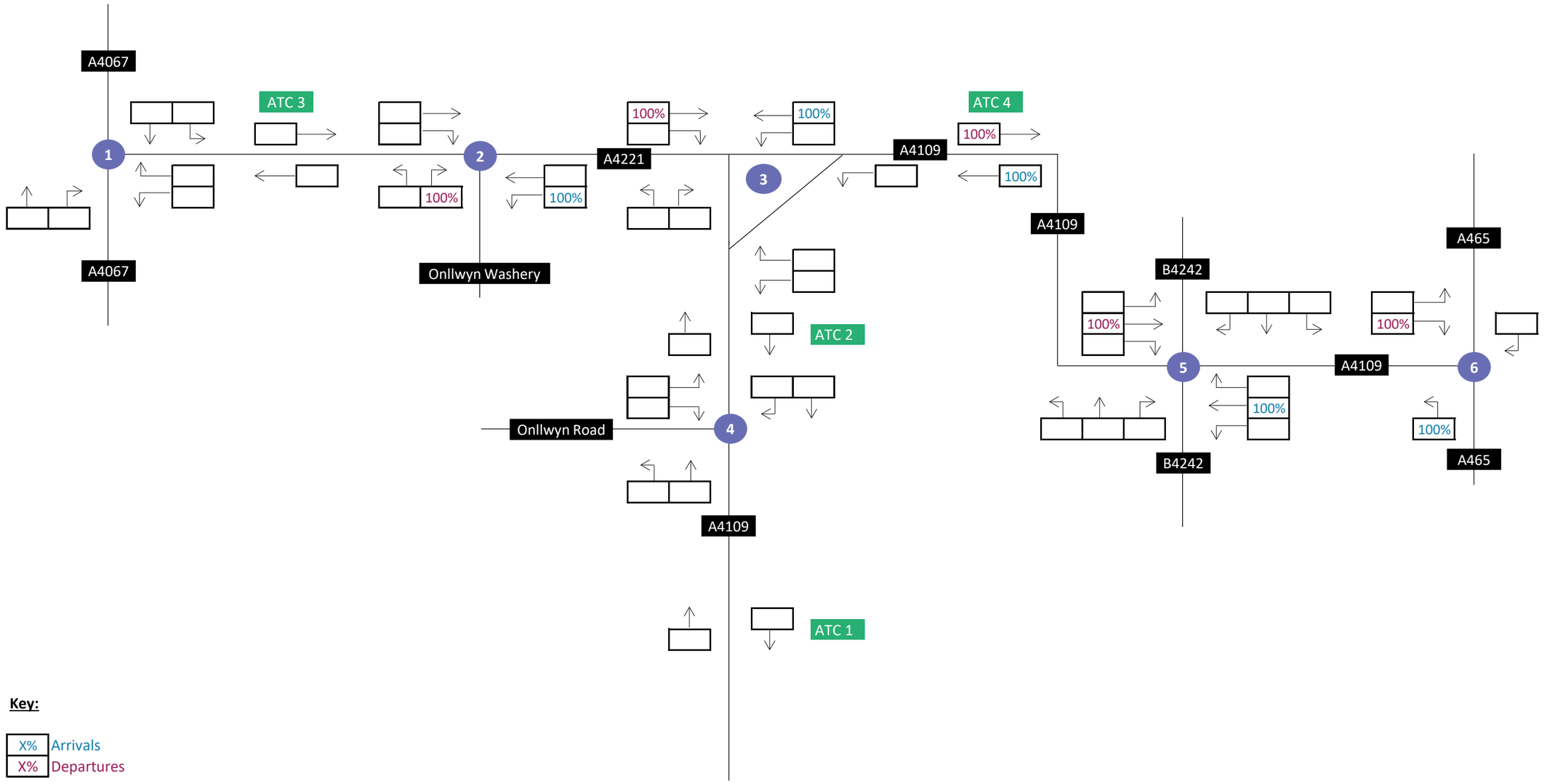
Global Centre of Rail Excellence	
Figure A8 - Existing Traffic Flows, 12hr AAWT HGVs	
264904-00	ARUP



Key:

X%	Arrivals
X%	Departures

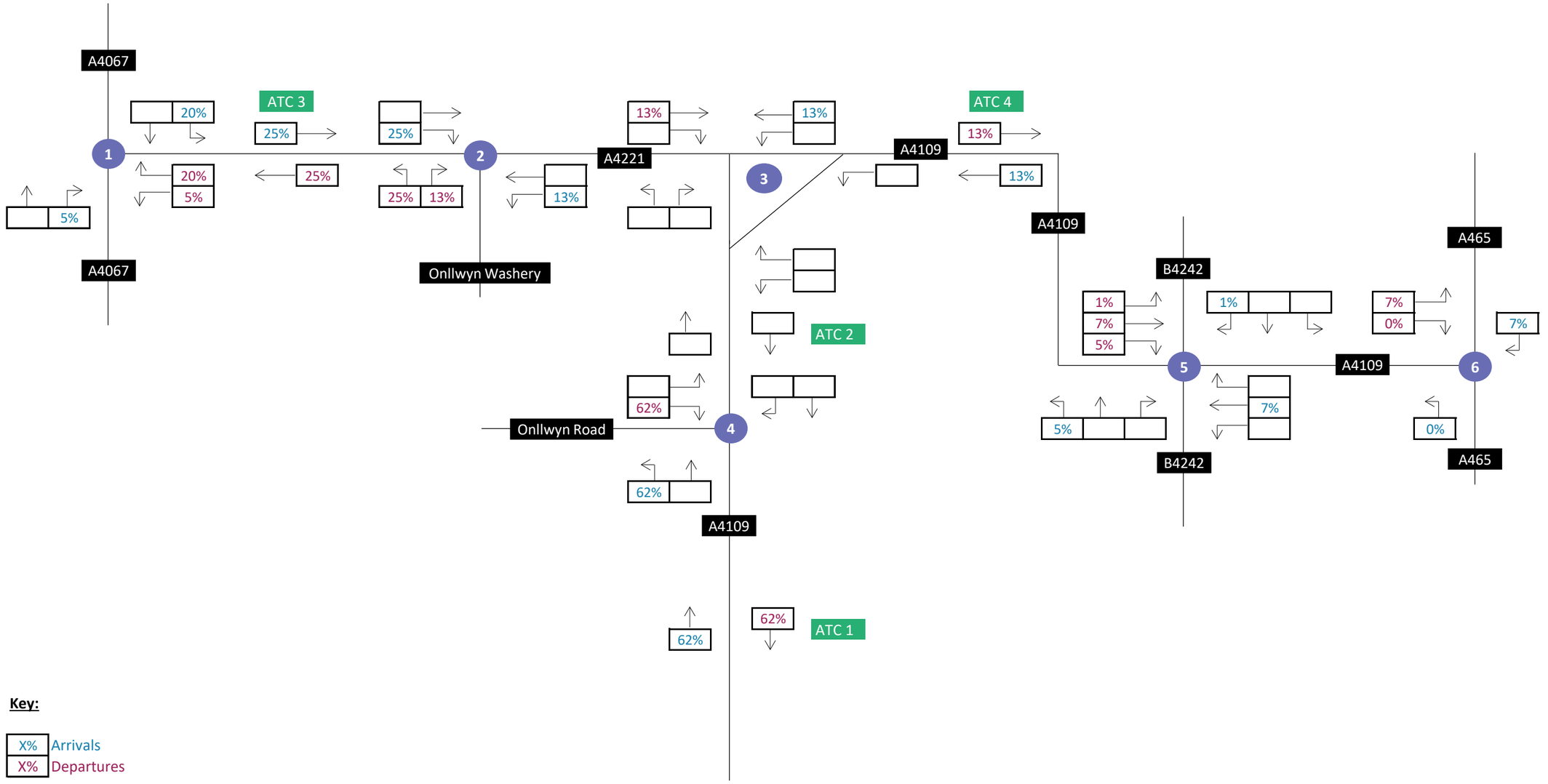
Global Centre of Rail Excellence	
Figure A9 - Construction Delivery Vehicles Trip Distribution	
264904-00	ARUP



Key:

X%	Arrivals
X%	Departures

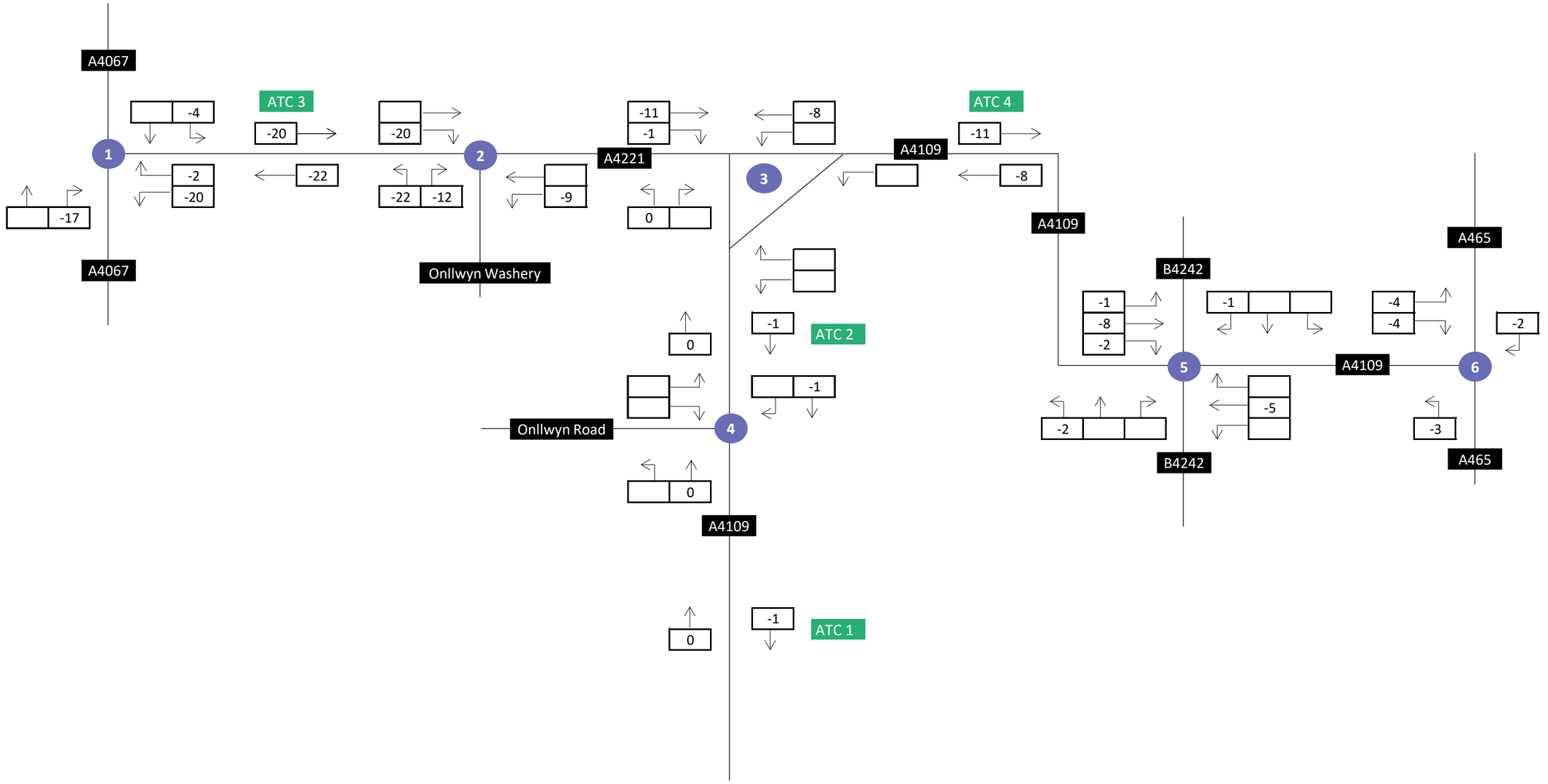
Global Centre of Rail Excellence	
Figure A10 - Operational Delivery Vehicles Trip Distribution	
264904-00	ARUP



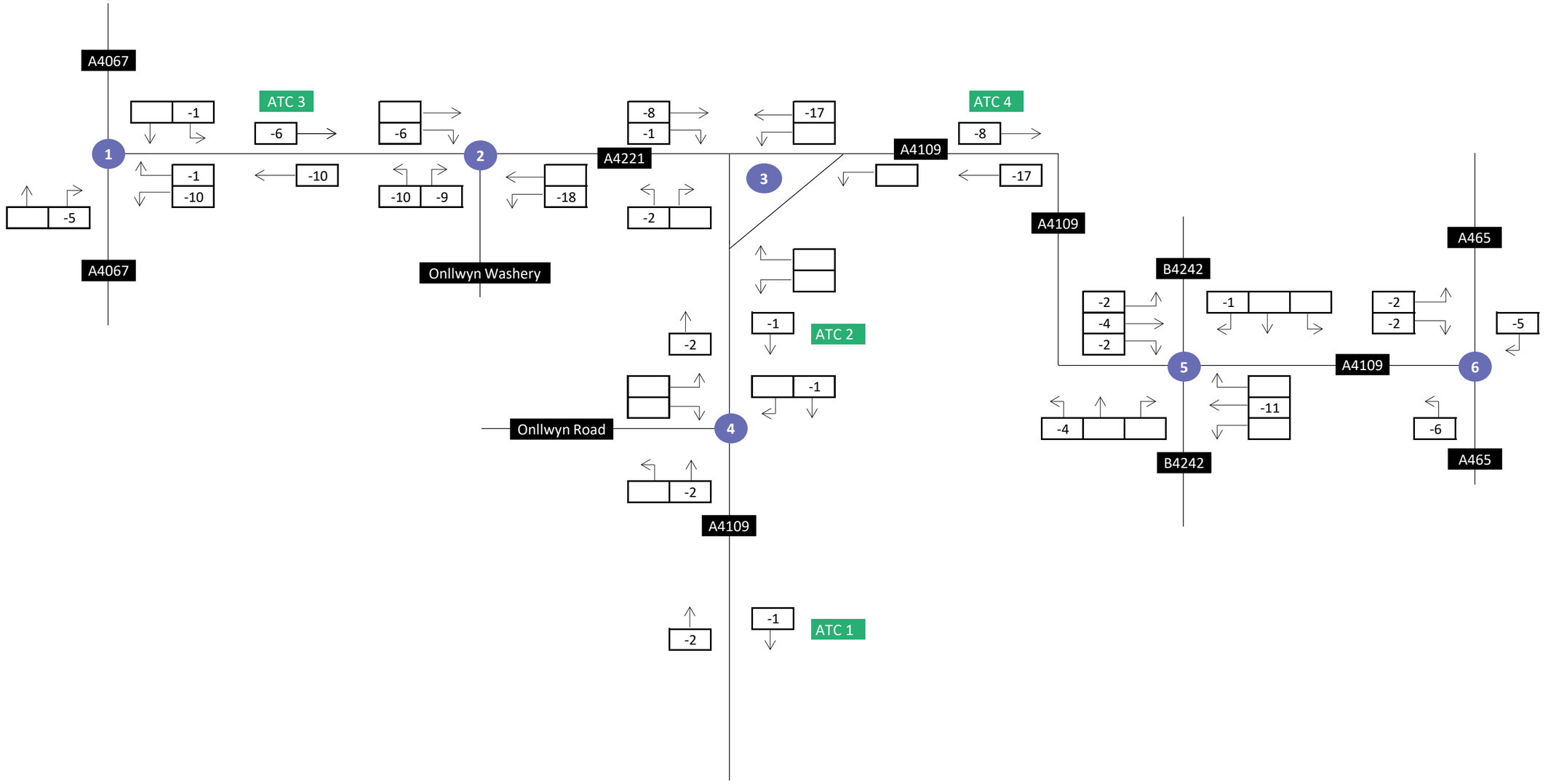
Key:

X%	Arrivals
X%	Departures

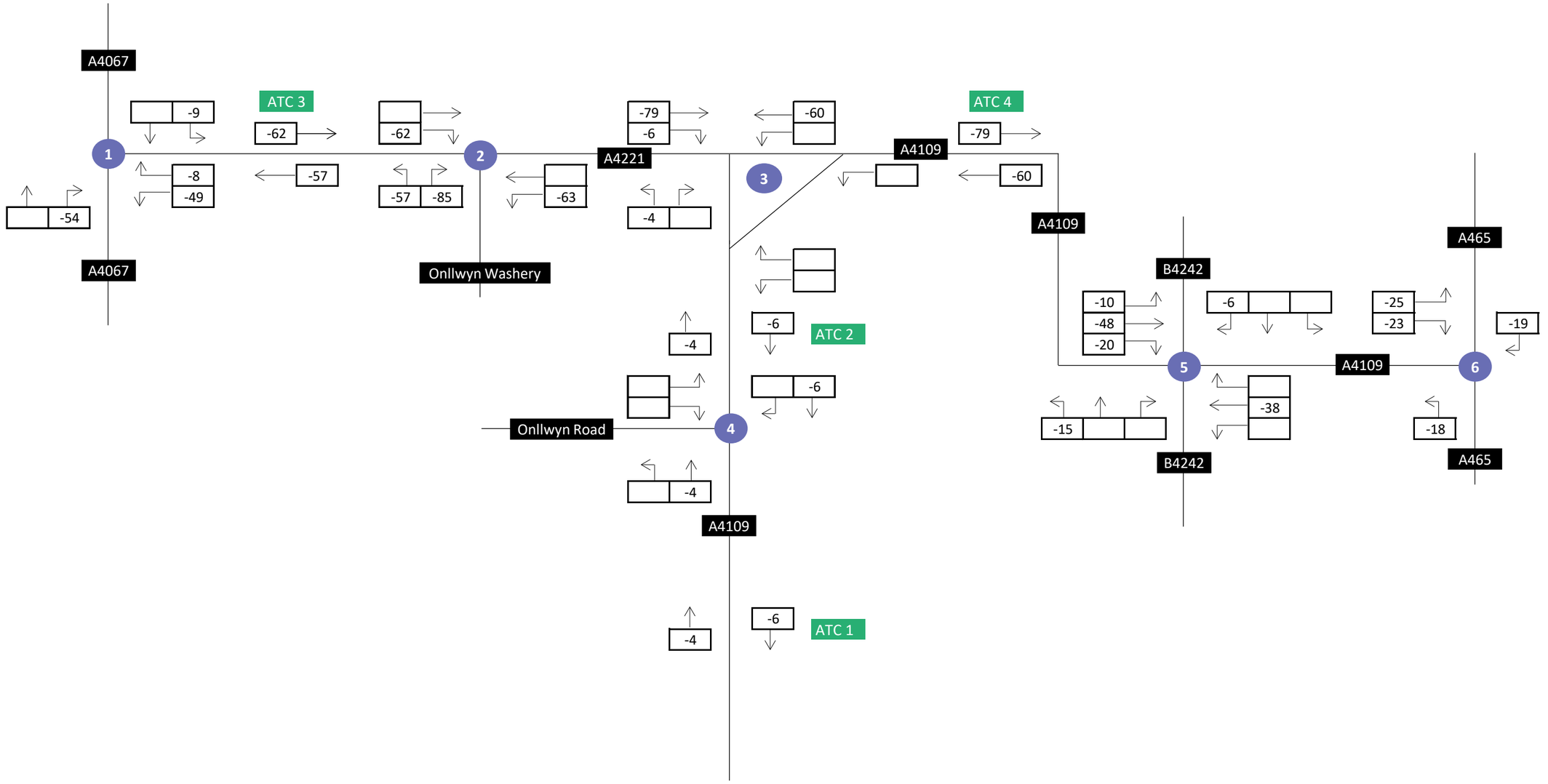
Global Centre of Rail Excellence	
Figure A11 - Staff Trip Distribution	
264904-00	ARUP



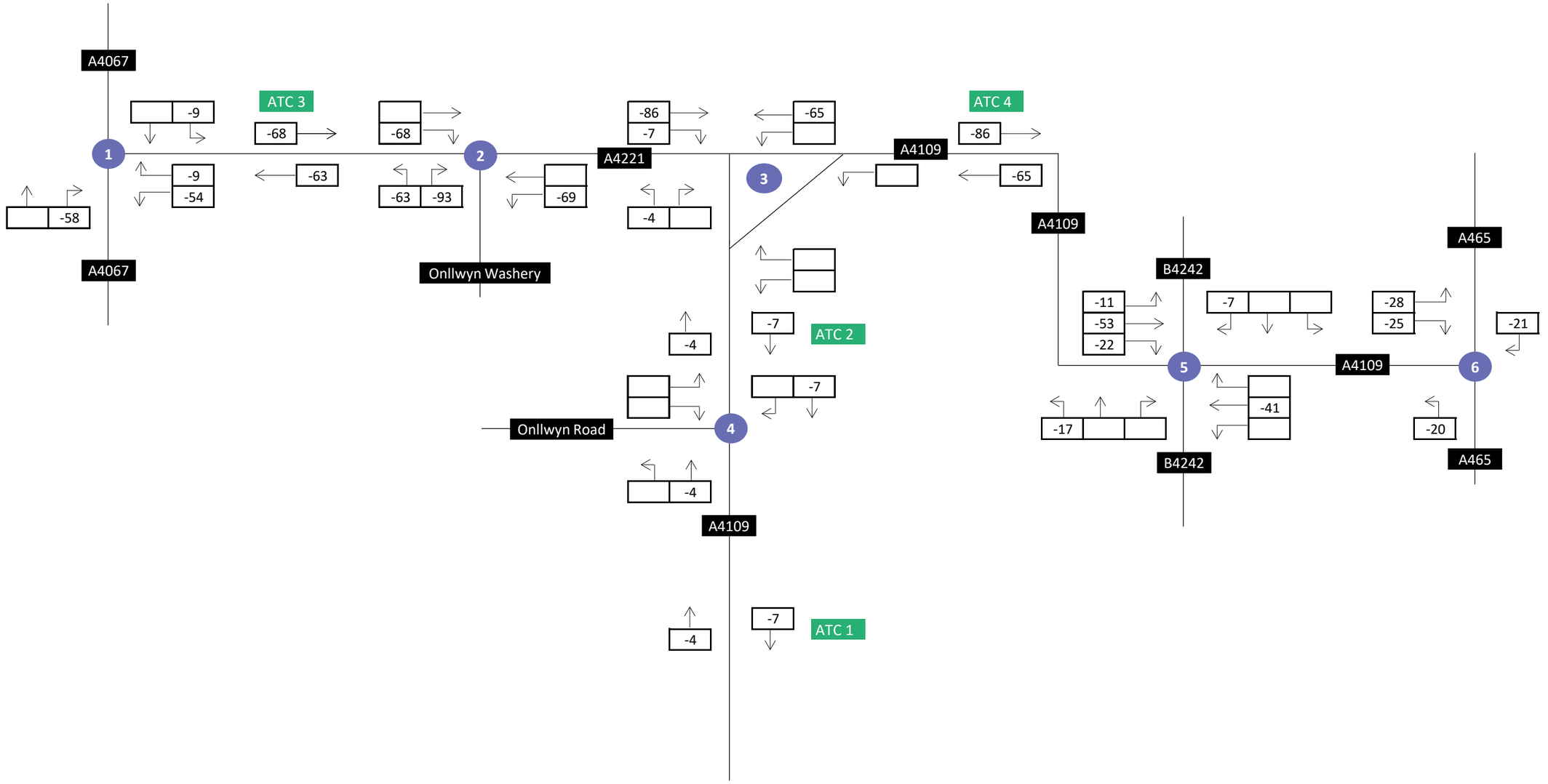
Global Centre of Rail Excellence	
Figure A12 - Existing Washeries Traffic Flows, AM Peak Hour (08:00-09:00) PCUs	
264904-00	ARUP



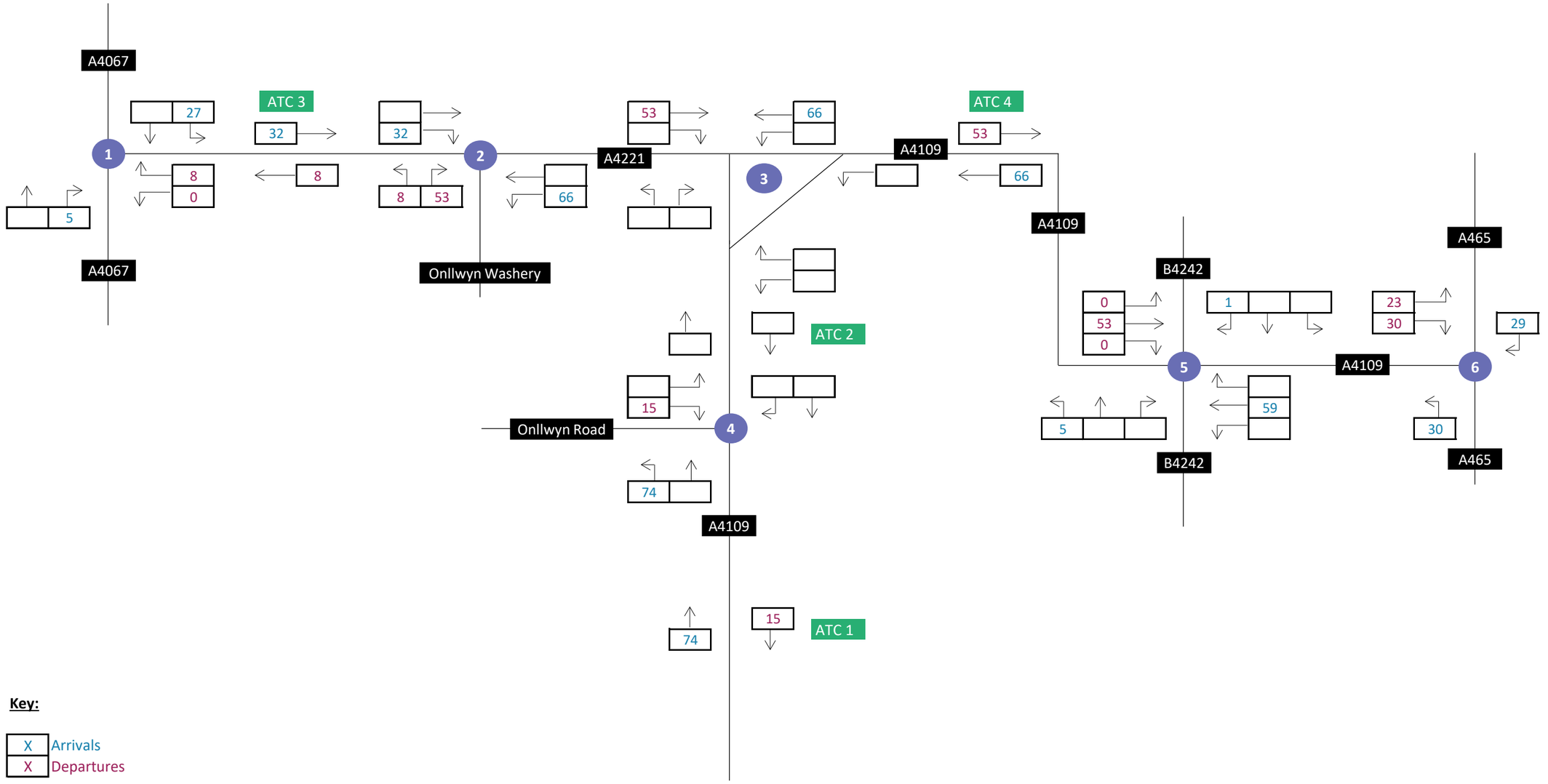
Global Centre of Rail Excellence	
Figure A13 - Existing Washeries Traffic Flows, PM Peak Hour (15:00-16:00) PCUs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A14 - Existing Washeries Traffic Flows, 24hr AADT Veh	
264904-00	ARUP



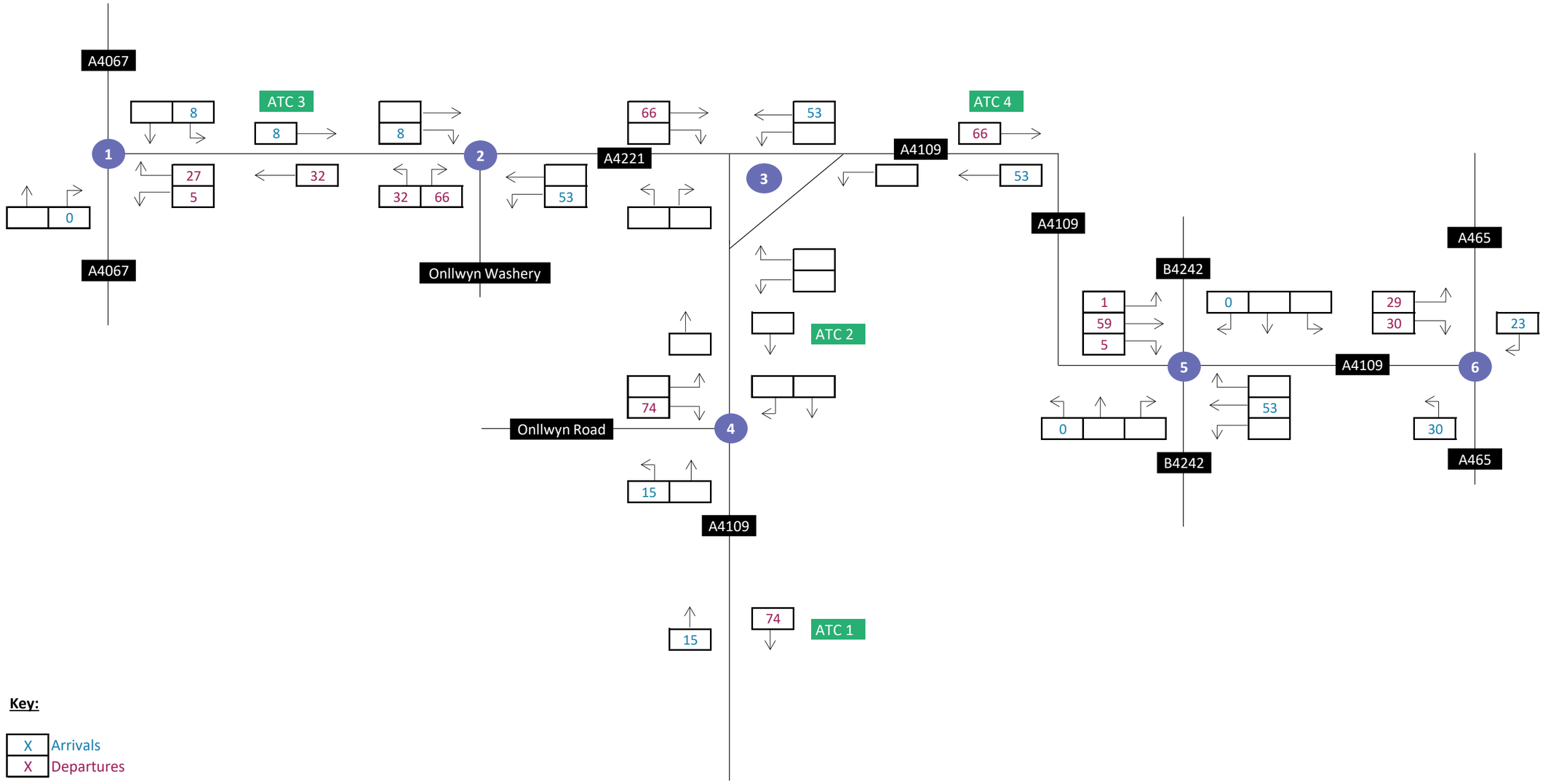
Global Centre of Rail Excellence	
Figure A15 - Existing Washeries Traffic Flows, 12hr AAWT Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

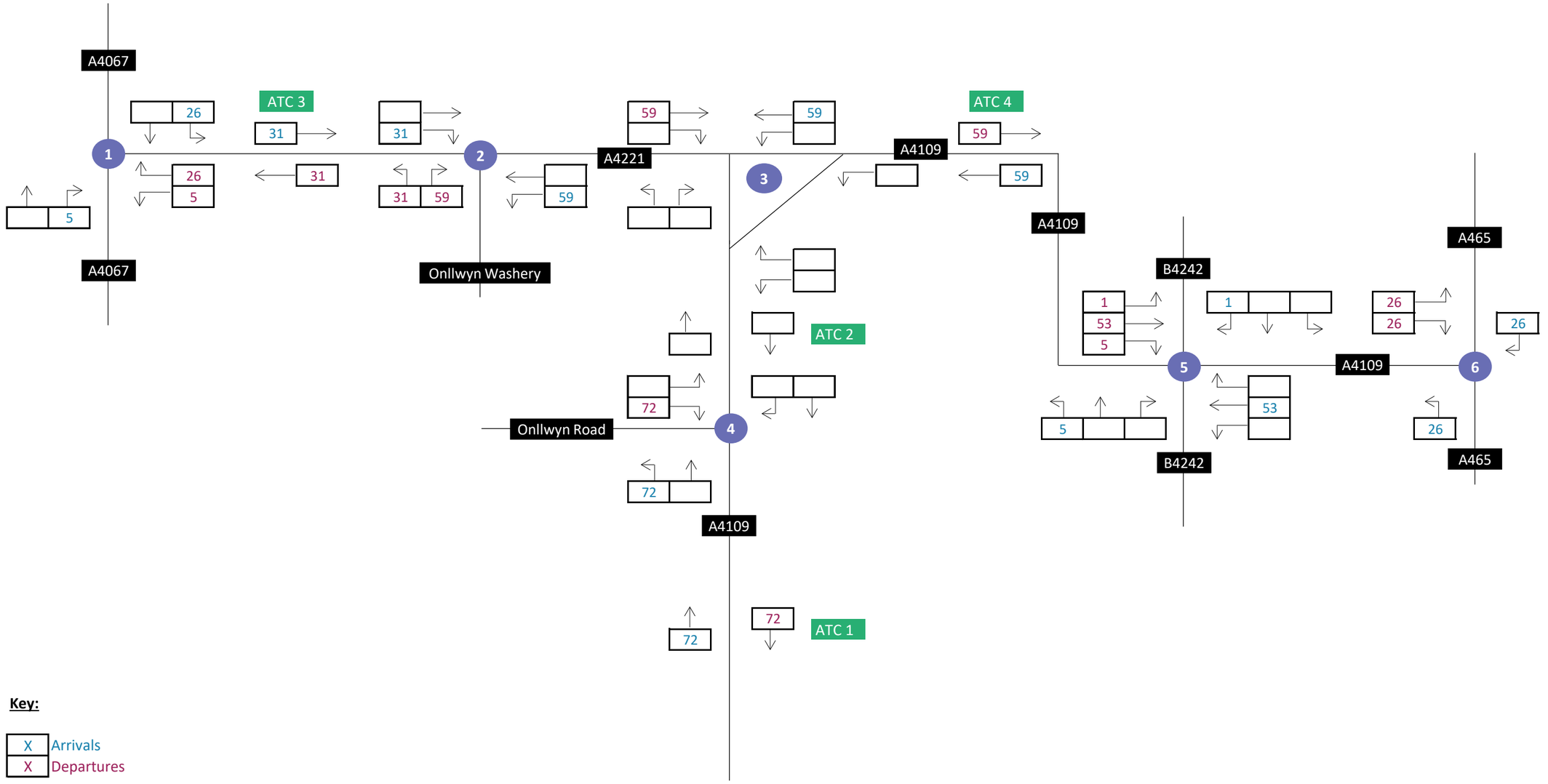
Global Centre of Rail Excellence	
Figure A16 - Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00) PCUs	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

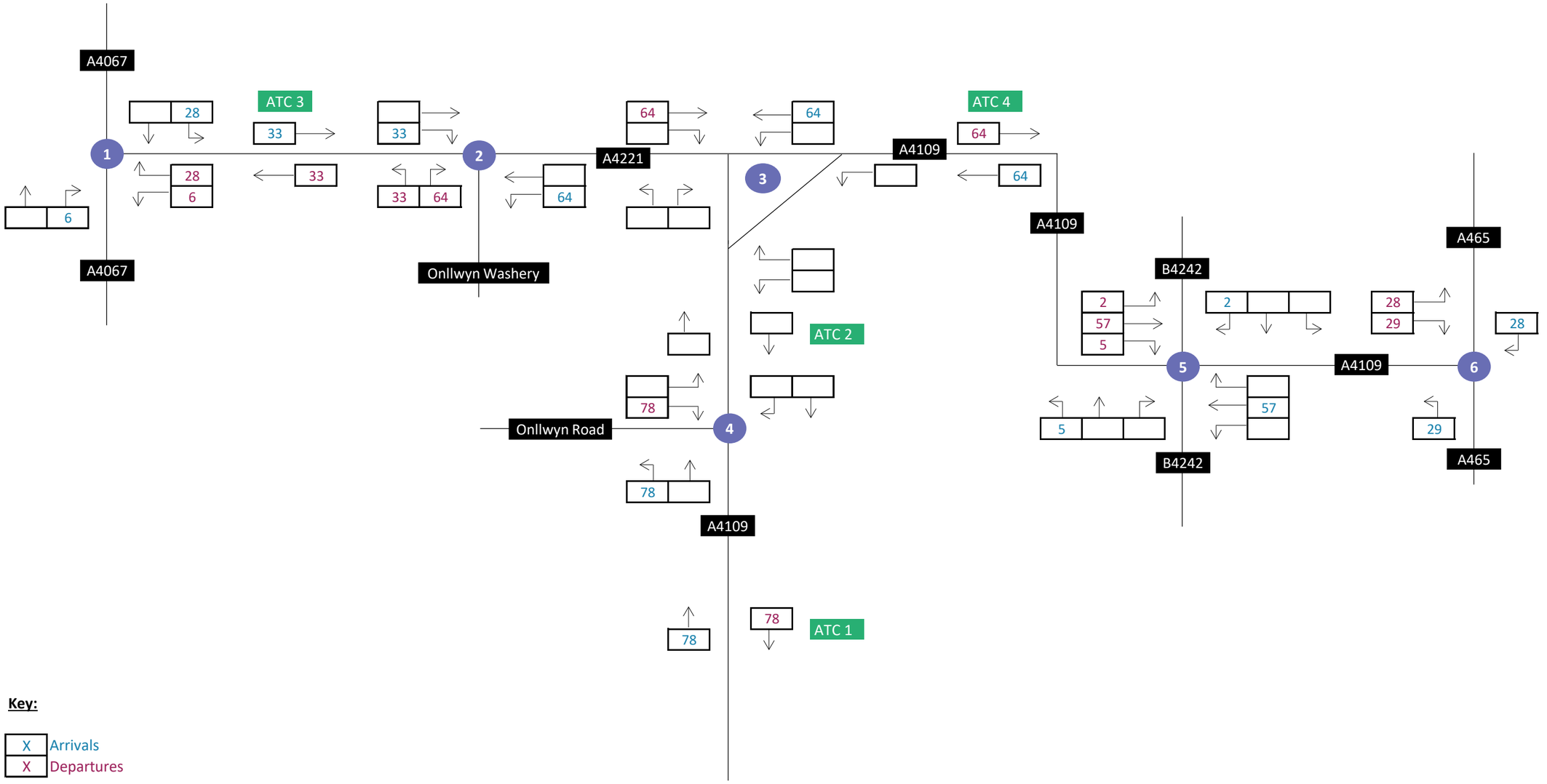
Global Centre of Rail Excellence	
Figure A17 - Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00) PCUs	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

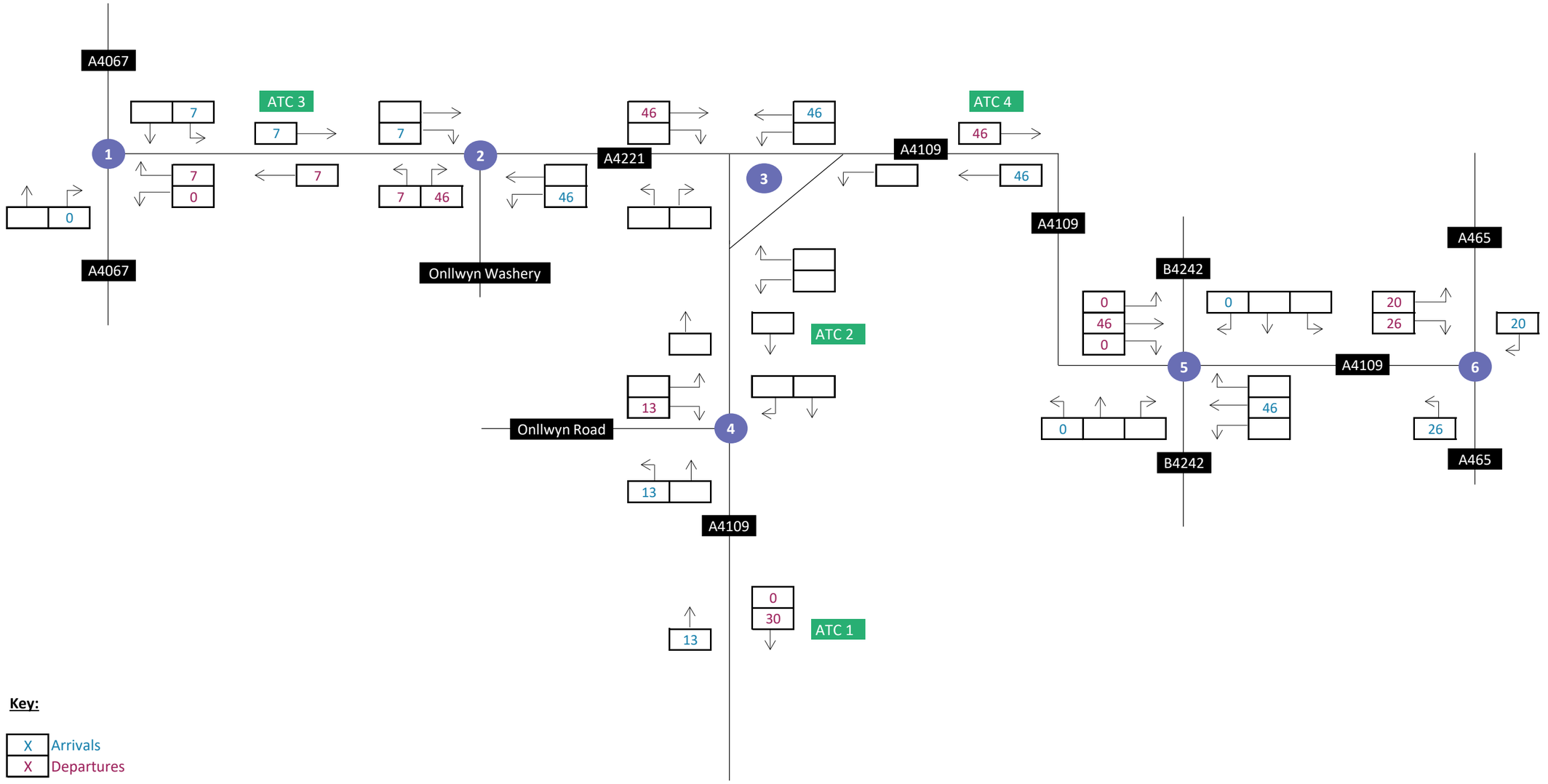
Global Centre of Rail Excellence	
Figure A18 - Phase 2 Construction Traffic Flows, 24hr AADT Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

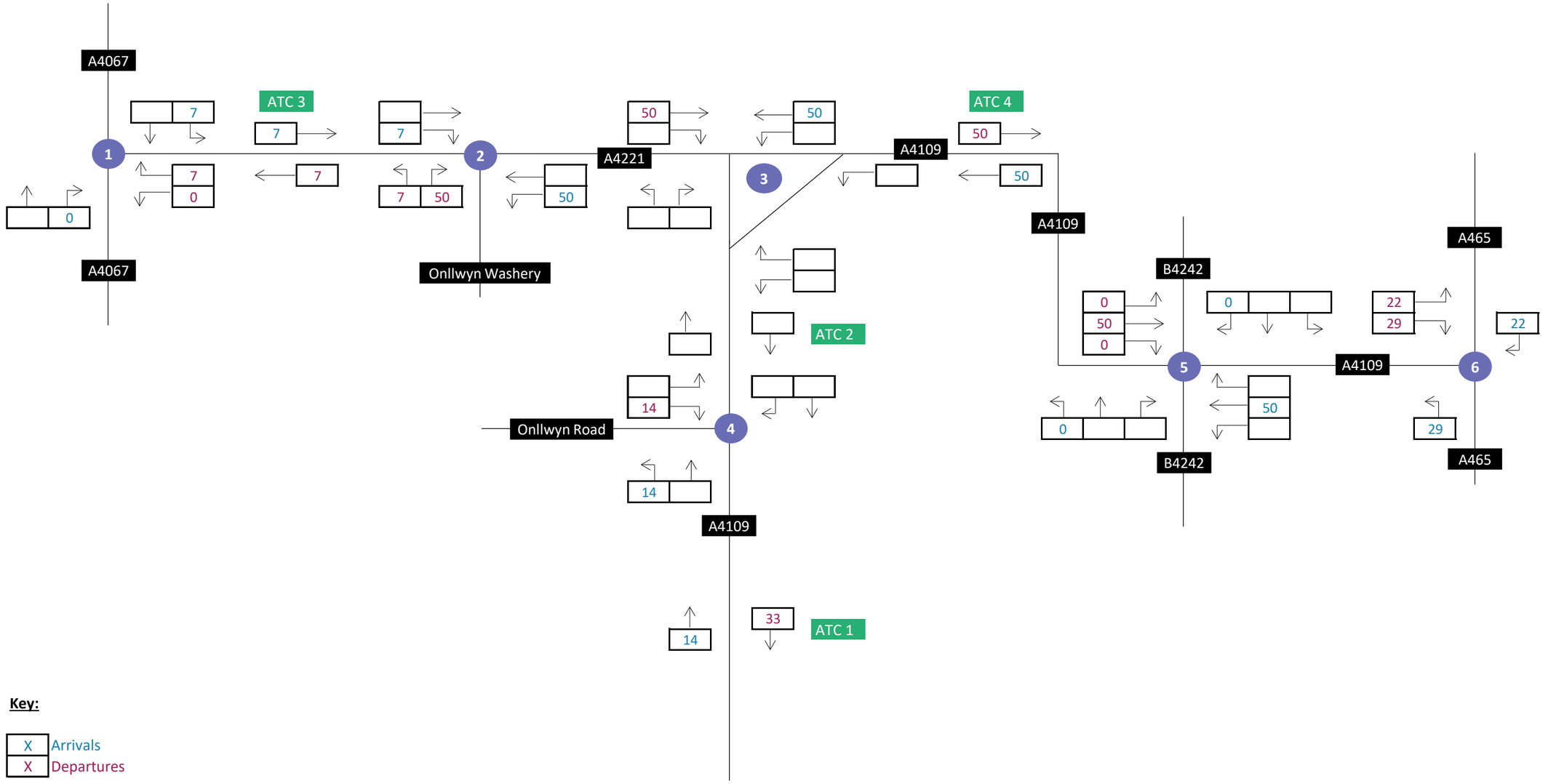
Global Centre of Rail Excellence	
Figure A19 - Phase 2 Construction Traffic Flows, AAWT Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

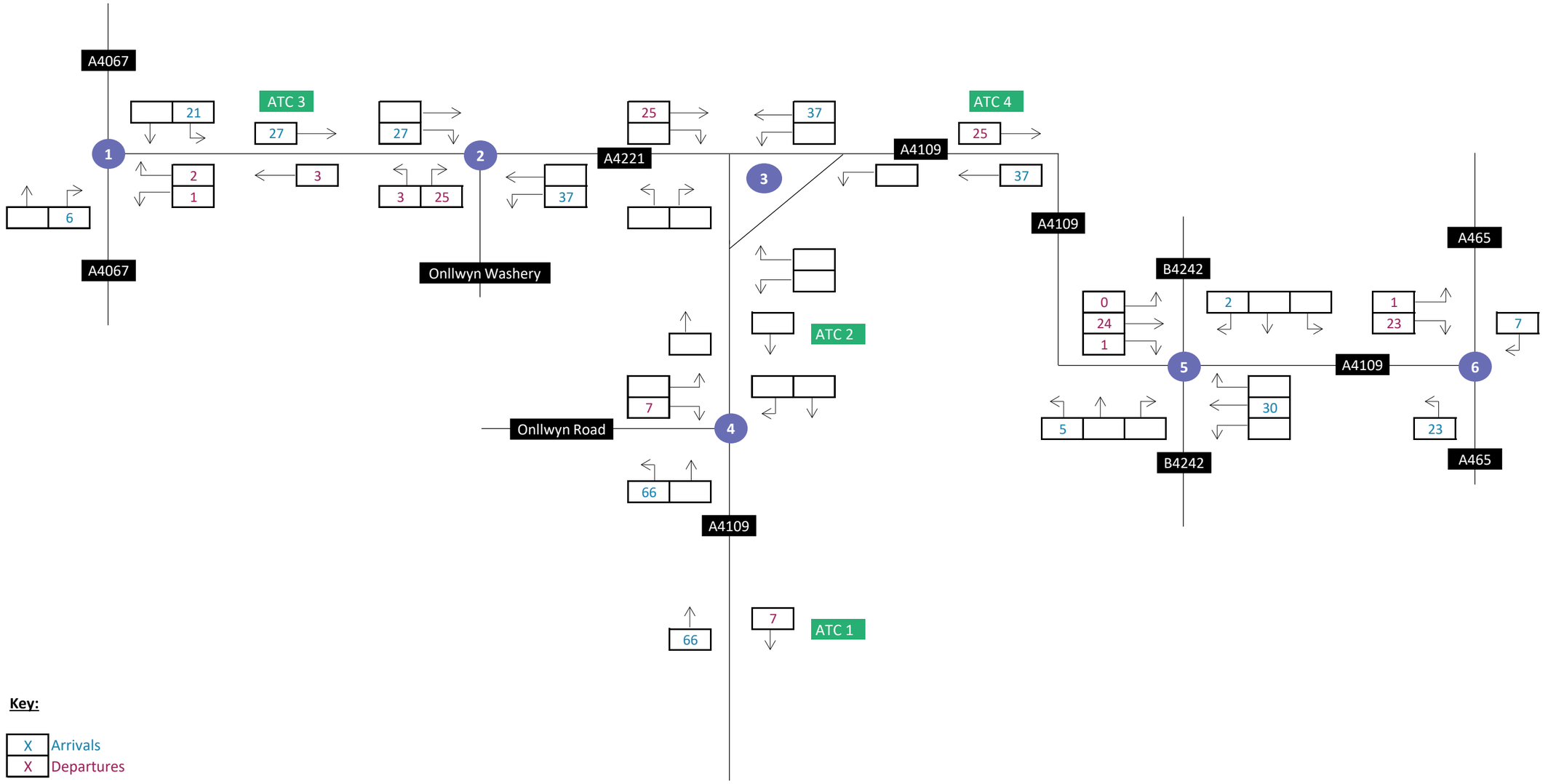
Global Centre of Rail Excellence	
Figure A20 - Phase 2 Construction Traffic Flows, 24hr AADT, HGV Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

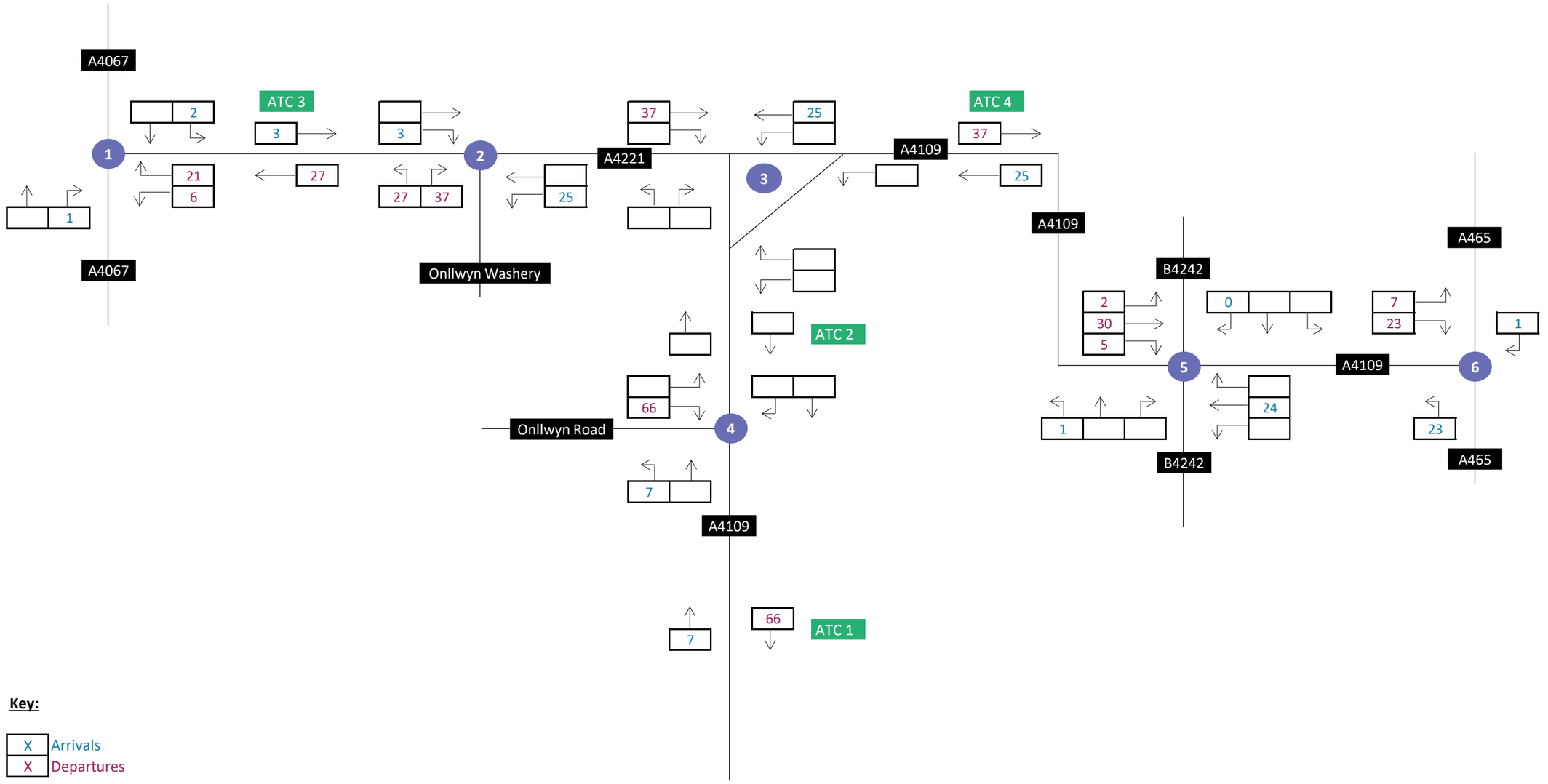
Global Centre of Rail Excellence	
Figure A21 - Phase 2 Construction Traffic Flows, 12hr AADT, HGV Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

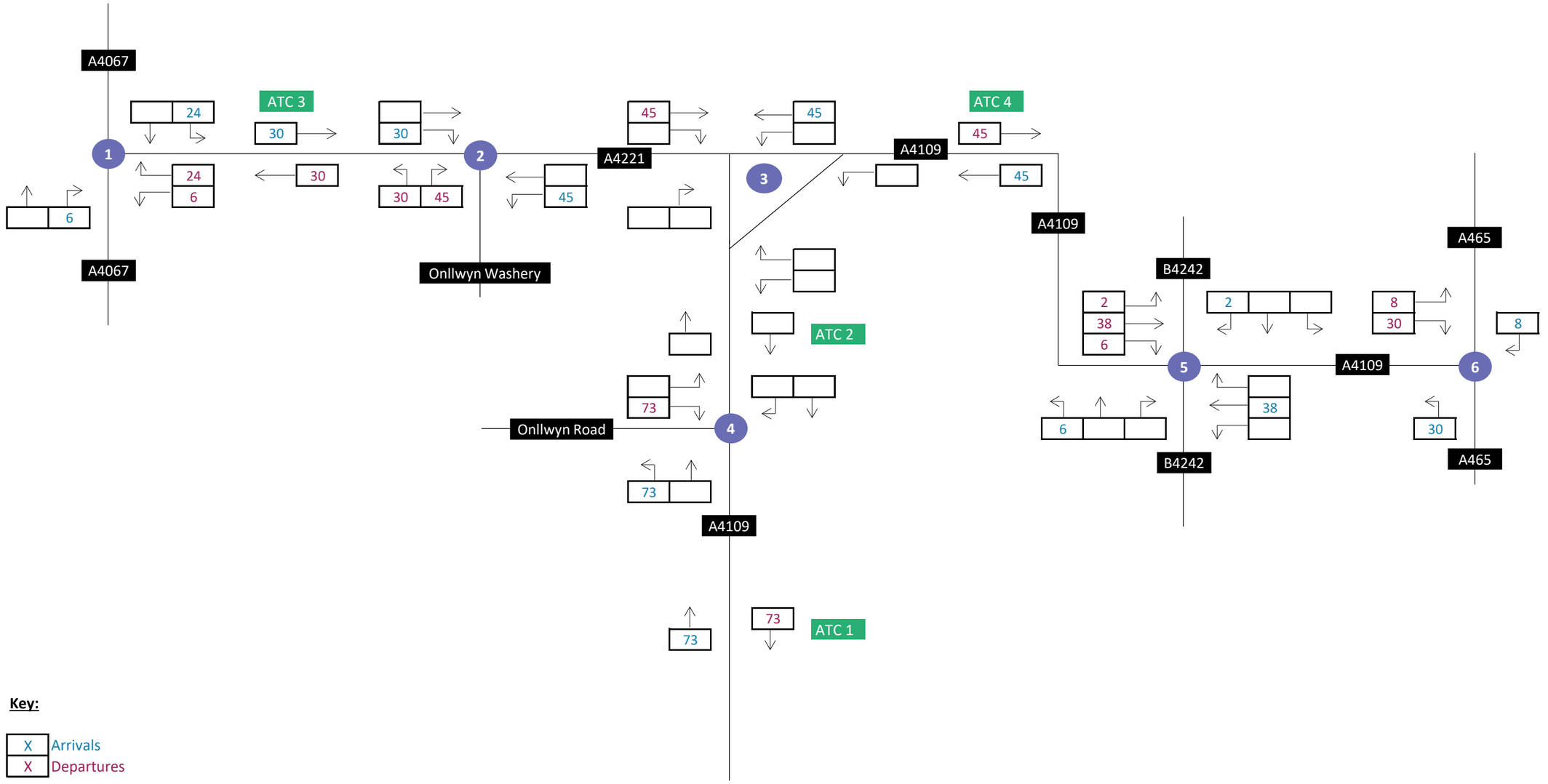
Global Centre of Rail Excellence	
Figure A22 - Operational Phase Development Trips, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

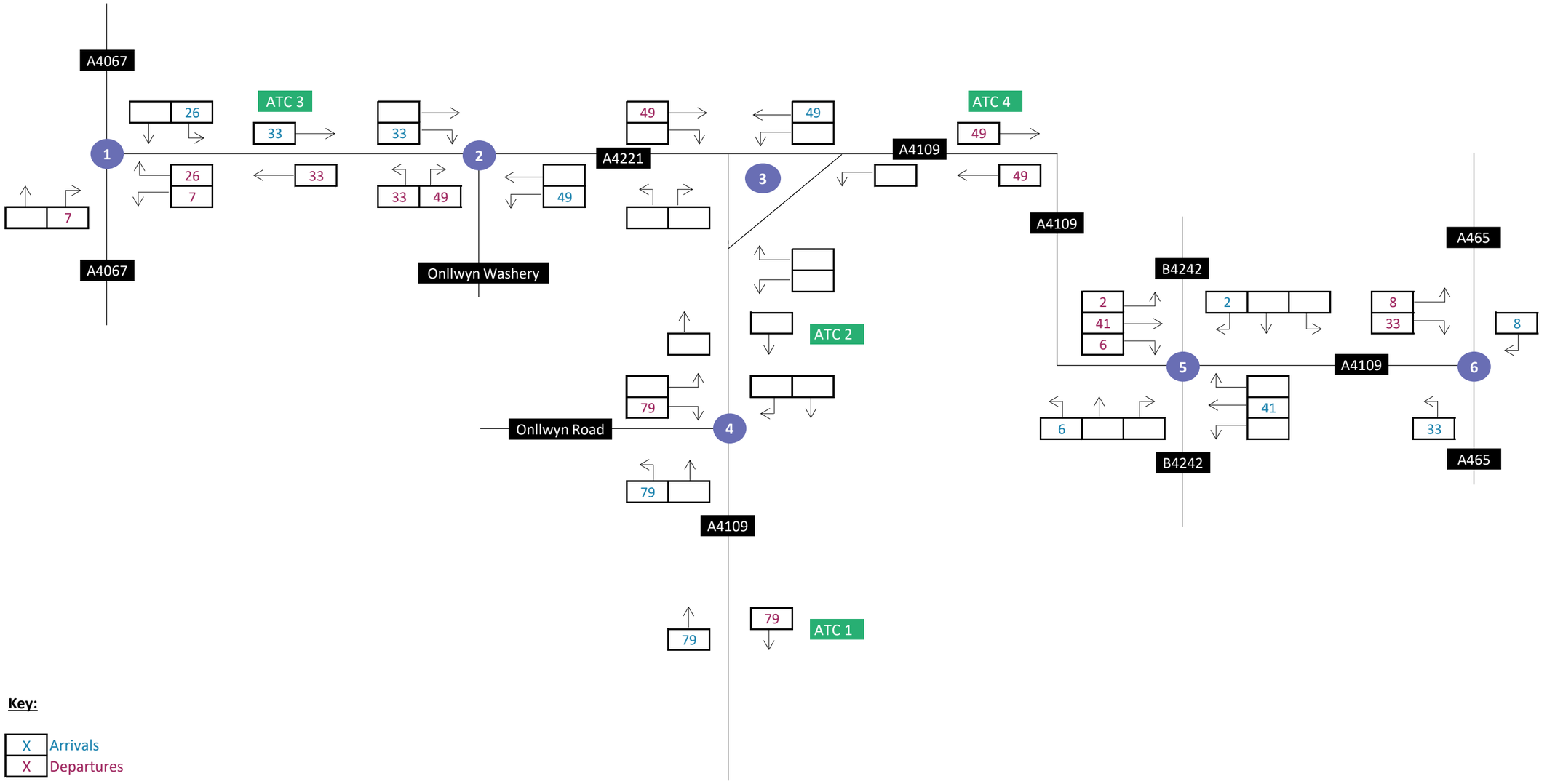
Global Centre of Rail Excellence	
Figure A23 - Operational Phase Development Trips, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

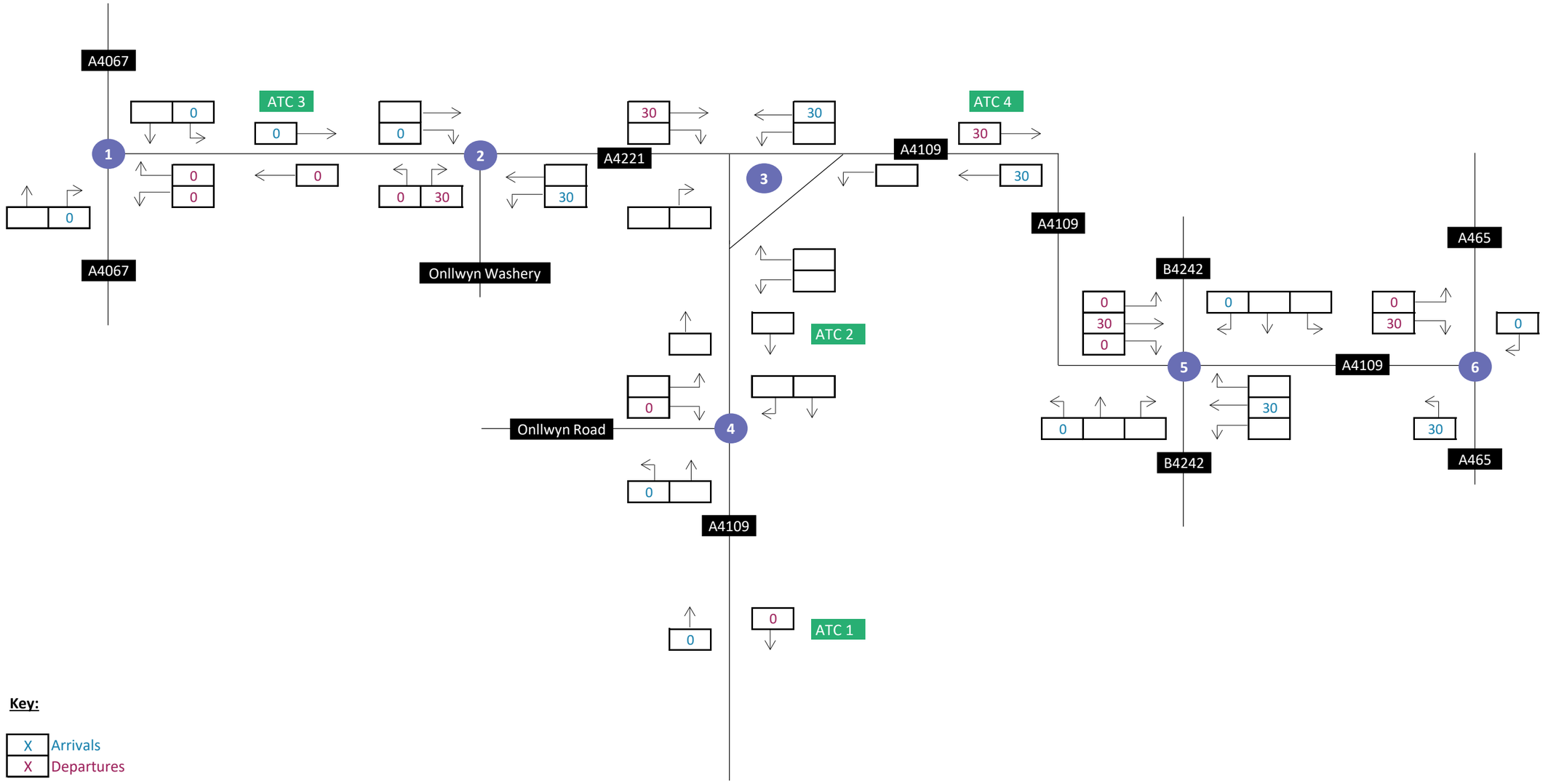
Global Centre of Rail Excellence	
Figure A24 - Operational Phase Development Trips, 24hr AADT Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

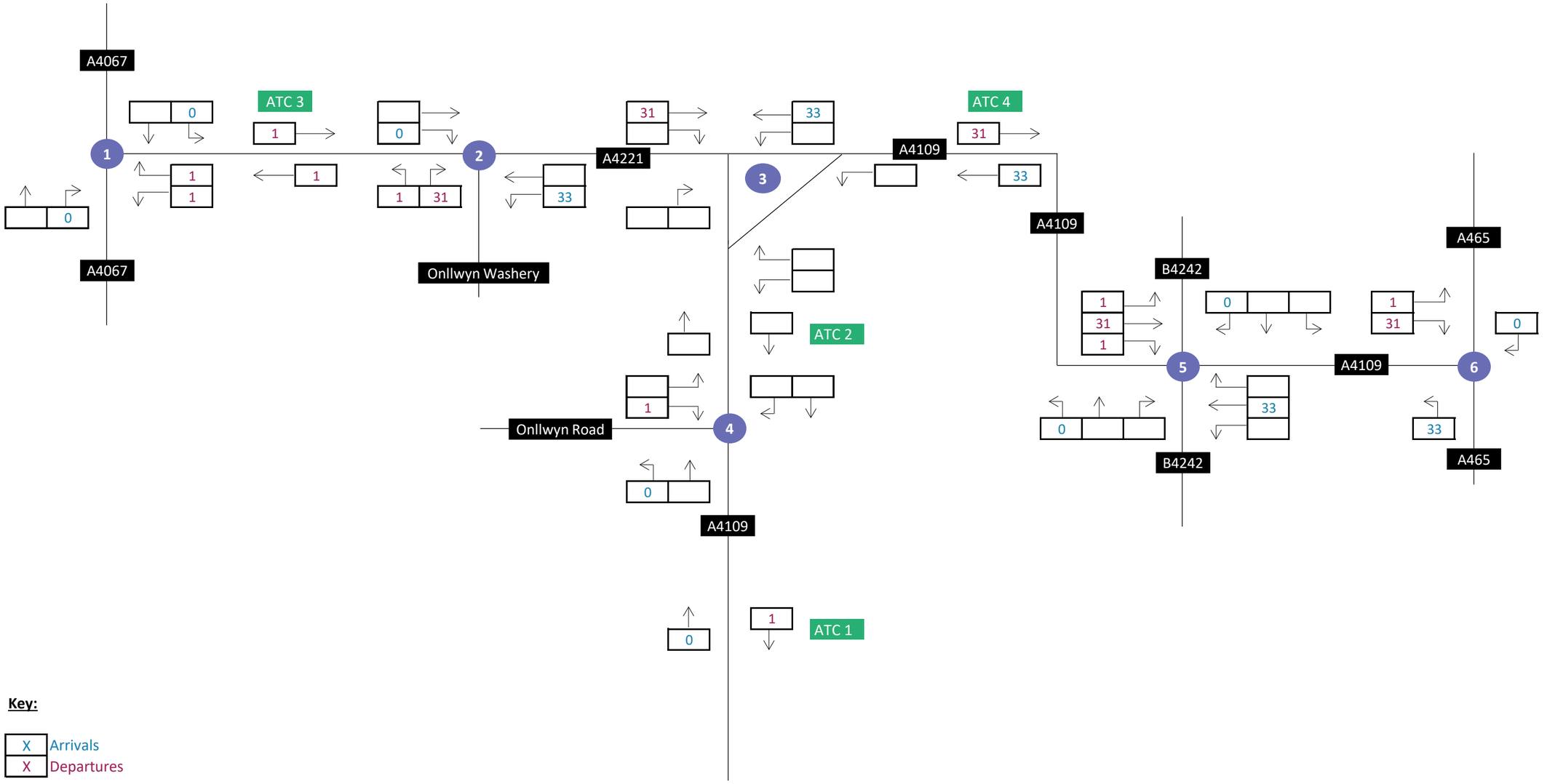
Global Centre of Rail Excellence	
Figure A25 - Operational Phase Development Trips, 12hr AAWT Veh	
264904-00	ARUP



Key:

X	Arrivals
X	Departures

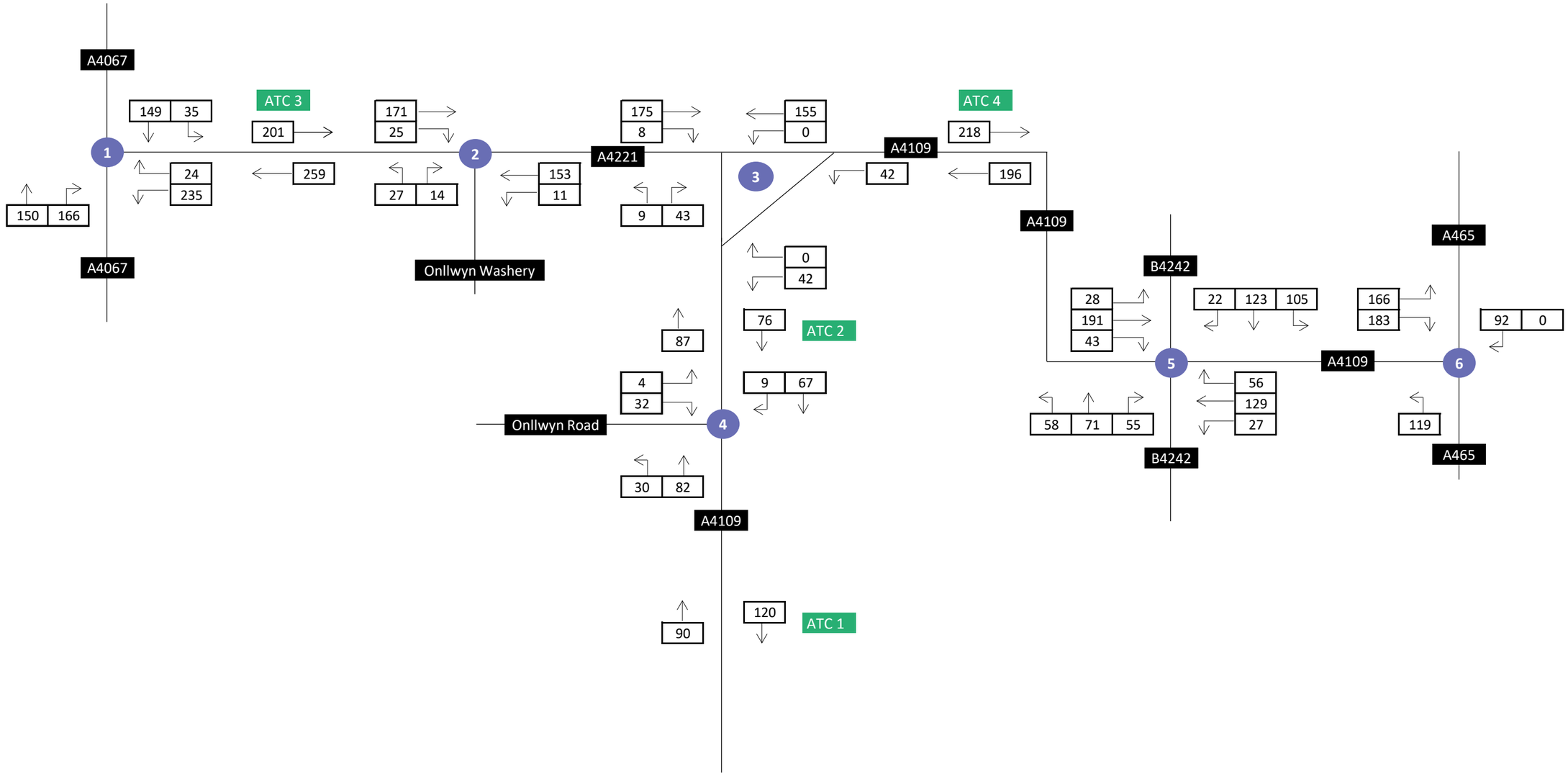
Global Centre of Rail Excellence	
Figure A26 - Operational Phase Development Trips, 24hr AADT, HGV Veh	
264904-00	ARUP



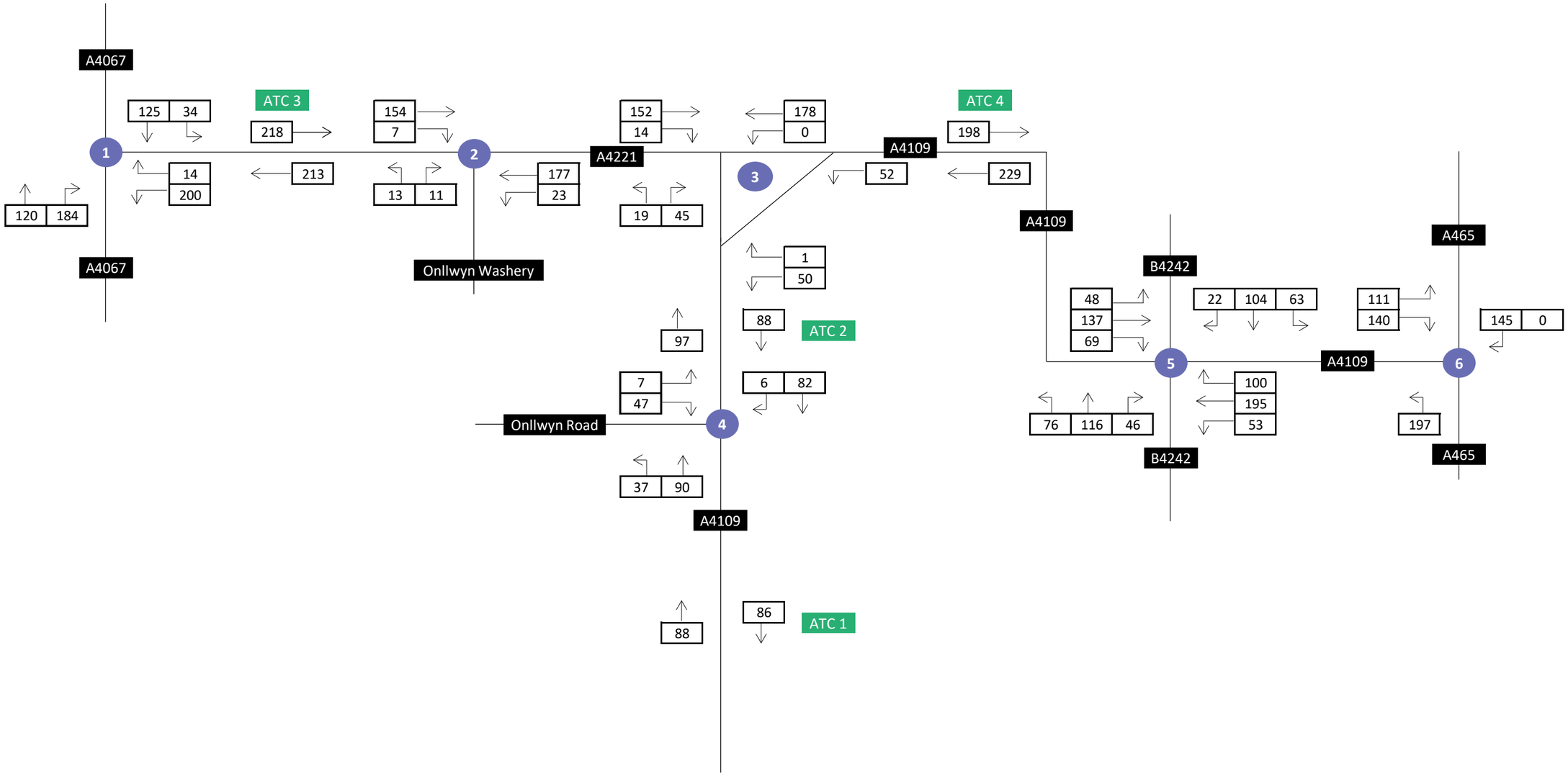
Key:

X	Arrivals
X	Departures

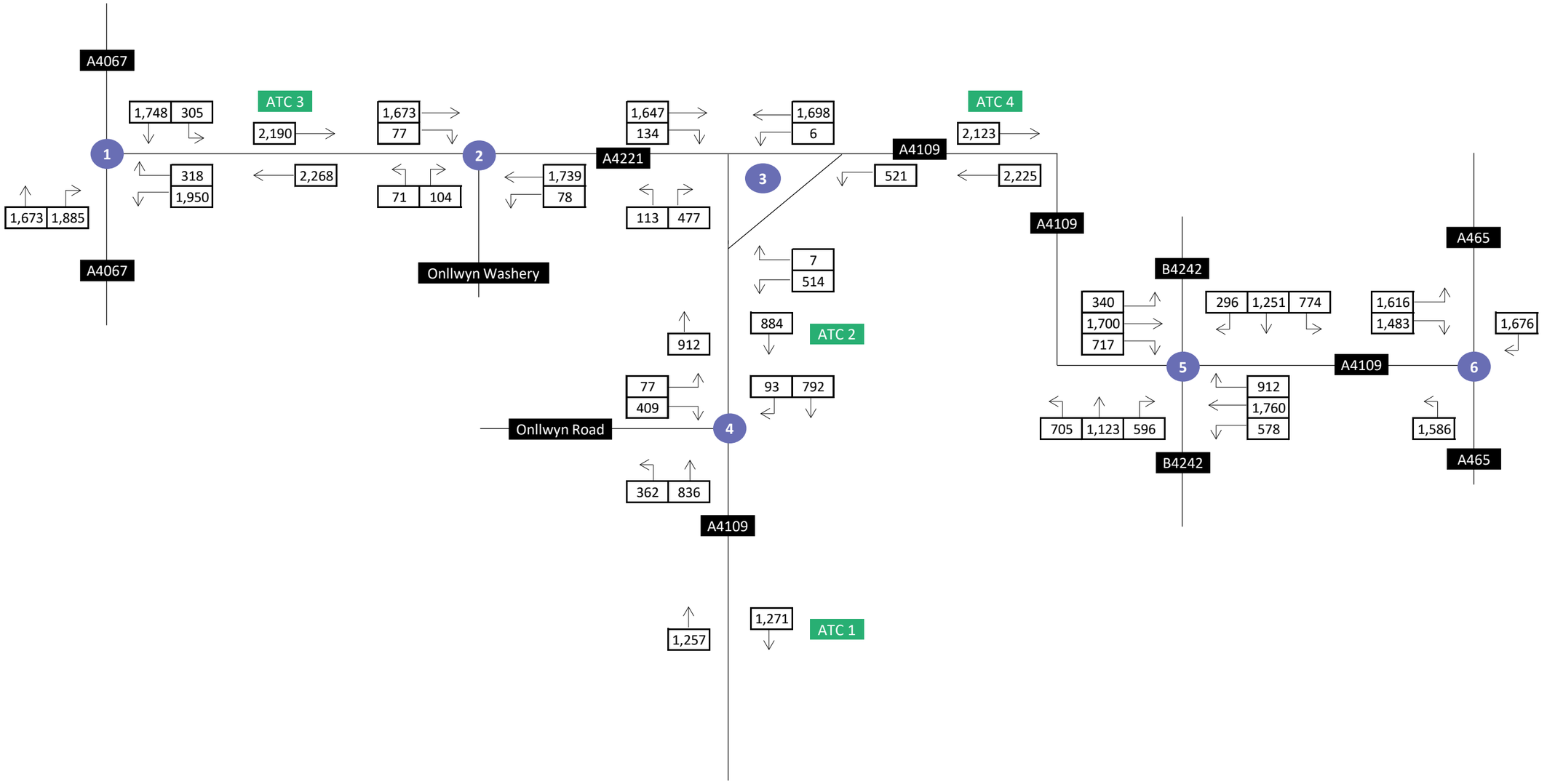
Global Centre of Rail Excellence	
Figure A27 - Operational Phase Development Trips, 12hr AADT, HGV Veh	
264904-00	ARUP



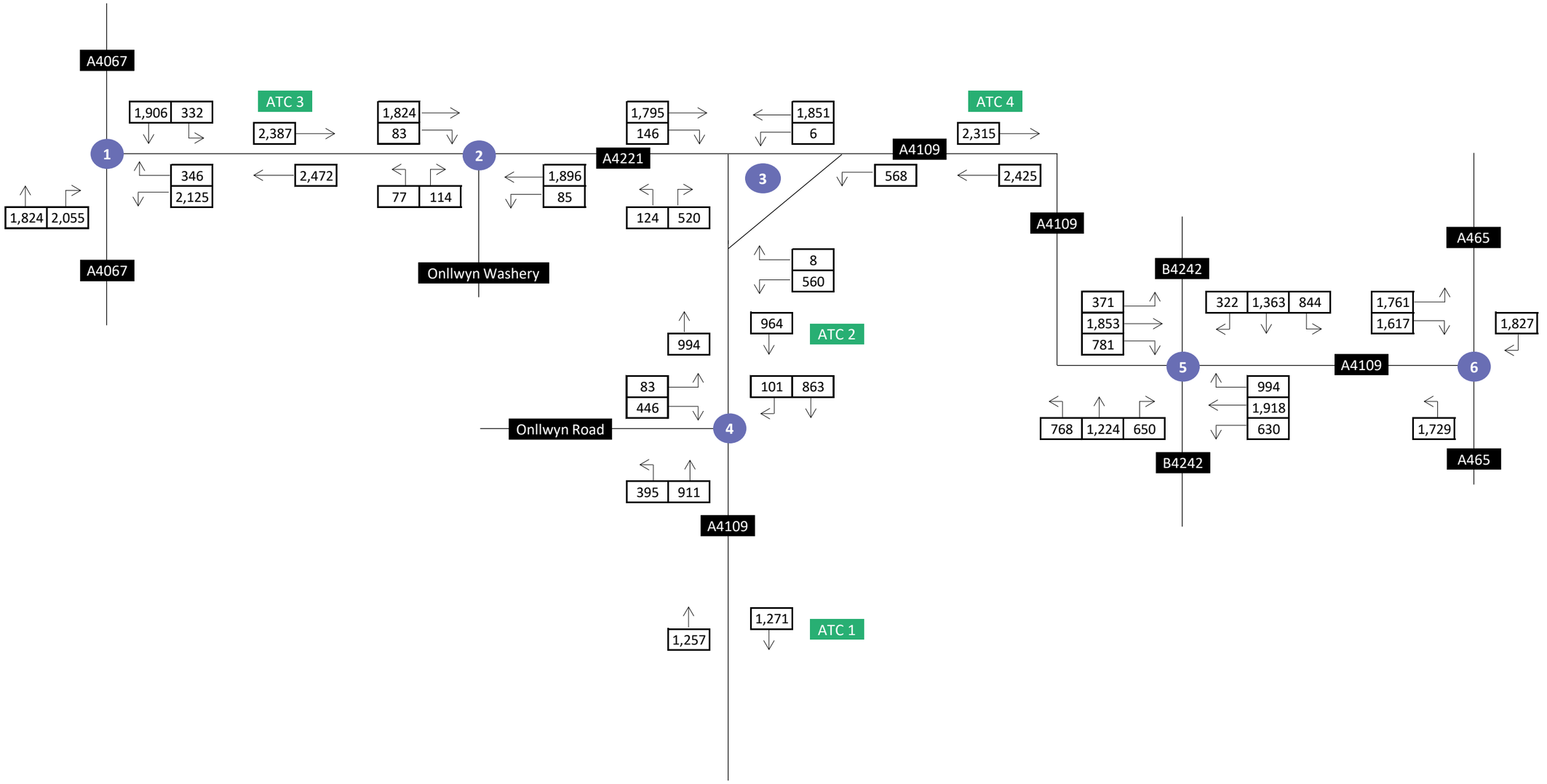
Global Centre of Rail Excellence	
Figure A28 - 2020 Base, AM Peak Hour (08:00-09:00) PCUs	
264904-00	ARUP



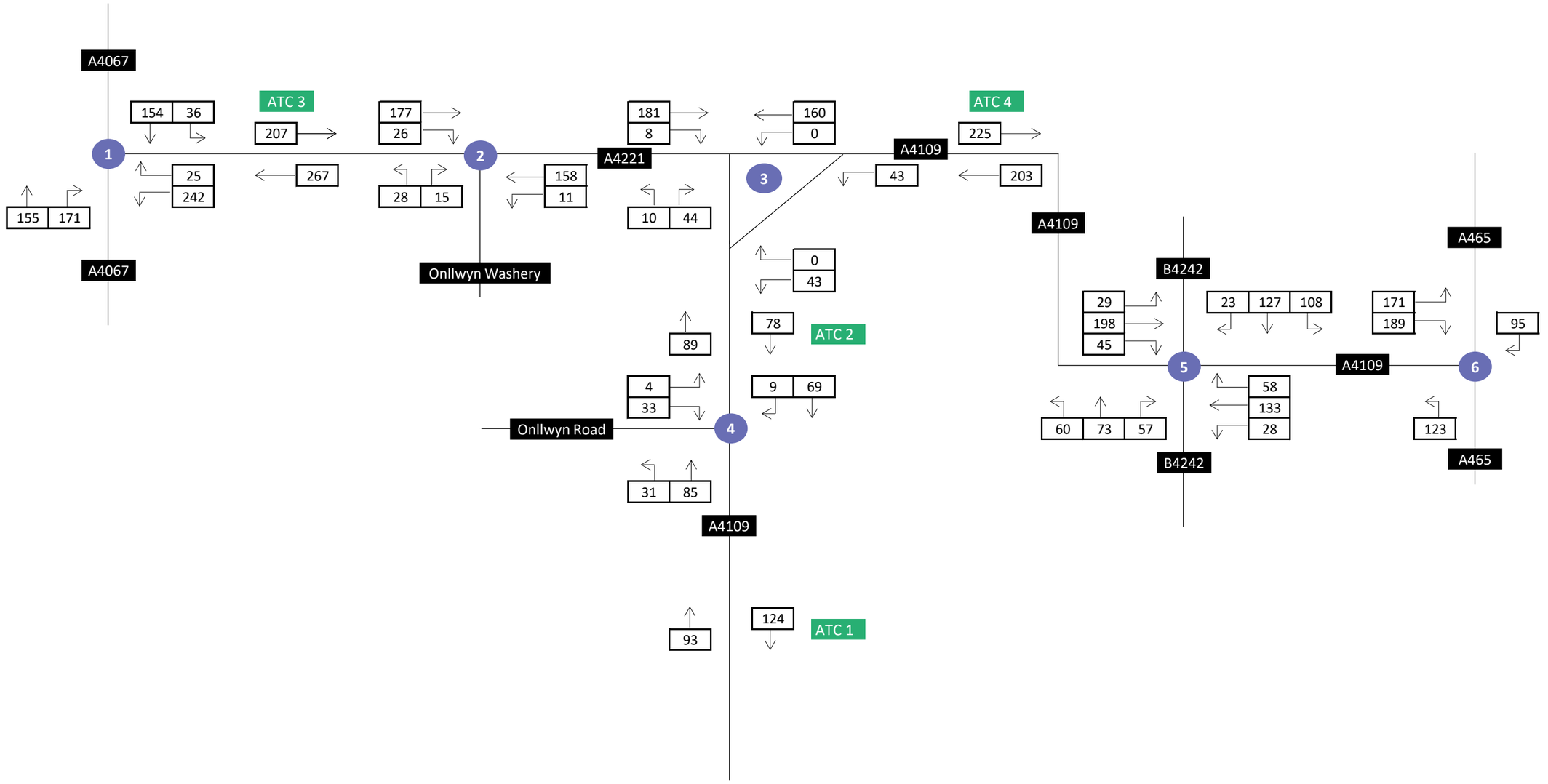
Global Centre of Rail Excellence	
Figure A29 - 2020 Base, PM Peak Hour (15:00-16:00) PCUs	
264904-00	ARUP



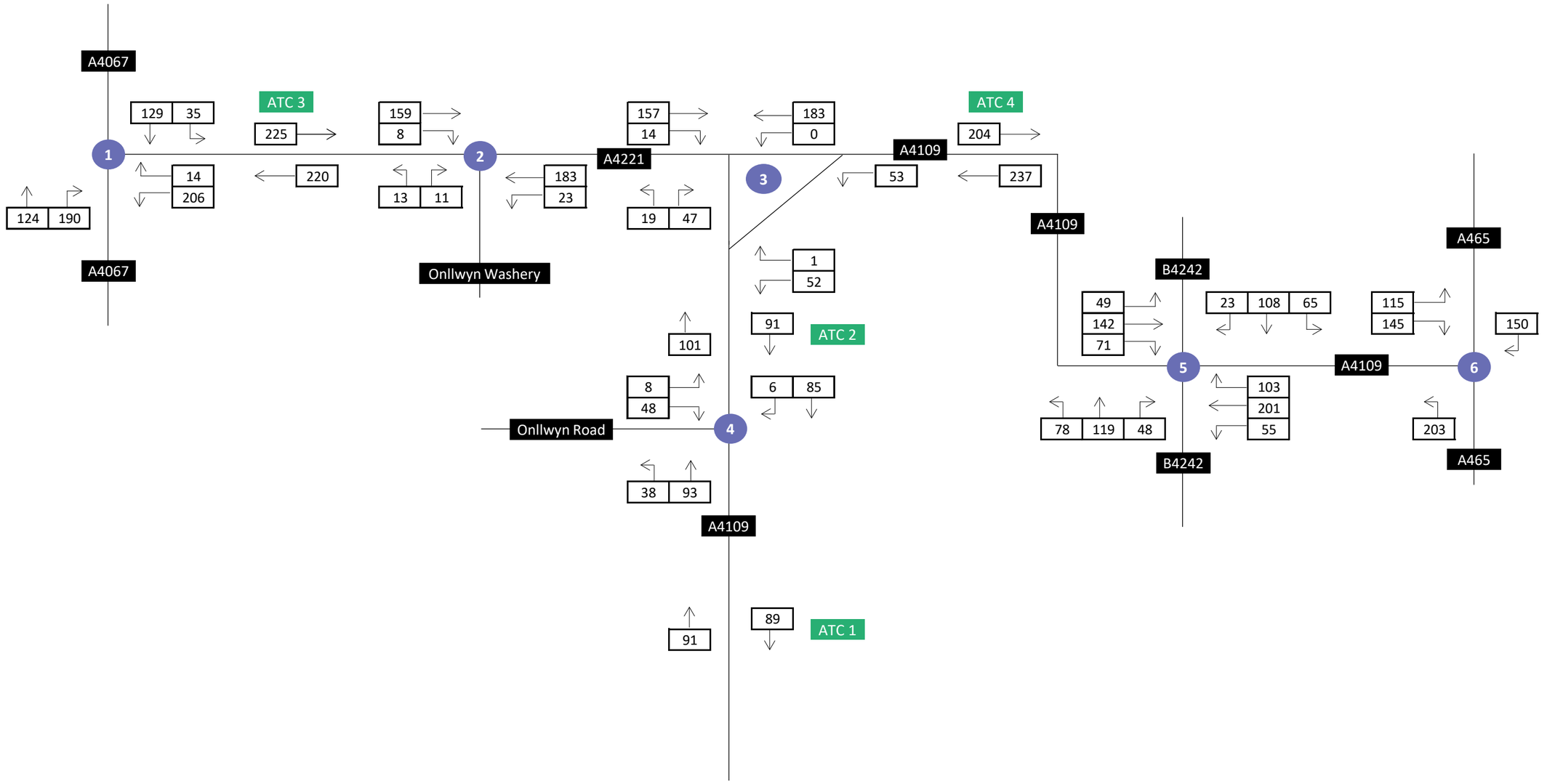
Global Centre of Rail Excellence	
Figure A30 - 2020 Base, 24hr AADT Veh	
264904-00	ARUP



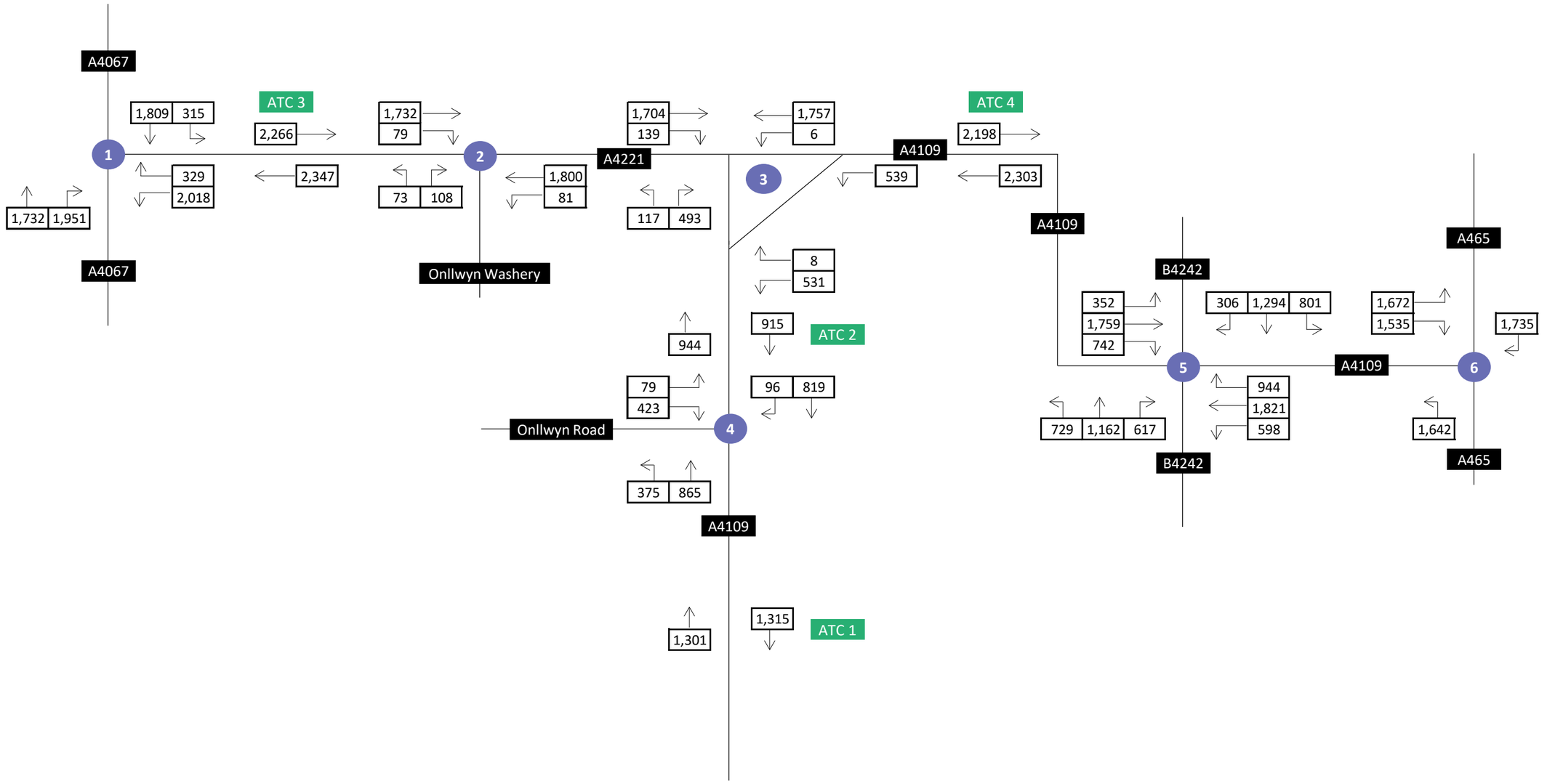
Global Centre of Rail Excellence	
Figure A31 - 2020 Base, 12hr AAWT Veh	
264904-00	ARUP



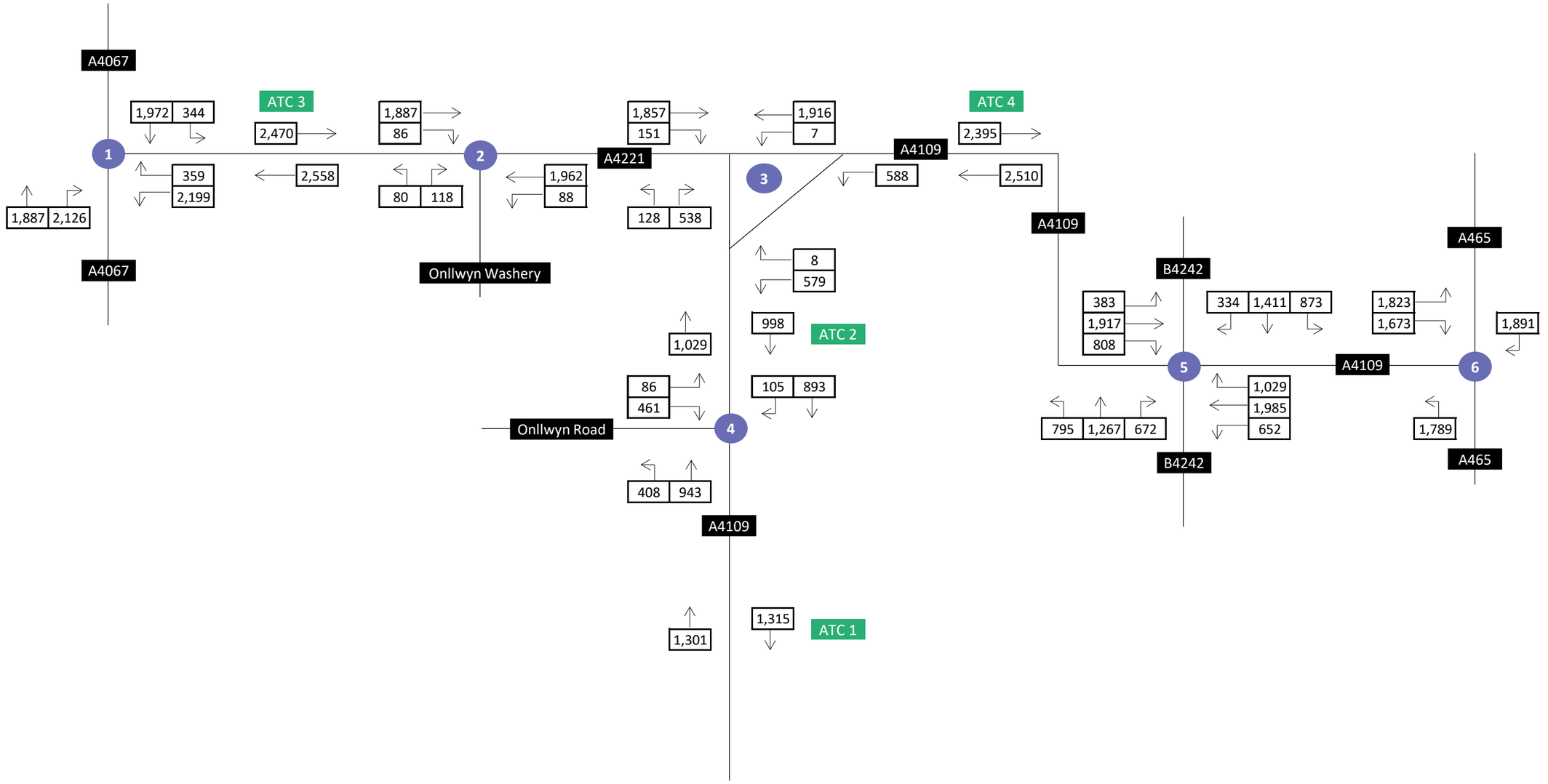
Global Centre of Rail Excellence	
Figure A32 - 2024 Base, AM Peak Hour (08:00-09:00) PCUs	
264904-00	ARUP



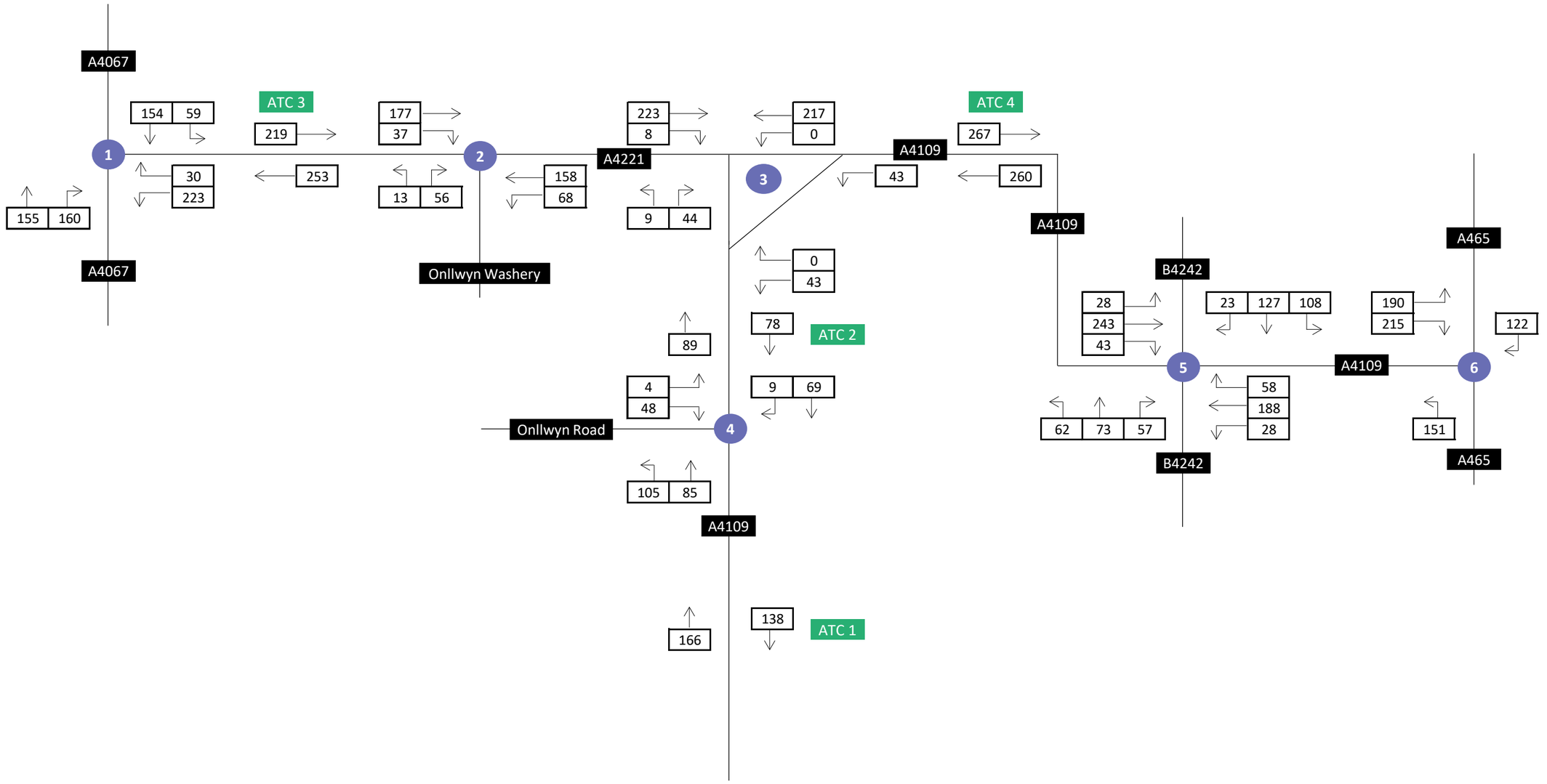
Global Centre of Rail Excellence	
Figure A33 - 2024 Base, PM Peak Hour (15:00-16:00) PCUs	
264904-00	ARUP



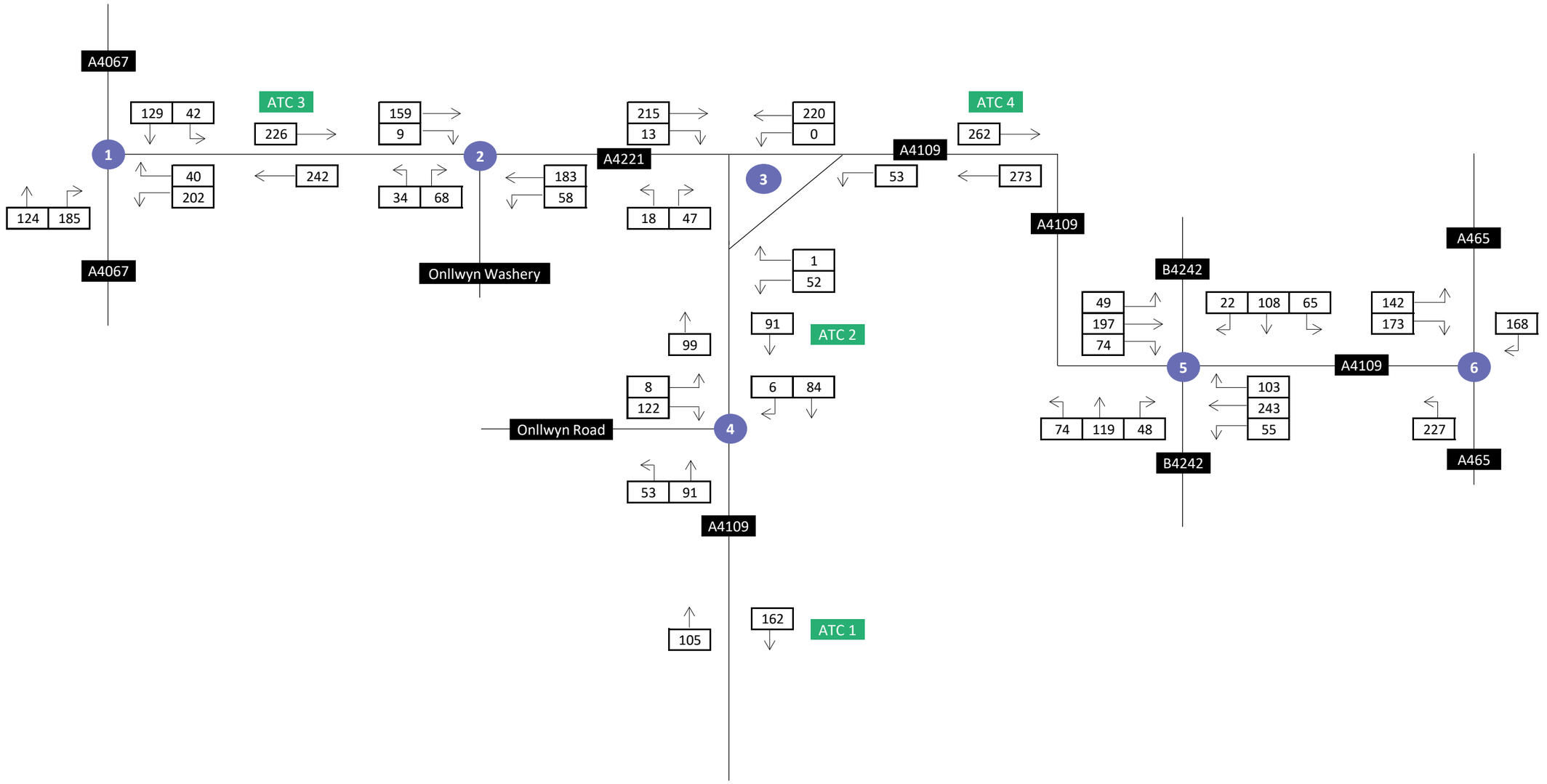
Global Centre of Rail Excellence	
Figure A24 - 2024 Base, 24hr AADT Veh	
264904-00	ARUP



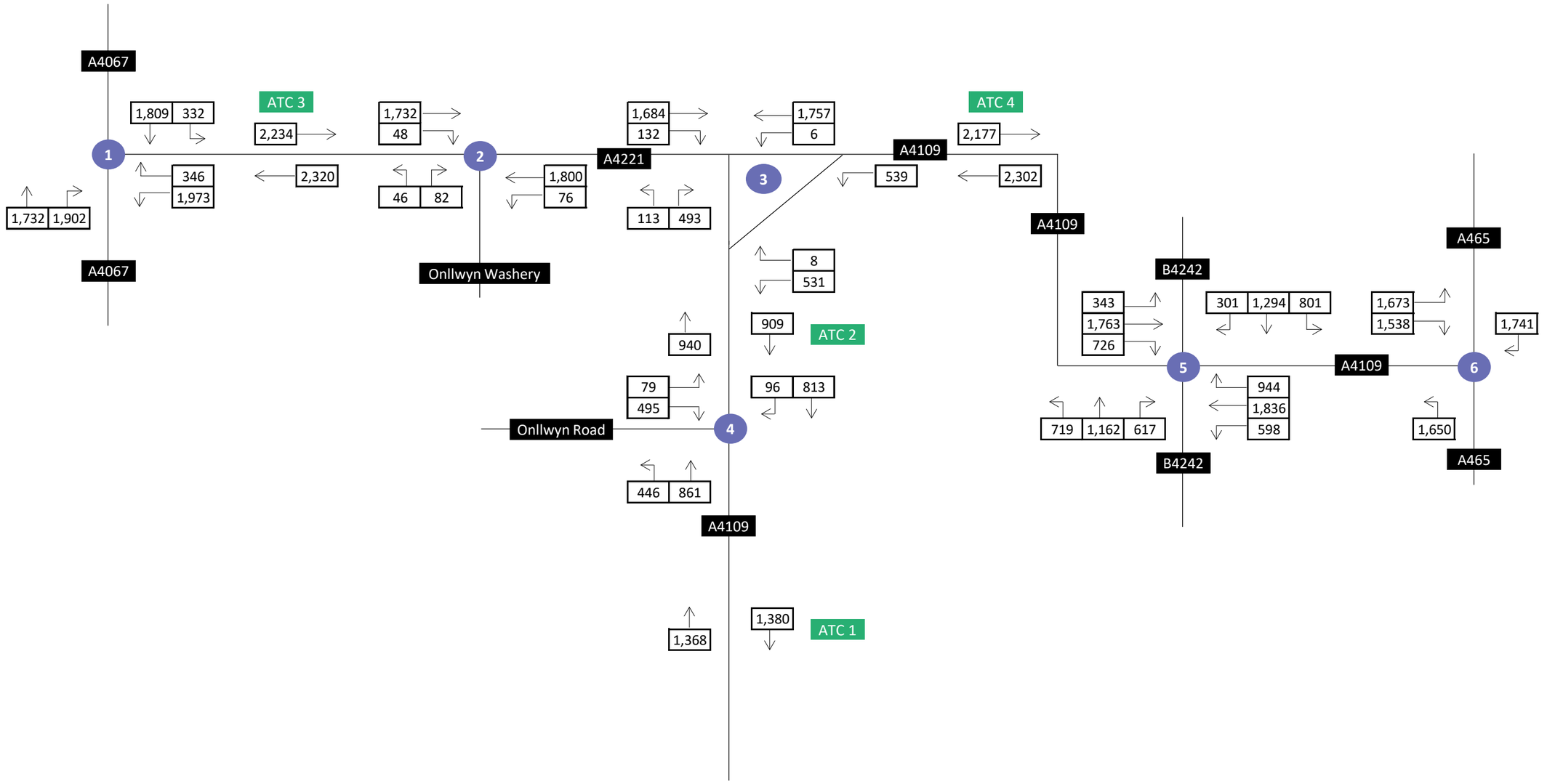
Global Centre of Rail Excellence	
Figure A35 - 2024 Base, 12hr AAWT Veh	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A36 - 2024 With Phase 2 Construction Traffic Flows, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A37 - 2024 With Phase 2 Construction Traffic Flows, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A38 - 2024 With Phase 2 Construction Traffic Flows, 24hr AADT Veh	
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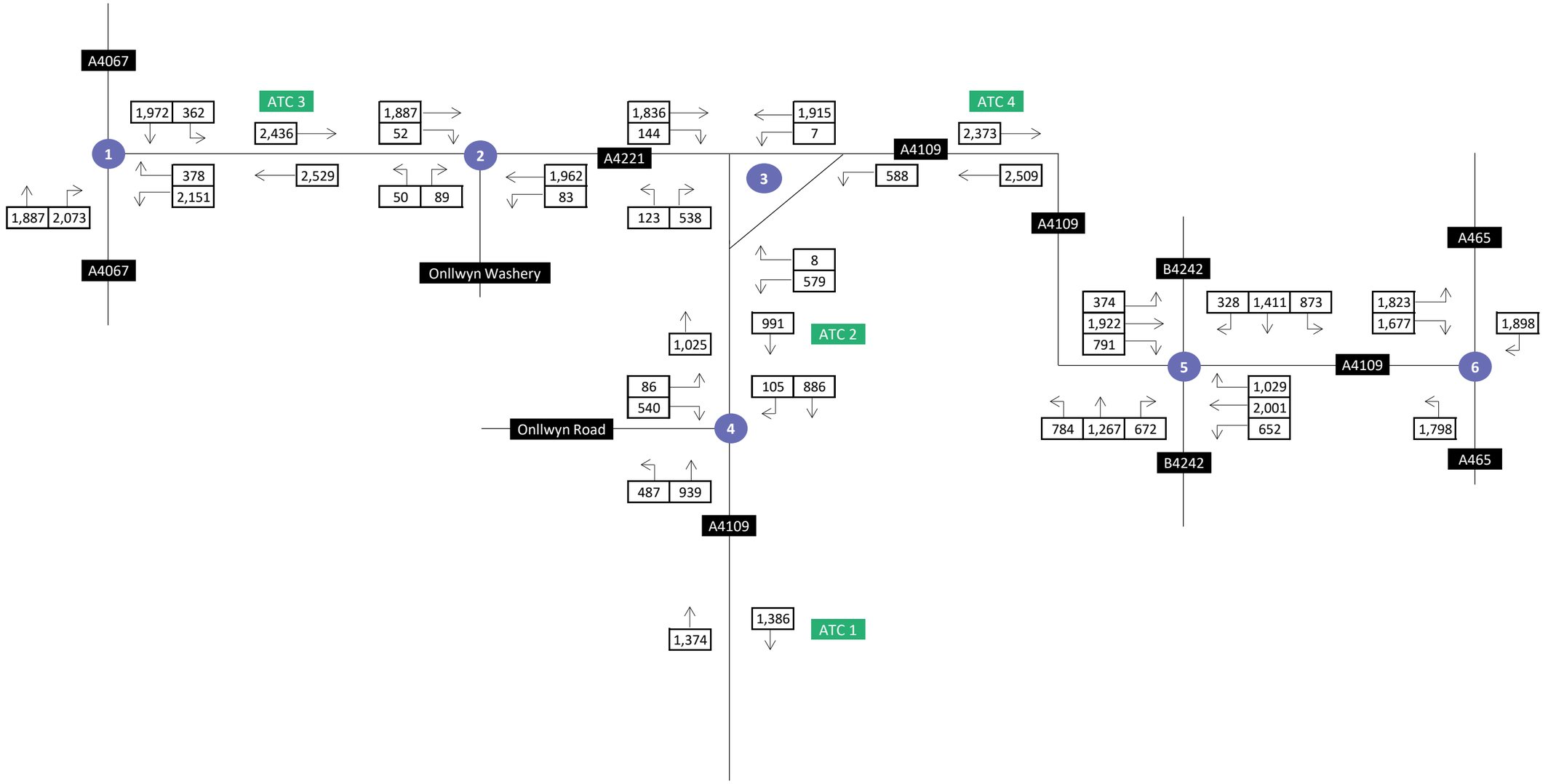
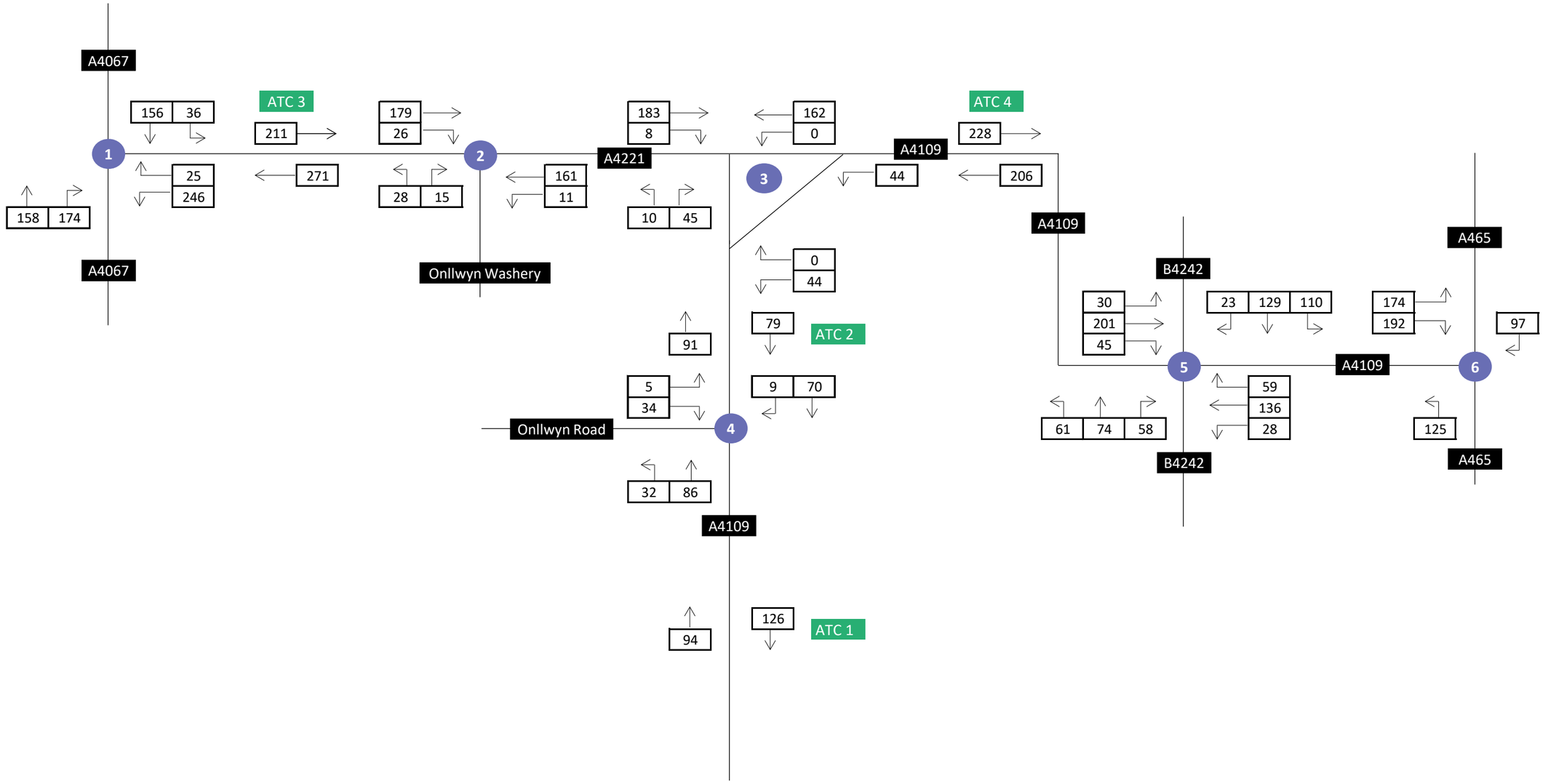
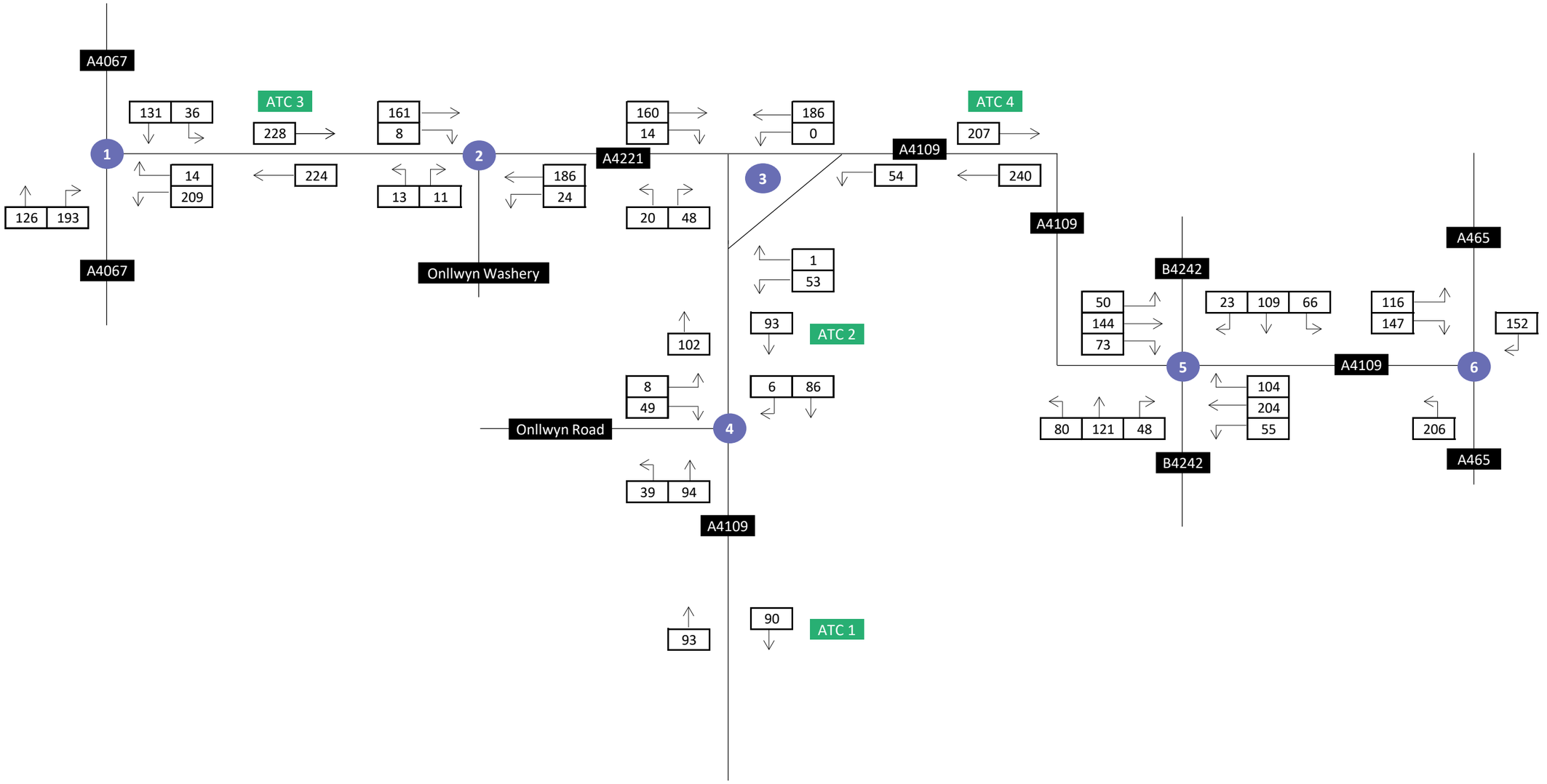


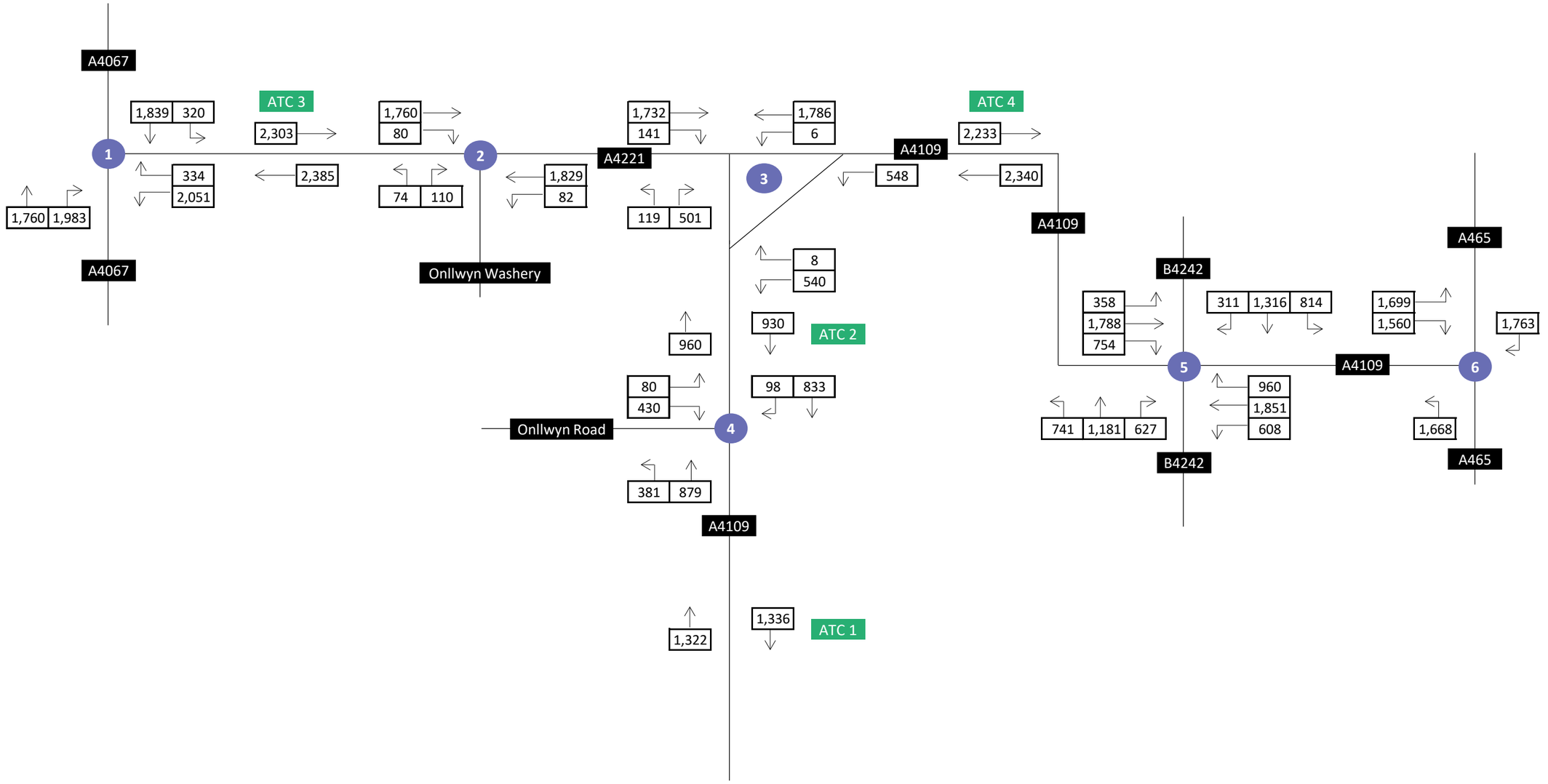
Global Centre of Rail Excellence	
Figure A39 - 2024 With Phase 2 Construction Traffic Flows, 12hr AAWT Veh	
264904-00	ARUP



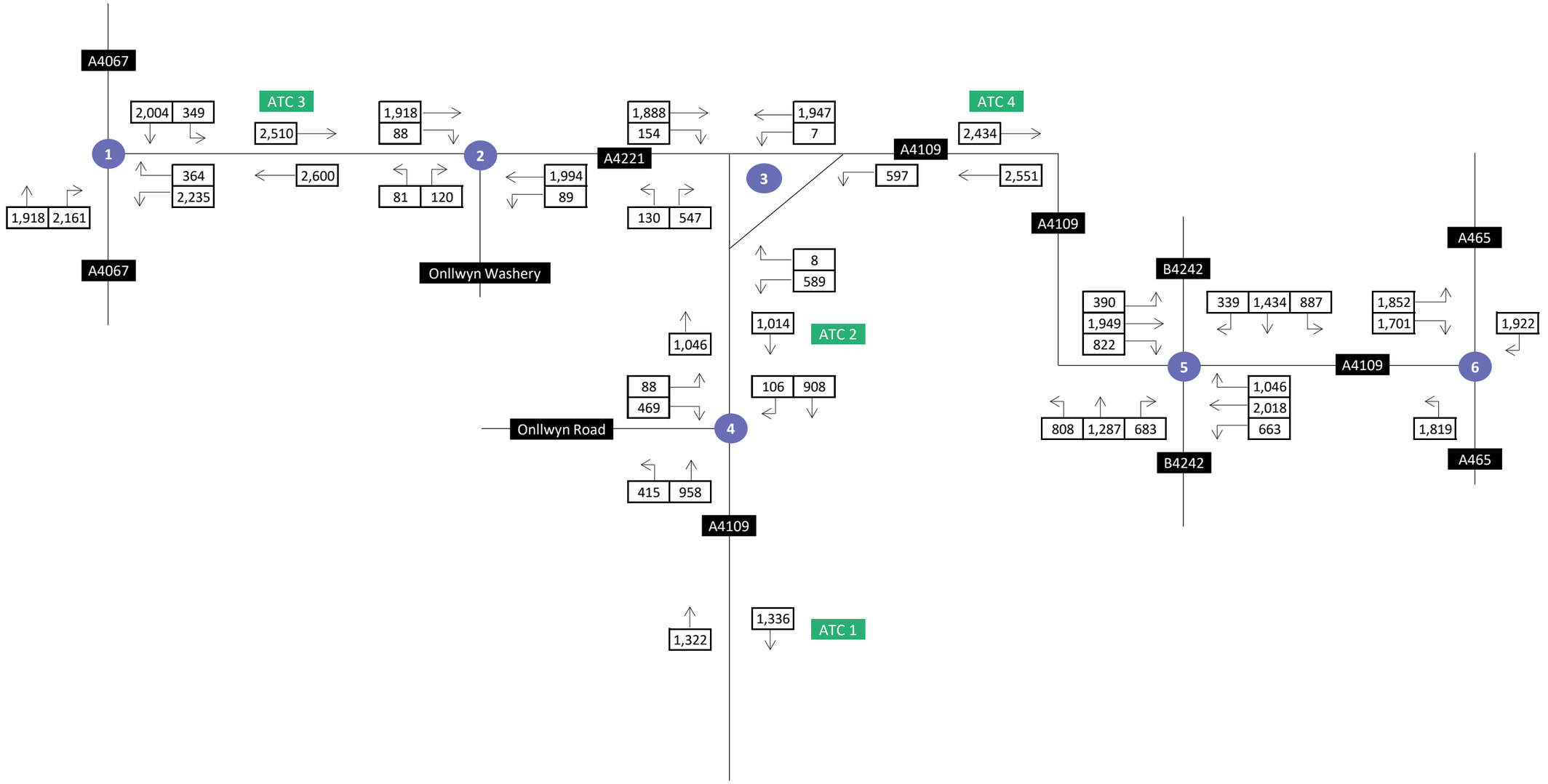
Global Centre of Rail Excellence	
Figure A40 - 2026 Base, AM Peak Hour (08:00-09:00) PCUs	
264904-00	ARUP



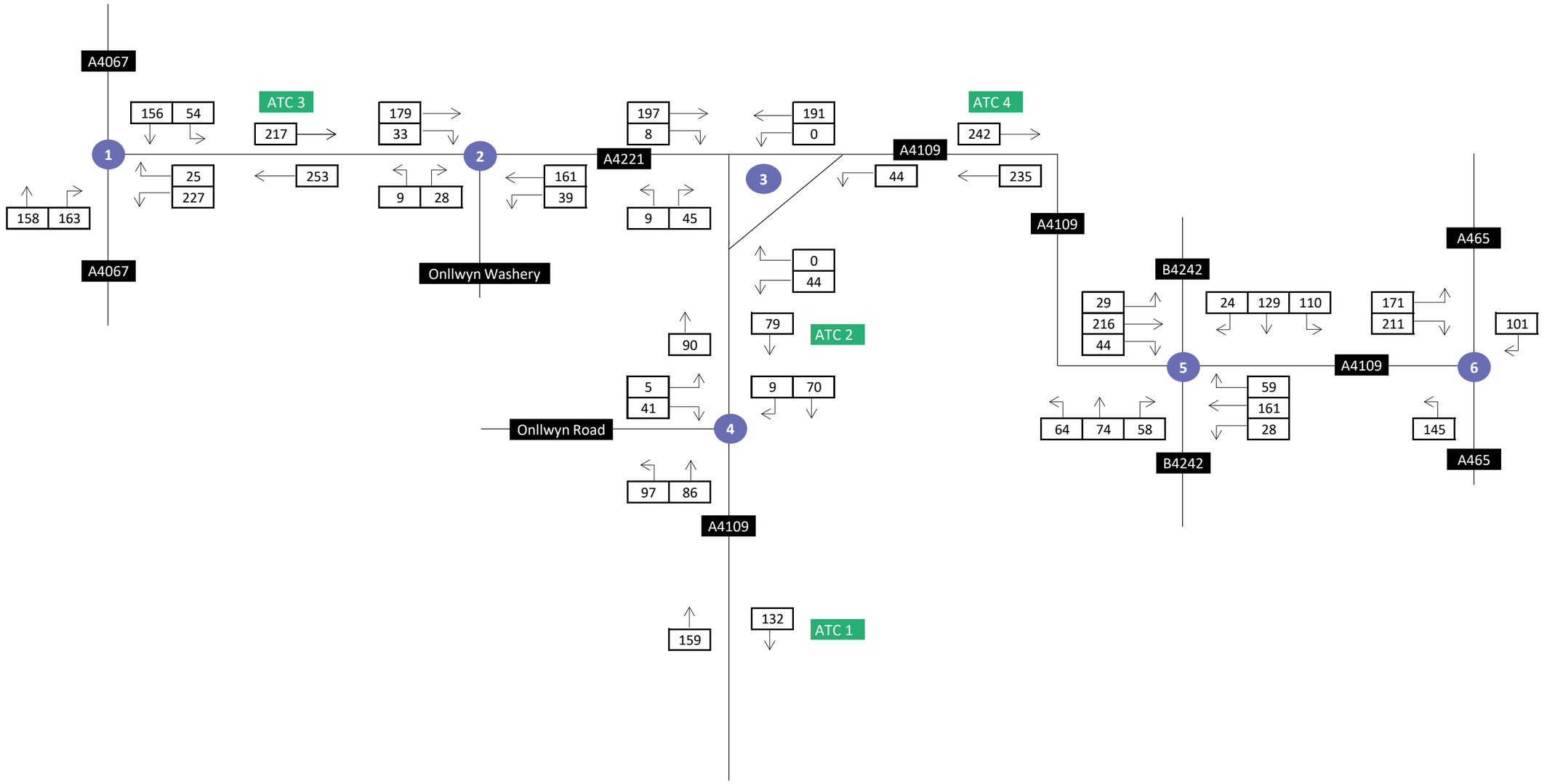
Global Centre of Rail Excellence	
Figure A41 - 2026 Base, PM Peak Hour (15:00-16:00) PCUs	
264904-00	ARUP



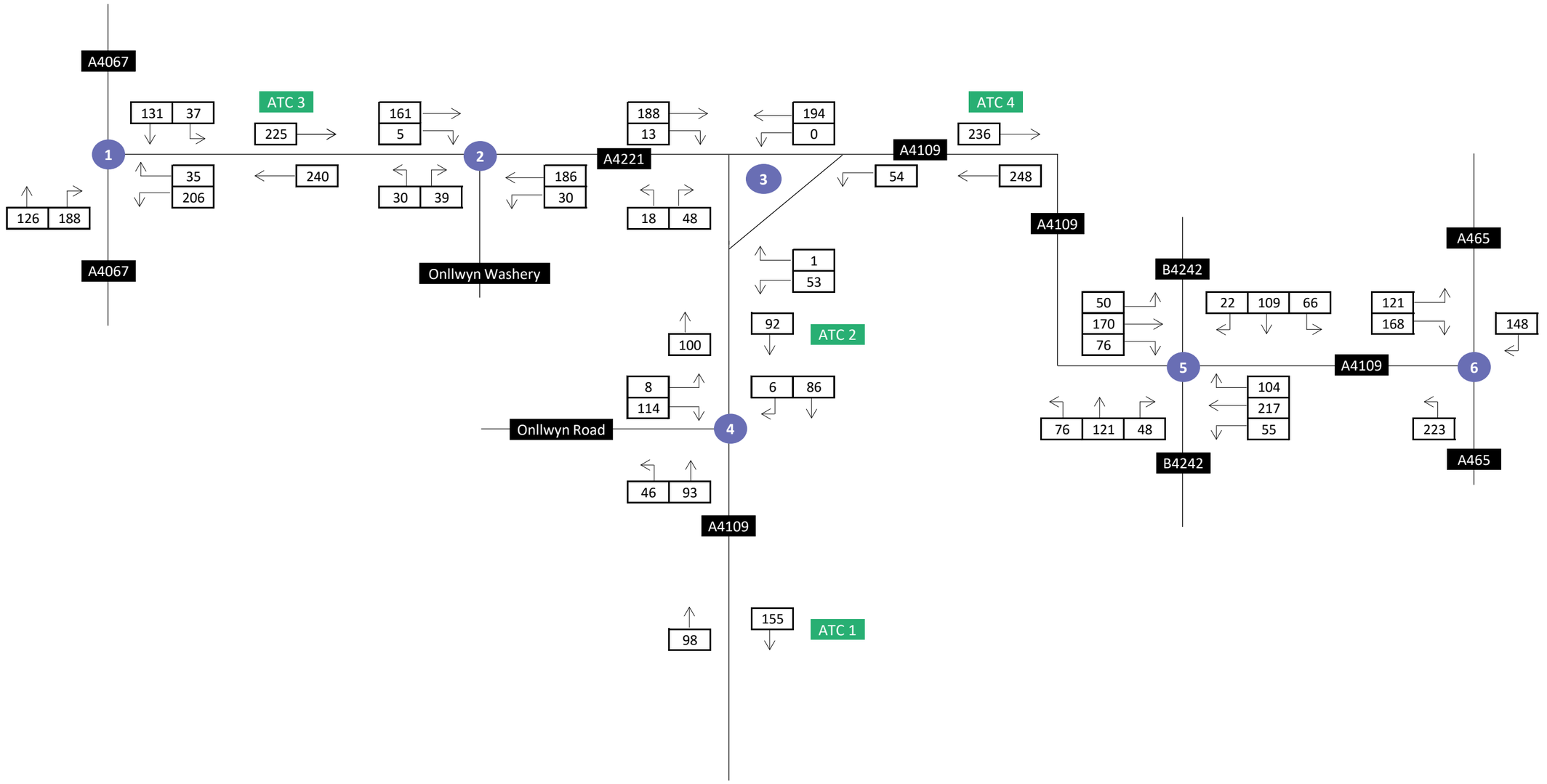
Global Centre of Rail Excellence	
Figure A42 - 2026 Base, 24hr AADT Veh	
264904-00	ARUP



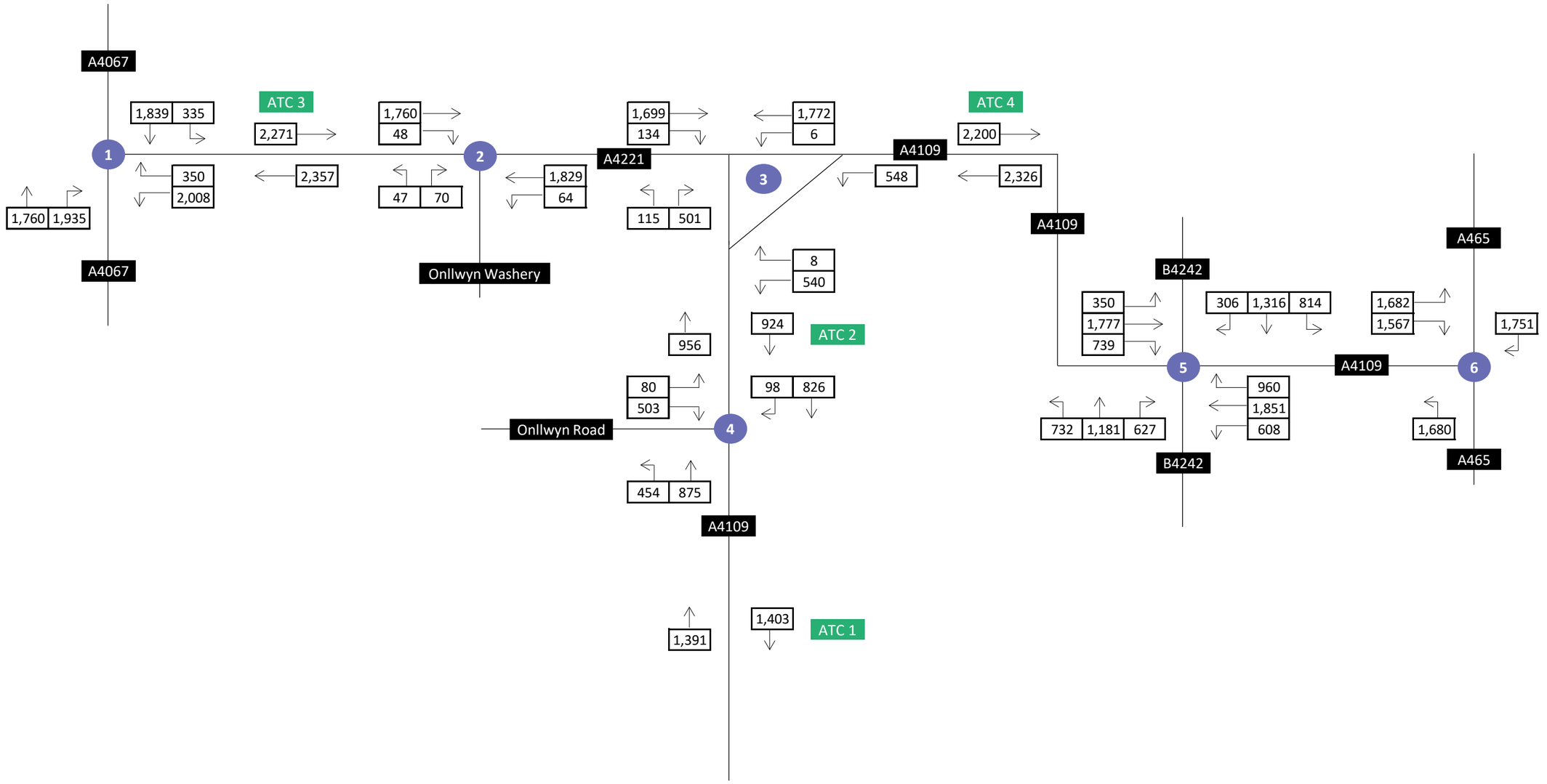
Global Centre of Rail Excellence	
Figure A43 - 2026 Base, 12hr AAWT Veh	
264904-00	ARUP



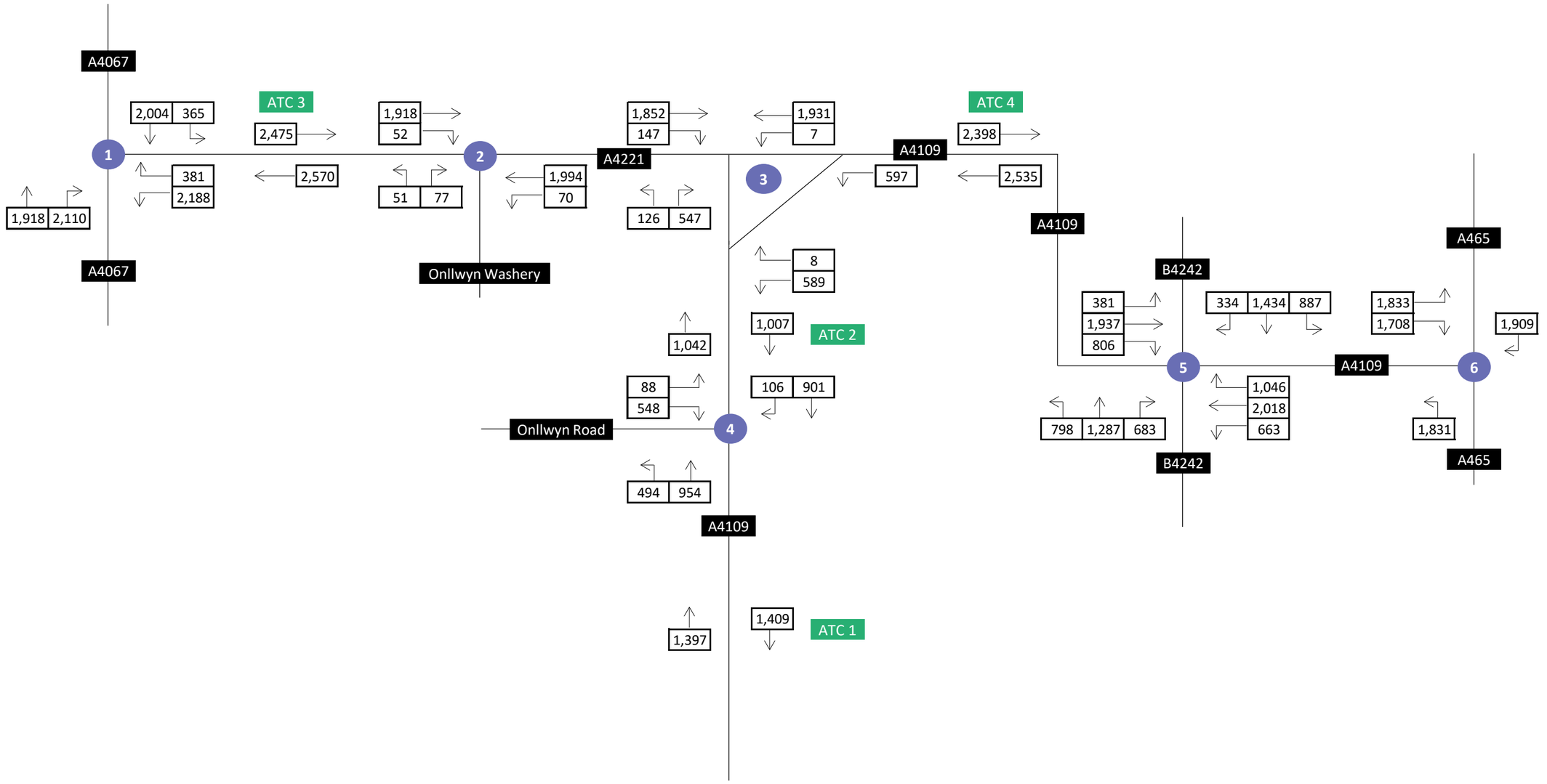
Global Centre of Rail Excellence	
Figure A44 - 2026 With Operational Development Trips, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



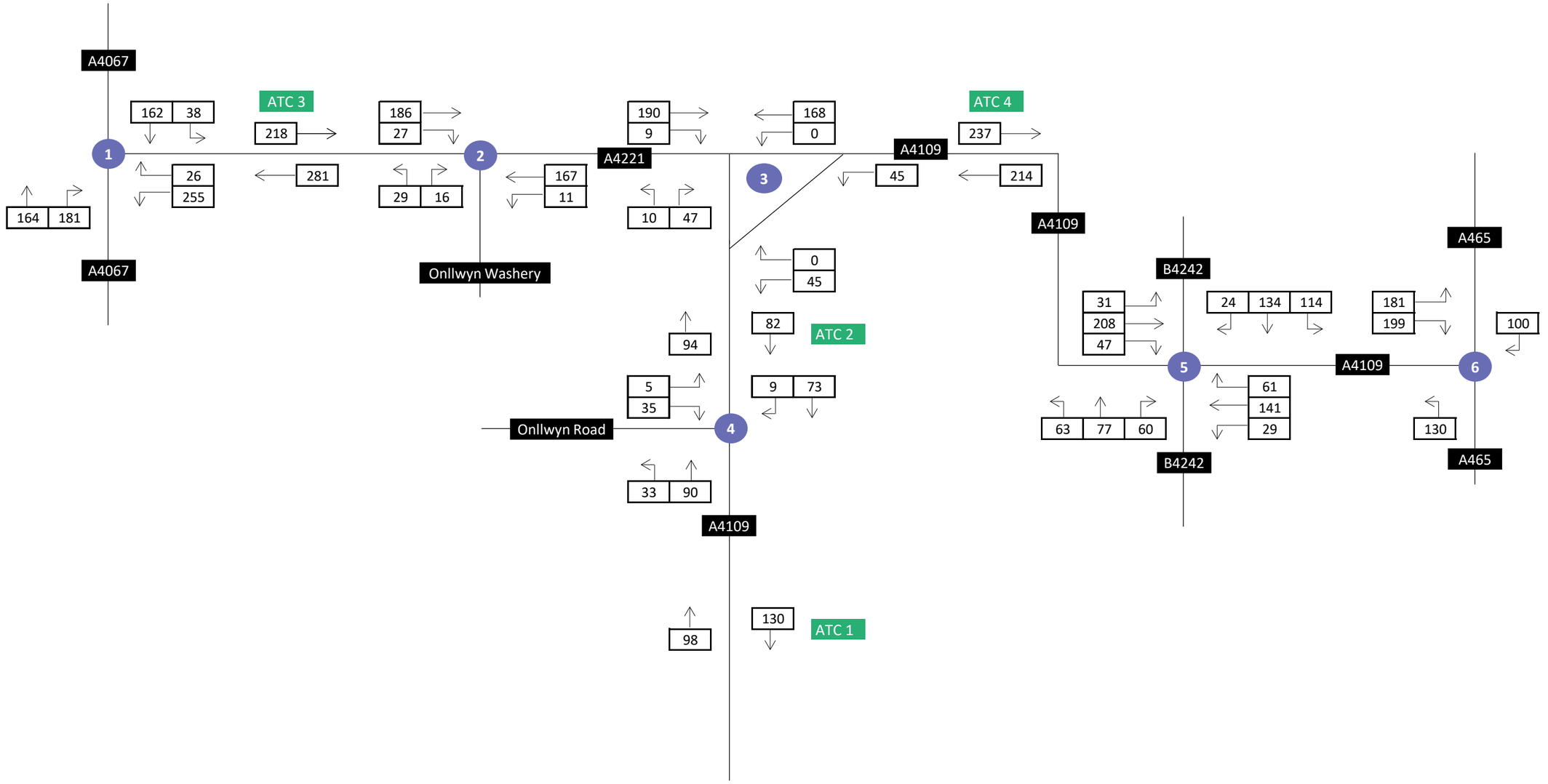
Global Centre of Rail Excellence	
Figure A45 - 2026 With Operational Development Trips, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



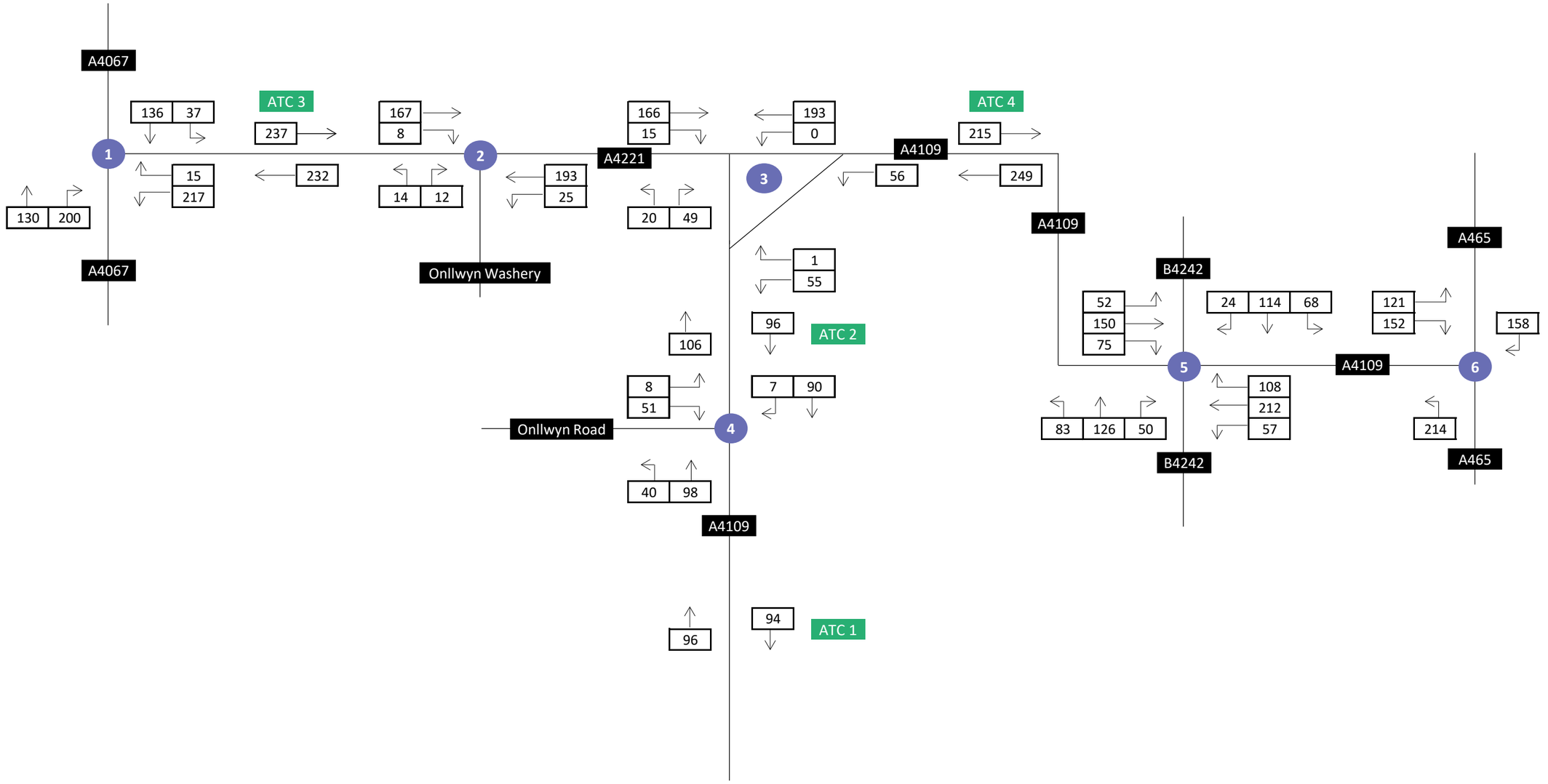
Global Centre of Rail Excellence	
Figure A46 - 2026 With Operational Development Trips, 24hr AADT Veh	
264904-00	ARUP



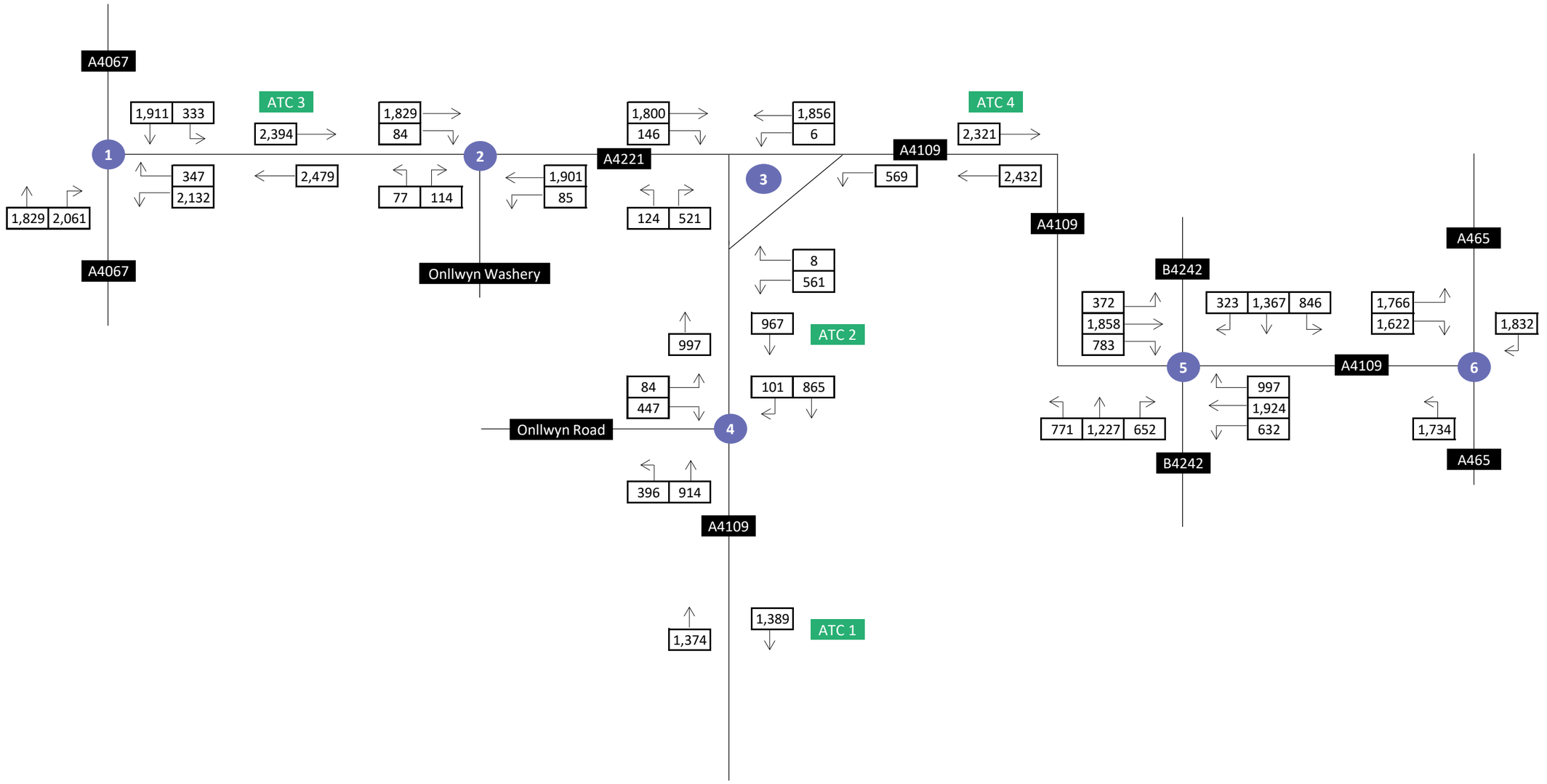
Global Centre of Rail Excellence	
Figure A47 - 2026 With Operational Development Trips, 12hr AAWT Veh	
264904-00	ARUP



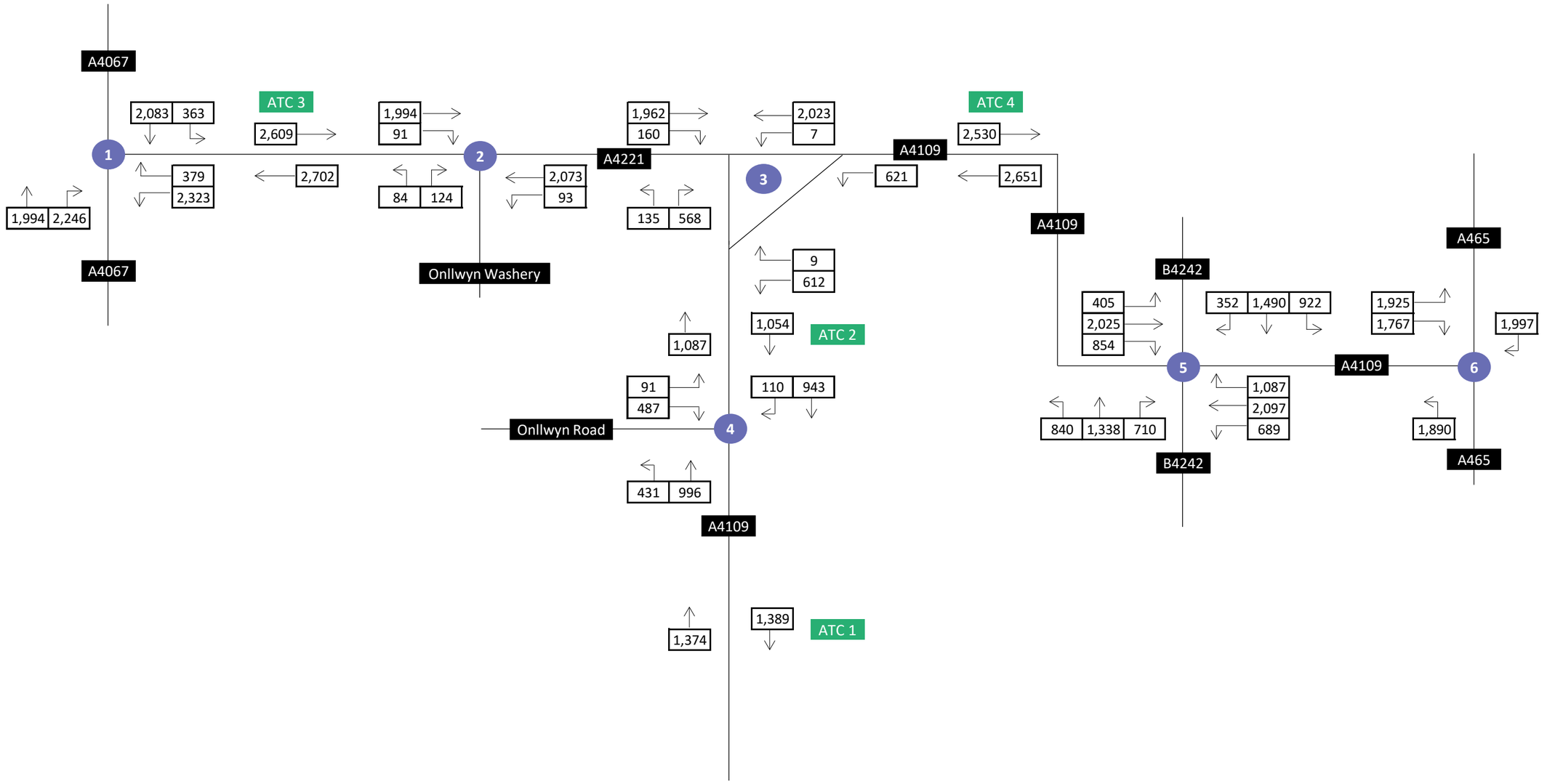
Global Centre of Rail Excellence	
Figure A48 - 2031 Base, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



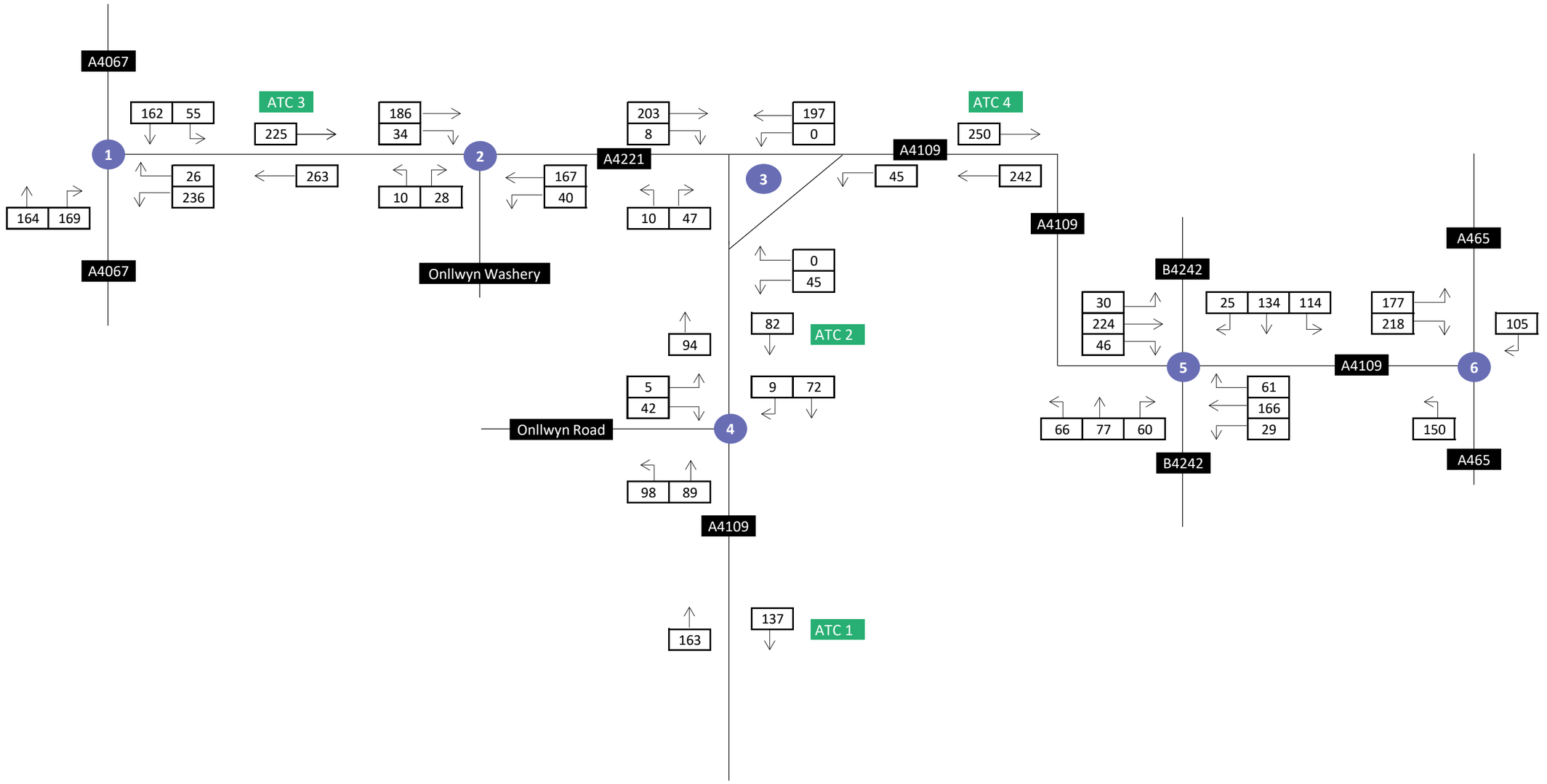
Global Centre of Rail Excellence	
Figure A49 - 2031 Base, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



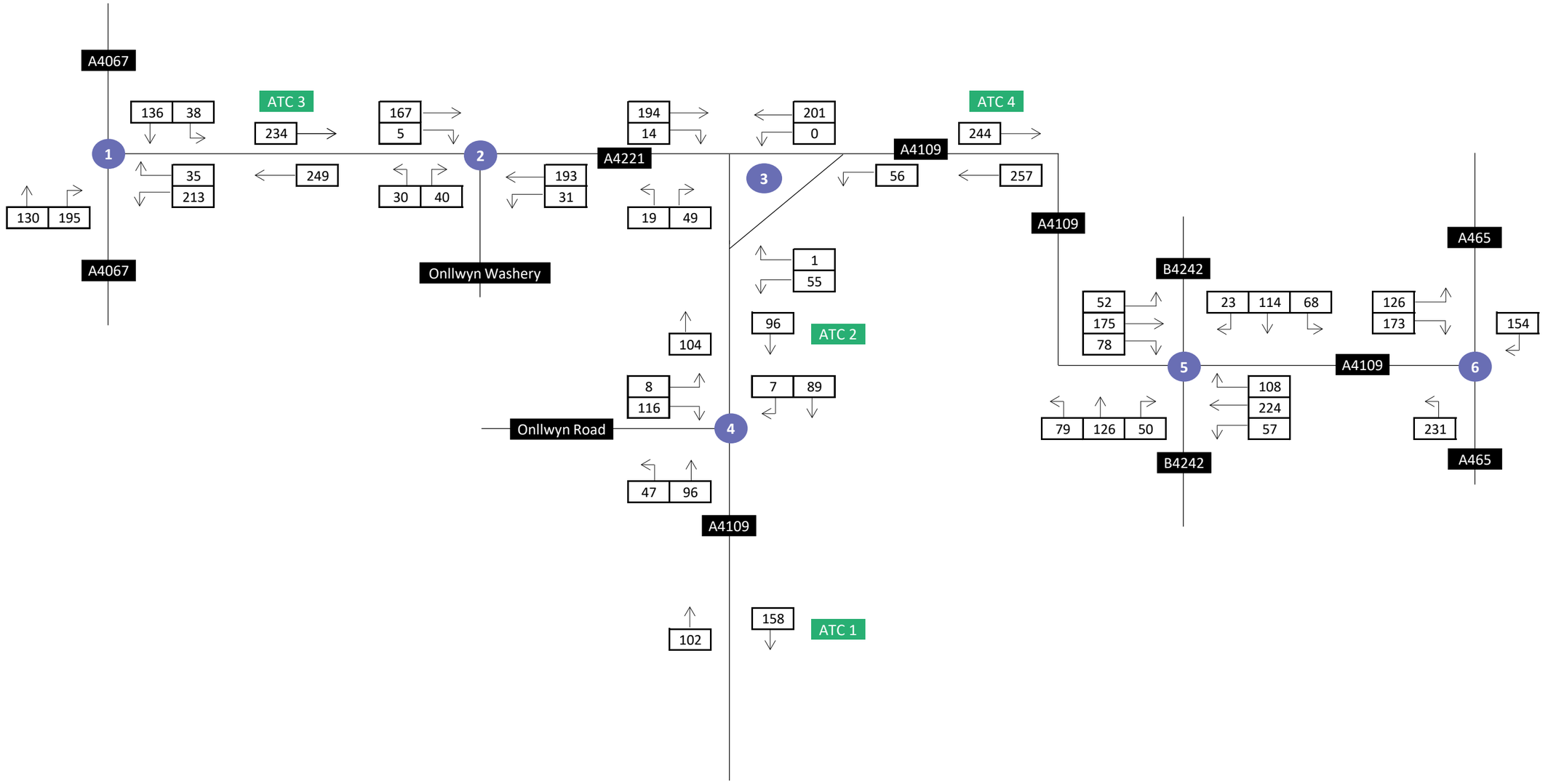
Global Centre of Rail Excellence	
Figure A50 - 2031 Base, 24hr AADT Veh	
264904-00	ARUP



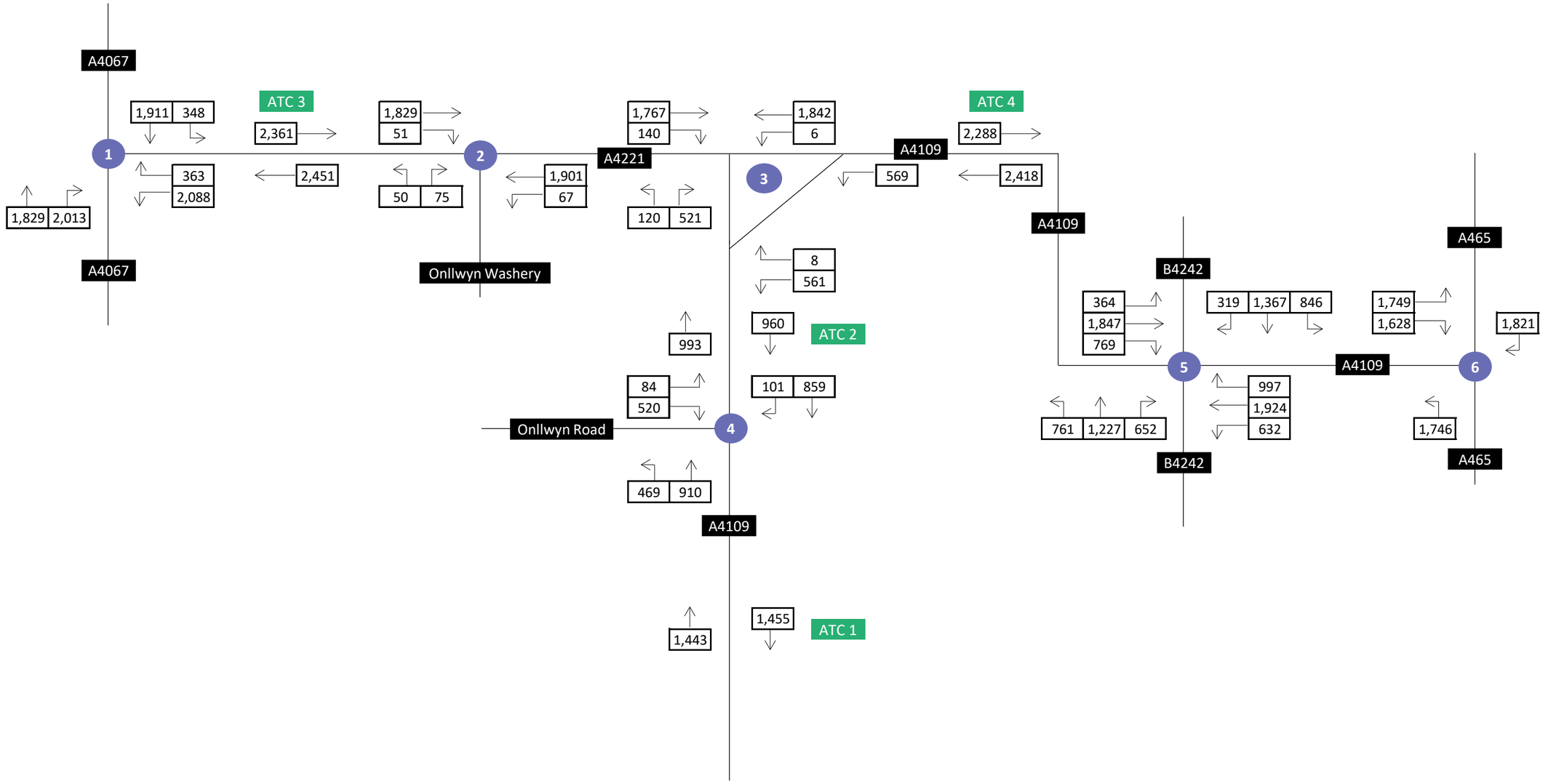
Global Centre of Rail Excellence	
Figure A51 - 2031 Base, 12hr AAWT Veh	
264904-00	ARUP



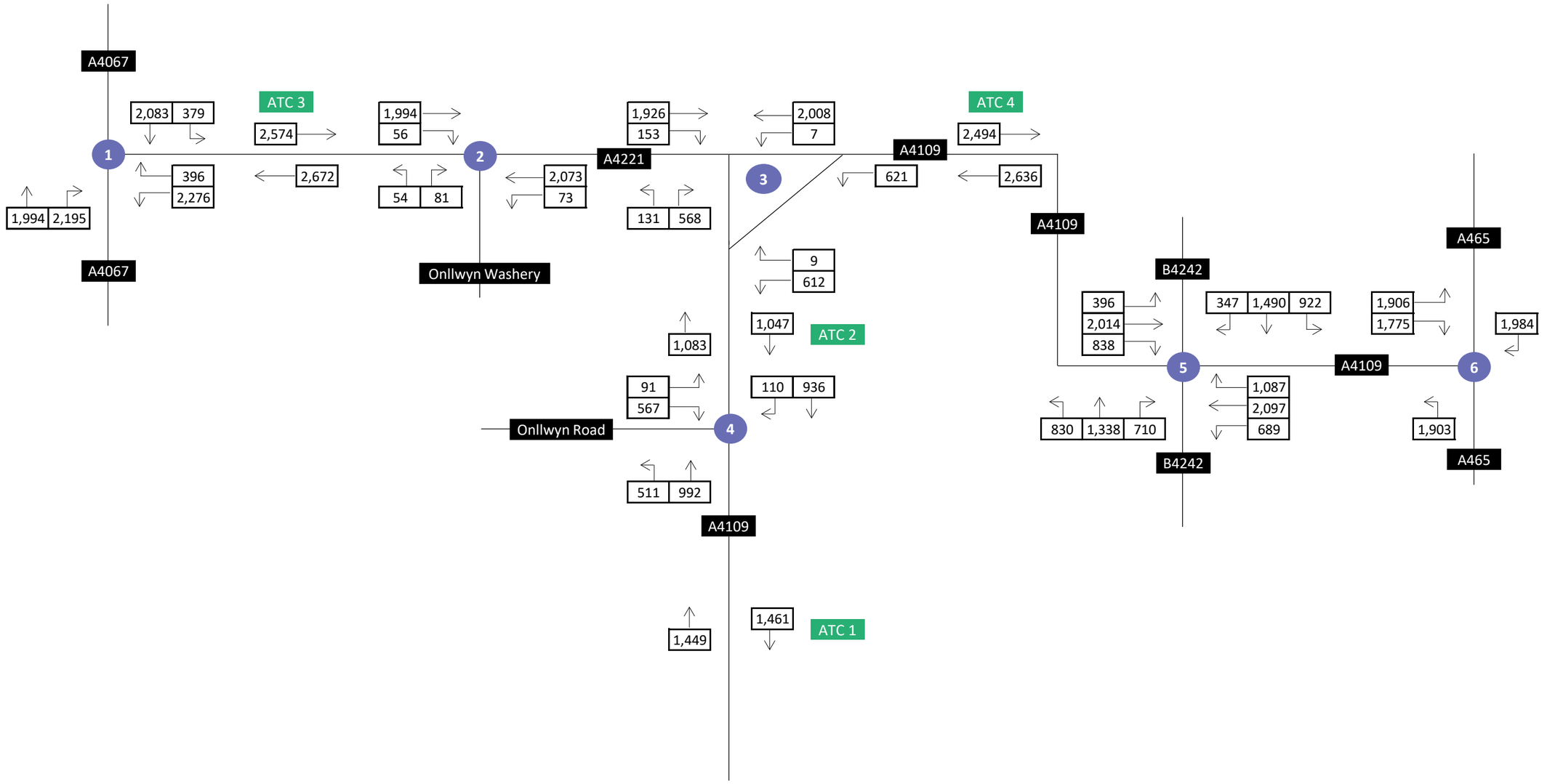
Global Centre of Rail Excellence	
Figure A52 - 2031 With Operational Development Trips, AM Peak Hour (08:00-09:00) Vehs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A53 - 2031 With Operational Development Trips, PM Peak Hour (15:00-16:00) Vehs	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A54 - 2031 With Operational Development Trips, 24hr AADT Veh	
264904-00	ARUP



Global Centre of Rail Excellence	
Figure A55 - 2031 With Operational Development Trips, 12hr AAWT Veh	
264904-00	ARUP

Appendix B

Preliminary Development Sketch

High Tonnage Infrastructure Testing Loop: 4.5km loop for track component reliability, wear and fatigue research under heavy axle loads. Provision of vehicular access track adjacent to loop for maintenance purposes.

High Tonnage Infrastructure Testing Loop

Large Railroad Test Loop

Railroad Test Loop: 6.9km track for stability and endurance testing for electric & diesel trains. Overhead Contact System (2kV AC, 1,500V DC etc.). Potential to include segments of different track material construction. To also be used for emergency brake testing. Provision of vehicular access track adjacent to loop for maintenance purposes.

2no. single-face platforms of 230m length and associated station building

LH CV 9.25 crossover connection to High Tonnage Loop from Railroad Test Loop

RH CV 9.25 crossover connection to High Tonnage Loop from Railroad Test Loop

LH CV 9.25 turnout connection to branch line from test loops

LH CV 9.25 turnout connection to branch line from test loops

RH CV 9.25 turnout connection to branch line from test loops

RH CV 9.25 turnout connection to test facilities from existing branch line

Existing Onllwyn sidings to be used for cold rolling stock storage (approximately 100 vehicle capacity). Potential to install further sidings between existing

Warm storage sidings with spatial capacity for up to 280 vehicles. Assumed vehicle length of 23m. Potential to extend sidings into greenfield land if required

230m 2-road rolling stock decommissioning facility

Multi-storey control centre building

4-road Maintenance Shed of 400m length. Capacity for 2no. 400m trains and 2no. 230m trains simultaneously. Light and heavy maintenance roads provided.

Research & Development centre, including driver training classroom and lab facilities. Potential for utilising as museum / exhibition space

Unidirectional carriagewash building with capacity to service trains up to 400m in length. CET point with canopy to be situated East of wash. Associated plant room required (not shown on plan).

230m headshunt for improved operational flexibility within depot area

Western Power Distribution overheads

National Grid overheads

Sidings with capacity for up to 130 units in currently disused land adjacent to branch line.

Winch-propelled facility for testing of track and track systems under traffic (500m track length). The combined system simulates a main line operation and capacity, achieving MGT figures such that components and assemblies can be tested. Wagons to be lifted onto track using heavy plant.

N

Appendix C

Construction Element Phasing

Element	Detail	Design Narrative (where required)	Source of Line Item	Means of delivery #1	Means of delivery #2	Percentage Split	Workforce	Duration	No. of Mat'ls Veh Movements (1-way)
Phase 1 - Infrastructure Testing & Initial Warm Storage									
Earthworks (for Track)	Earthworks	Part of commercial deal with CE	Requirement for rail	On-site	N/A	N/A	10	18	N/A
	Cuttings into rock	Part of commercial deal with CE	Requirement for rail	On-site	N/A	N/A	N/A	N/A	N/A
	Embankments	Part of commercial deal with CE	Requirement for rail	On-site	N/A	N/A	N/A	N/A	N/A
Power	Primary sub station	DNO MC intake room and customer MV room for MV ring provision for site		Road	N/A	100	5	2	3
	Connection to Mains Electricity		Requirement for facility. Based entirely on assumption	Road	N/A	100	5	6	3
	Additional Infrastructure (Substations, transformers etc.)	2 additional sub-station required for general site supplies; 2 additional sub stations required for Shore Supplies		Road	N/A	100	5	6	6
Staff Facilities	Staff Facilities	8no. 10m x 3m modular site cabin buildings. Full MEP installation. Male and female accessible toilets. Typical mess facilities (running hot water, fridge, microwave) Fully ventilated PPE storage room, male and female changing rooms. Desktop computers.	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using similar real-life depot examples.	Road	N/A	100	5	1	6

	IT equipment & technology (Basic WIFI & 4G/5G Connection)	Fibre cables exist running along branch line to existing washery. Buried cabled connection from washery required. Resilience required due to increased level of usage and increased sophistication of work being undertaken.	Base requirement for operations at the Infrastructure Testing Facility. Based on assumption.	Road	N/A	100	5	1	2
High Tonnage Infrastructure Test Loop	New Track System	Rail (incl. clips etc)	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using standard provision over unit lengths of track.	Rail	Road	80/20	10	4	1 trains (x20 wagons) + 5 trucks
		Sleepers (at 700mm spacing)		Rail	Road	80/20	10	4	3 trains (x20 wagons) + 5 trucks
		Ballast (200mm depth)		Rail	Road	80/20	10	4	6 trains (x20 wagons) + 5 trucks
		Track Drainage (chambers and pipework)		Road	N/A	100	10	4	25
		Geotextile (4.5m x 100m)		Road	N/A	100			1
	Vehicular access road	Gravel track running in parrallel with rail	Base requirement for operations at the Infrastructure Testing Facility. Calculated using track length.	N/A	N/A	N/A	N/A	N/A	0 - assume materials already exist on site
	OLE 25kV	OLE cantilever structures over 4km of track. Assumed structure spacing of 40m through plain line track.	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using standard provision over unit lengths of track.	Rail	Road	70/30	20	4	1 train + 5 trucks
Train Storage		Rail (incl. clips etc)	Inclusion of warm storage sidings for the	Rail	Road	80/20	10	3	1 train (x15 wagons)

	Serviceable Track: Warm Storage sidings	Sleepers (at 700mm spacing)	stabling of the Angel Trains rolling stock fleet. Units calculated using standard provision over unit lengths of track.	Rail	Road	80/20	5	3	3 trains (x20 wagons) + 5 trucks
		Ballast (200mm depth)		Rail	Road	70/30	10	3	7 trains (x20 wagons)
		Track Drainage (chambers and pipework)		Road	N/A	100	5	3	18
		Geotextile (4.5m x 100m)		Road	N/A	100			2
	Switches and Crossings for Warm Storage Sidings	All new BV8 units - hand operated points		Rail	Road	80/20	10	3	1 train + 1 truck
	Shore Supplies	5.0km total siding length to be serviced. 2.5km of cable length adjacent to stabled train required. Additional 1km~ required for connecting into proposed substation. Shore supply voltage between 400V - 850V. Cabling to be provided between alternate sidings. 1no. lineside pillar, 1no. ground box and 2no. plug to be provided at 50m intervals along track.		Road	N/A	100	4	3	4
	Lighting for Storage tracks / maintenance area	Bollard lighting to be provided along alternate sidings. 2.5km of bollard lighting and associated cabling required (4.1km of track). Assumed bollard spacing of 8m. Potential to change to floodlighting at later design stage.		Road	N/A	100	4	3	4
Signalling	Mainline Neath & Brecon Signalling Upgrades	Outside of project scope.		Road	N/A	100	N/A	N/A	1
	Facility Signalling	Basic signalling for operation of stabling sidings and infrastructure test track only.	Required for rail to function. Approximate	Road	N/A	100	2	3	1

	(HTL & Sidings)		number of signals calculated.						
	Shunters cabin	Small facility signal box occupied by shunter. Responsible for the control of all train movements within the through sidings area.	Required for rail to function / for efficient rolling stock movements. 1 required.	Road	N/A	100	4	1	1
Infrastructure, Access Roads & Rail Crossings	Drainage	Drainage ditches, ponds and culverts for test loop and sidings in the Washeries	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	10	6	30
	Retaining Walls	Retaining walls in south	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	6	6	100
	Rail Crossings	One land bridge/tunnel & one bridge crossing	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	5	6	10
Miscellaneous	Security & CCTV for Site	Column-mounted CCTV cameras providing full perimeter coverage of site.	Basic security requirement. Units calculated from assumed fence line length.	Road	N/A	100	10	3	4
	Standard Palisade Perimeter Fencing	2.1m metallic palisade fencing.	Basic security requirement. Assumed fence line length.	Road	N/A	70	10	4	(50 panels/truck) = 50 trucks
	Internal highways	New internal highway through washeries and across inner test track, including upgrade of existing roads	Calculated on basis of tarmac roads	Road	N/A	100	10	12	3000 HGV's
Phase 2 - Rolling Stock Test Track & Testing Facilities									
Earthworks (for proposed trackwork)	Earthworks	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	10	18	N/A
	Cuttings into rock	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	N/A	N/A	N/A

	Embankments	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	N/A	N/A	N/A
Power	Additional Infrastructure (Substations, transformers etc.)	1 sub-station required for site supplies 1 sub station required for Shore Supplies 2 further for OLE supplies		Road	N/A	100	5	3	5
Rolling Stock & Infrastructure Testing	Testing Maintenance Shed	400m Maximum Vehicle Length on 2no. Roads, 230m on 2no. Roads		Road	N/A	100	50	12	250
	CET, Diesel & Water Filling Facility for Rolling Stock being tested	All equipment to be situated on carriage wash road. Single CET point required. Canopy of 25m length to be provided to cover CET point. Manual sanding to be proposed. Concrete Apron.	Typical feature within rolling stock depot. Assumed to be used by fleets using stabling facility (CET unlikely to be required by trains undergoing testing).	Road	N/A	100	10	12	20
Large Railroad Test Loop	New Track System	Rail (incl. clips etc)	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using standard provision over unit lengths of track.	Rail	Road	90/10	15	6	1 train (x20 wagons) + 5 trucks
		Sleepers (at 700mm spacing)		Rail	Road	90/10	15	6	10 trains (x20 wagons) + 10 trucks
		Ballast (200mm depth)		Rail	Road	90/10	15	6	12 trains (x20 wagons) + 10 trucks
		Track Drainage (chambers and pipework)		Road	N/A	100	15	6	40
		Geotextile (4.5m x 100m)		Road	N/A	100			2
	OLE 25kV	OLE cantilever structures over 4km of track. Assumed structure spacing of 40m through plain line track.	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using	Rail	Road	70/30	30	9	2 trains + 10 trucks

			standard provision over unit lengths of track.						
	Third Rail or Other DC Electrification Systems	3rd rail electrification for 6.8km, for the purpose of running DC electric rolling stock. 750V system to support rolling stock used in Southeast England and on MerseyRail.	Aspirational requirement. Driven by needs of train operators / manufacturers. Potential to be designed-out at later design stage.	Rail	Road	70/30	5	9	2 trains + 10 trucks
	Facility Signalling (Sitewide)	Multi-aspect signalling for access / egress from High Tonnage Test Loop (HTL) to be adapted to allow access onto rolling stock test loop. 2no. Signals require replacement. No ETCS	Required for rail to function. Approximate number of signals calculated.	Road	N/A	100	3	3	1
	Vehicular access road	Gravel track running in parallel with rail	Base requirement for operations at the Infrastructure Testing Facility. Calculated using track length.	N/A	N/A	N/A	N/A	N/A	0 - assume materials already exist on site
	Station Environment (2no. Single-faced Platforms)	2no. 230m length NR-compliant platforms. Modular pre-cast concrete platforms to be constructed off-site to minimise implication on HTL operations.	Means of testing platform interface with static / dynamic train gauge. Interest in facility expressed by multiple train operators / manufacturers during industry engagement.	Road	N/A	100	20	6	120
	Standard Palisade Perimeter Fencing for additional test tracks	2.1m metallic palisade fencing.	Basic security requirement. Assumed fence line length.	Road	N/A	100	15	12	(50 panels/truck) = 135 trucks

Carriage Wash Facility	Carriage wash building, plant room & all specialist equipment	For cleaning of all trains at the facility (testing and stabling). Includes all foundations, civils and structural works (steelwork and cladding), MEP and P-way.	Aspirational requirement. Potential to be designed-out at later design stage.	Road	N/A	100	5	4	6
Central Control Centre	Manned building responsible for the central control of train movements	Supersedes the signalling control box proposed at phase 1. A central point's control system would be used for the control of the upgraded points. Controllable via video display units. Can interface with either axle counters or track circuits, where required.	Required to maximise efficiency of trains moving around facility. Works in-line with new automatic points introduced at this phase.	Road	N/A	100	6	3	20
Staff Facilities	Improved Staff Facilities (Multi-storey Unit)	Removal of pre-existing modular units and replace with permanent structure. All previous facilities, with further lay-down and mess facilities. Computer access provision within staff block. Overnight accommodation provision for 10no. Staff (including those using the testing facilities). Further accessible toilet and wash facility provision. Connected to rolling stock maintenance shed.	Required to allow for additional workforce introduced with rolling stock testing facilities.	Road	N/A	100	5	1	10
Additional Track - Testing Facilities	Additional track in washery area for rolling stock testing	Reused track, formation, track drainage, ballast, geotextiles, sleepers (concrete), clips, baseplates.	Base requirement for operations at the Infrastructure Testing Facility. Units calculated using standard provision over unit lengths of track.	Rail	Road	80/20	10	2	1 trains (x5 wagons) + 2 trucks
	Switches and Crossings: Testing Facility (Cv9.25 Units)	Powered points - Cables and power to be provided to all point locations.	Base requirement for operations at the Infrastructure Testing Facility. Units	Rail	Road	80/20	10	2	1 trains (x20 wagons) + 10 trucks

			calculated using track layout						
Train Storage	Serviceable Track: Warm Storage sidings	Rail (incl. clips etc)	Inclusion of warm storage sidings for the stabling of the Angel Trains rolling stock fleet. Units calculated using standard provision over unit lengths of track.	Rail	Road	80/20	10	3	1 train (x10 wagons) + 10 trucks
		Sleepers (at 700mm spacing)		Rail	Road	80/20	5	3	3 trains (x20 wagons)
		Ballast (200mm depth)		Rail	Road	70/30	10	3	6 trains (x20 wagons)
		Track Drainage (chambers and pipework)		Road	N/A	100	5	3	14
		Geotextile (4.5m x 100m)		Road	N/A	100			1
	Switches and Crossings for Warm Storage Sidings	All new BV8 units - hand operated points		Rail	Road	80/20	10	3	1 train + 1 truck
	Shore Supplies	5.0km total siding length to be serviced. 2.5km of cable length adjacent to stabled train required. Additional 1km~ required for connecting into proposed substation. Shore supply voltage between 400V - 850V. Cabling to be provided between alternate sidings. 1no. lineside pillar, 1no. ground box and 2no. plug to be provided at 50m intervals along track.		Road	N/A	100	3	3	3
	Lighting for Storage tracks / maintenance area	Bollard lighting to be provided along alternate sidings. 2.5km of bollard lighting and associated cabling required (4.1km of track). Assumed bollard spacing of 8m. Potential to change to floodlighting at later design stage.		Road	N/A	100	3	3	3
Access Roads & Rail Crossings	Access Roads	New and upgraded access roads to outer loop, washeries road formed in Phase 1	Base requirement for operations at the	Road	N/A	100	7	6	900 HGV's

			Infrastructure Testing Facility.						
	Drainage	Amendments where necessary to the ditches, ponds and culverts which Celtic Energy may be incorporating this as part of the Earthworks. New drainage features to be installed at the Washeries.	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	10	6	25
	Retaining Walls	Retaining wall around Pylon and in South	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	10	6	160
	Rail Crossings	3 No bridge crossings for Commoners, one of which is also for access	Base requirement for operations at the Infrastructure Testing Facility.	Road	N/A	100	20	9	200
Miscellaneous	Fencing	Column-mounted CCTV cameras providing full perimeter coverage of site.	Basic security requirement. Units calculated from assumed fence line length.	Road	N/A	100	10	6	(50 panels/truck) = 32
	Security & CCTV for Site	2.1m metallic palisade fencing.	Basic security requirement. Assumed fence line length.	Road	N/A	100	10	1	2
	Internal highways	NA - not sure what other internal roads may be required that aren't covered in the 'Access Roads and Rail Crossings? -IA'	Not required - Covered in above section						
Phase 3 - Aspirational Facilities / Features									
Earthworks (for proposed trackwork)	Earthworks	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	10	18	N/A
	Cuttings into rock	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	N/A	N/A	N/A
	Embankments	Part of commercial deal with CE	Requirement for rail	N/A	N/A	N/A	N/A	N/A	N/A

S&C Upgrades	All hand points to be upgraded to powered points	As part of phases 1 & 2, only the points proposed for rolling stock testing within phase 2 are powered. This proposal means for the upgrade of all points to automatic, electronically controlled units.	Entirely aspirational. Should the operational potential of fully powered points within the facility be realised, this could be made part of the key scheme. One for detailed design.	Road	N/A	100	5	4	5
Additional Infrastructure	Research & Development / Education Facility	Single-storey permanent building (50m x 10m) with provision of multiple classrooms and computer suites. Adjoined to the maintenance shed.	Key requirement, though not paramount to the operation of the rolling stock testing - so sits within phase 3. Remit of the facility is yet to be clearly defined and will take shape at later design stage.	Road	N/A	100	6	3	20
	Stationary Testing Facilities & Laboratories	Laboratory / workshop to be capable of stationary testing e.g. aerodynamic testing, tilting equipment for determining rolling characteristics, weighing and distortion testing facility. Alternatively, could assume GCRE provides the building and the customers bring (or at least pay for) their own kit to be installed as required.	Little understanding of stationary testing equipment within Arup. Again, posed as an aspirational requirement with further investigation to be completed at a later design stage.	Road	N/A	100	10	6	15

Rolling Stock Decommissioning	Decommissioning Facility	Facility for treatment and removal of hazardous materials & liquids. Removal and retrieval of reusable components - wheel sets, bogies, bogie frames, buffers, springs, couplings, doors and brake systems. Compressing and shredding of remaining materials. 1 siding on concrete Apron. Large static crane supplemented by vehicular plant for demolition. Facility for 1 carriage length covered clean and contamination removal building.	Aspirational requirement. Raised as a potential USP for the facility during industry engagement since typically the rail industry are poor at retaining materials / components for re-use, rather lean towards scrapping.	Road	N/A	100	6	6	20
Train Storage	Serviceable Track: Warm Storage sidings	Rail (incl. clips etc)	Inclusion of warm storage sidings for the stabling of the Angel Trains rolling stock fleet. Units calculated using standard provision over unit lengths of track.	Rail	Road	80/20	10	3	1 train (x 15 wagons)
		Sleepers (at 700mm spacing)		Rail	Road	80/20	5	3	3 trains (x20 wagons) + 5 trucks
		Ballast (200mm depth)		Rail	Road	70/30	10	3	7 trains (x20 wagons)
		Track Drainage (chambers and pipework)		Road	N/A	100	5	3	18
		Geotextile (4.5m x 100m)		Road	N/A	100			2
	Switches and Crossings for Warm Storage Sidings	All new BV8 units - hand operated points		Rail	Road	80/20	10	3	1 train + 1 truck
	Shunters cabin	Small facility signal box occupied by shunter. Responsible for the control of all train movements within the through sidings area.		Road	N/A	100	4	1	1
	Facility Signalling (Sidings only)	Multi-aspect signals at both siding accesses. Introduction of physical stop boards.		Road	N/A	100	1	3	1

	Additional Infrastructure (Substations, transformers etc.)	1 additional sub stations required for Shore Supplies		Road	N/A	100	2	3	2
	Shore Supplies	5.0km total siding length to be serviced. 2.5km of cable length adjacent to stabled train required. Additional 1km~ required for connecting into proposed substation. Shore supply voltage between 400V - 850V. Cabling to be provided between alternate sidings. 1no. lineside pillar, 1no. ground box and 2no. plug to be provided at 50m intervals along track.		Road	N/A	100	4	3	4
	Lighting for Storage tracks / maintenance area	Bollard lighting to be provided along alternate sidings. 2.5km of bollard lighting and associated cabling required (4.1km of track). Assumed bollard spacing of 8m. Potential to change to floodlighting at later design stage.		Road	N/A	100	4	3	4

Appendix D

Junction Modelling Results

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D1 Introduction

Junction assessments have been undertaken for six junctions using LinSig for a signalised junction and PICADY software for priority junctions.

Junction capacity in the above software packages is measured as the Ratio of Flow to Capacity (RFC) (PICADY) and Practical Reserve Capacity (PRC) (LinSig). RFC is a measure of the volume of traffic making a turning movement at the junction, divided by the capacity of that movement; ascertained from the geometric measurements of the junction. As stated in the DMRB Vol. 6, the generally agreed operational capacity of a junction is at a ratio of 0.85 for roundabouts and priority junctions. Junctions can still operate within capacity with an RFC value of up to 1.00, however as practical capacity is approached delays will increase.

PRC is a measure of how much additional traffic could pass through a junction and is calculated from the maximum degree of saturation on each lane. Another measure that can be assessed with LinSig is the Degree of Saturation (DoS). DoS is a measure of the volume of traffic making a turning movement at the junction divided by the capacity of that movement, ascertained from the geometric measurements of the junction and, where appropriate, signal timings. The generally agreed operational capacity of a junction is at a ratio of 90% for traffic signals.

These parameters have been used to summarise the operational effectiveness of individual junctions in accordance with the following pre-determined thresholds:

	Within Practical Capacity – *junctions with an RFC below 0.85 or PRC above 0% have been deemed to operate within practical capacity.*
	Over Practical Capacity, Approaching Theoretical Capacity – *junctions with an RFC of between 0.85-0.99 or a PRC of between -10% and 0%.*
	Over Theoretical Capacity - *junctions with an RFC over 1.00 or PRC below -10% have been deemed to operate over theoretical capacity with substantial queuing delays.*

Interaction between the junctions has been considered because of the predicted queues; some of the junctions are located close to one another, as a result of which excessive queues may affect the operation of adjacent junctions ‘blocking back’. The mean maximum queue forecast to occur on each arm of the junction has been monitored for this reason.

Differences between model and survey queue lengths were overcome by calibrating model junction arms, which involved applying a capacity adjustment. The percentage applied takes into account site-specific conditions once all geometric features have been calculated for a junction arm. Such conditions, which are not taken into account and may require a correction could include driver behaviour, changes in signage, re-marking of the junction or complete resurfacing.

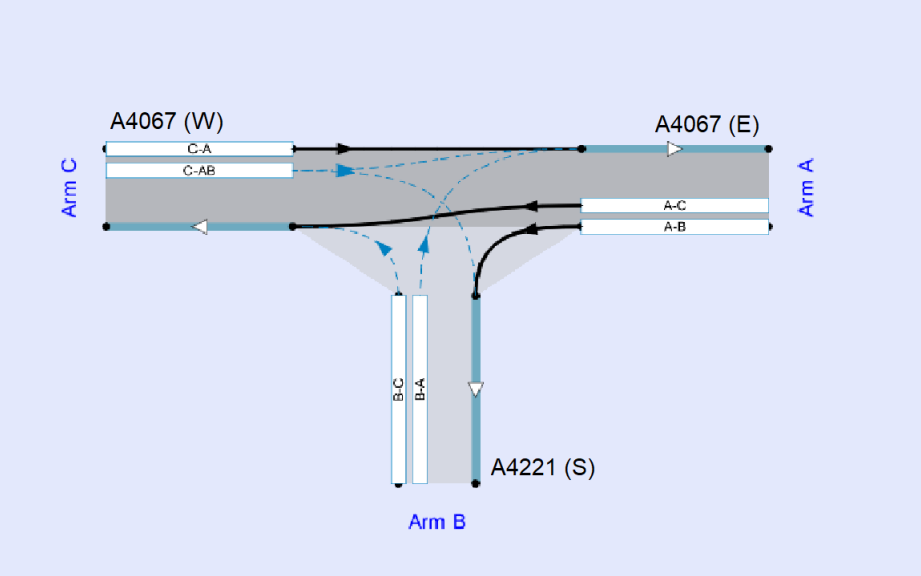
D2 A4067 / A4221

Priority T junction modelled in Junctions 9. The junction is located north of the site in Abercave, the junction between A4067 and A4221.

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software then synthesis a 15-minute profile (a bell curve) which represents a peak within a peak.

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junction is operating within practical capacity and does not experience any notable queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2024. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2024 + Phase 2 Construction Traffic

In 2024 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 3% in the AM peak and 7% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

The development results in reduced HGV movements in construction phase, with overall traffic increasing due to the high level of existing HGV movements from the current Washery.

2026 Base

5% additional traffic has been forecast between 2020 and 2026. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 + Operational Development Trips

In 2026 the additional traffic through the junction, due to the development, is forecast to be 7% during the PM peak (no additional traffic during the AM peak). This has a negligible impact on the

junction which continues to operate within capacity and without any noticeable queues.

The development results in reduced HGV movements in operation of the development, with overall traffic increasing due to the high level of existing HGV movements from the current Washery.

2031 Base

9% additional traffic has been forecast between 2020 and 2036. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 + Operational Development Trips

In 203i the additional traffic through the junction, due to the development, is forecast to be reduced to 7% during the AM peak and increased to 11% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

The development results in reduced HGV movements in operation of the development, with overall traffic increasing due to the high level of existing HGV movements from the current Washery.

AM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
A4221 Left Turn	0.8	8.86	0.39	A
A4221 Right Turn	0.1	9.97	0.07	A
A4067 Right Turn	0.5	8.56	0.3	A
2024 Base				
A4221 Left Turn	0.8	9.09	0.4	A
A4221 Right Turn	0.1	10.15	0.07	B
A4067 Right Turn	0.5	8.71	0.31	A
2024 With Phase 2 Construction Traffic Flows				
A4221 Left Turn	0.7	8.79	0.37	A
A4221 Right Turn	0.1	10.13	0.09	B
A4067 Right Turn	0.5	8.59	0.3	A
2026 Base				
A4221 Left Turn	0.8	9.2	0.41	A
A4221 Right Turn	0.1	10.23	0.07	B
A4067 Right Turn	0.6	8.79	0.31	A
2026 With Operational Development Trips				
A4221 Left Turn	0.7	8.8	0.38	A
A4221 Right Turn	0.1	10.08	0.07	B
A4067 Right Turn	0.5	8.64	0.3	A
2031 Base				
A4221 Left Turn	0.9	9.51	0.43	A
A4221 Right Turn	0.1	10.47	0.08	B
A4067 Right Turn	0.6	9.01	0.33	A
2031 With Operational Development Trips				
A4221 Left Turn	0.8	9.07	0.4	A
A4221 Right Turn	0.1	10.3	0.08	B
A4067 Right Turn	0.5	8.82	0.31	A

PM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
A4221 Left Turn	0.5	6.89	0.3	A
A4221 Right Turn	0	8.65	0.04	A
A4067 Right Turn	0.5	8.08	0.31	A
2024 Base				
A4221 Left Turn	0.5	7	0.31	A
A4221 Right Turn	0	8.75	0.04	A
A4067 Right Turn	0.5	8.24	0.32	A
2024 With Phase 2 Construction Traffic Flows				
A4221 Left Turn	0.5	7.29	0.31	A
A4221 Right Turn	0.1	9.17	0.1	A
A4067 Right Turn	0.5	8.18	0.32	A
2026 Base				
A4221 Left Turn	0.5	7.06	0.31	A
A4221 Right Turn	0	8.81	0.04	A
A4067 Right Turn	0.5	8.32	0.33	A
2026 With Operational Development Trips				
A4221 Left Turn	0.5	7.29	0.31	A
A4221 Right Turn	0.1	9.12	0.09	A
A4067 Right Turn	0.5	8.22	0.32	A
2031 Base				
A4221 Left Turn	0.5	7.22	0.32	A
A4221 Right Turn	0	8.95	0.04	A
A4067 Right Turn	0.6	8.5	0.34	A
2031 With Operational Development Trips				
A4221 Left Turn	0.5	7.42	0.33	A
A4221 Right Turn	0.1	9.26	0.09	A
A4067 Right Turn	0.6	8.4	0.33	A

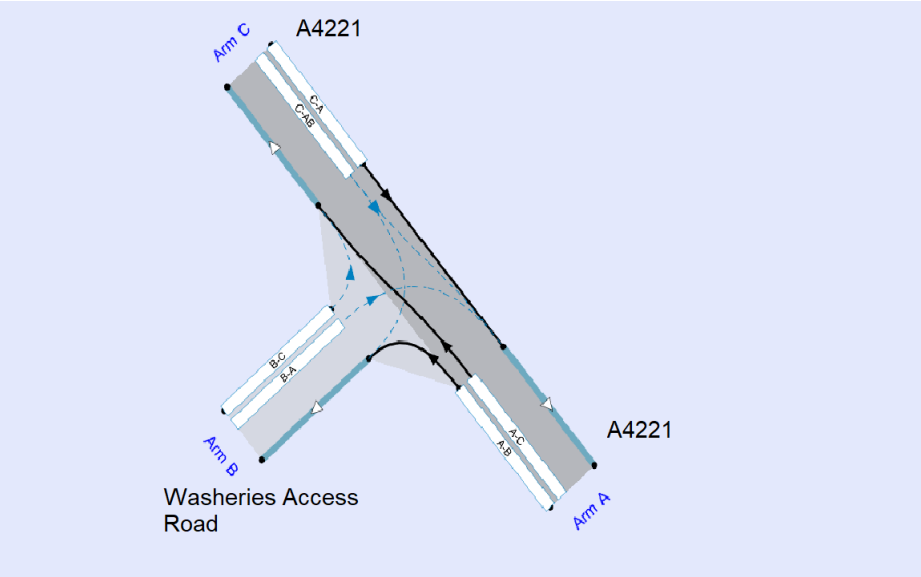
D3 Washeries Access Road

Priority T junction modelled in Junctions 9. The site access junction is to the east of the site along the A4221.

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software then synthesis a 15-minute profile (a bell curve) which represents a peak within a peak.

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junction is operating within practical capacity and does not experience any notable queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2024. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2024 + Phase 2 Construction Traffic

In 2022 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 27% in the AM peak and 33% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 Base

5% additional traffic has been forecast between 2020 and 2026. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 + Operational Development Trips

In 2025 the additional traffic through the junction, due to the development, is forecast to be 12% during the AM peak and 18% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 Base

9% additional traffic has been forecast between 2020 and 2031. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 + Operational Development Trips

In 2030 the additional traffic through the junction, due to the development, is forecast to be 16% during the AM peak and 21% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

AM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Washeries Left Turn	0.1	10.49	0.04	B
Washeries Right Turn	0	7.7	0.03	A
A4221 Right Turn	0.1	9.63	0.06	A
2022 Base				
Washeries Left Turn	0.1	10.56	0.04	B
Washeries Right Turn	0	7.76	0.03	A
A4221 Right Turn	0.2	9.57	0.06	A
2022 With Phase 3 Construction Traffic Flows				
Washeries Left Turn	0	11.64	0.02	B
Washeries Right Turn	0.1	8.01	0.12	A
A4221 Right Turn	0.2	9.85	0.09	A
2025 Base				
Washeries Left Turn	0.1	10.57	0.04	B
Washeries Right Turn	0	7.77	0.03	A
A4221 Right Turn	0.2	9.55	0.06	A
2025 With Operational Development Trips				
Washeries Left Turn	0	11.19	0.02	B
Washeries Right Turn	0.1	7.51	0.06	A
A4221 Right Turn	0.2	9.71	0.08	A
2030 Base				
Washeries Left Turn	0.1	10.64	0.05	B
Washeries Right Turn	0	7.84	0.04	A
A4221 Right Turn	0.2	9.47	0.06	A
2030 With Operational Development Trips				
Washeries Left Turn	0	11.2	0.02	B
Washeries Right Turn	0.1	7.6	0.06	A
A4221 Right Turn	0.2	9.64	0.08	A

PM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Washeries Left Turn	0	10.33	0.02	B
Washeries Right Turn	0	13.25	0.02	B
A4221 Right Turn	0	10.31	0.02	B
2022 Base				
Washeries Left Turn	0	10.35	0.02	B

Washeries Right Turn	0	13.33	0.02	B
A4221 Right Turn	0	10.27	0.02	B
2022 With Phase 3 Construction Traffic Flows				
Washeries Left Turn	0.1	11.67	0.06	B
Washeries Right Turn	0.3	14.83	0.15	B
A4221 Right Turn	0	10.36	0.02	B
2025 Base				
Washeries Left Turn	0	10.37	0.02	B
Washeries Right Turn	0	13.36	0.02	B
A4221 Right Turn	0	10.24	0.02	B
2025 With Operational Development Trips				
Washeries Left Turn	0.1	11.09	0.05	B
Washeries Right Turn	0.2	13.97	0.09	B
A4221 Right Turn	0	10.21	0.01	B
2030 Base				
Washeries Left Turn	0	10.44	0.02	B
Washeries Right Turn	0	13.47	0.03	B
A4221 Right Turn	0	10.17	0.02	B
2030 With Operational Development Trips				
Washeries Left Turn	0.1	11.15	0.05	B
Washeries Right Turn	0.2	14.08	0.09	B
A4221 Right Turn	0	10.14	0.01	B

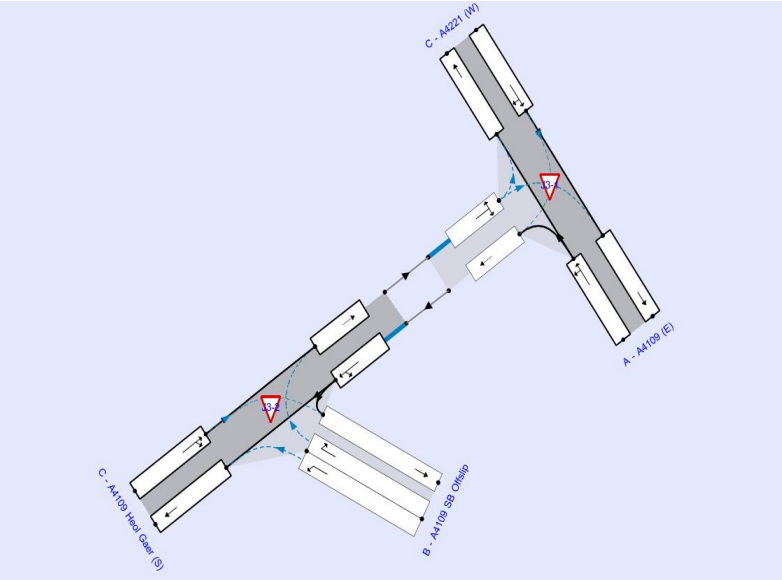
D5 A4221 / A4109 Heol Gaer

Priority T junction modelled in Junctions 9 To understand the traffic movement between both junctions the 'lane based' model was used. The Dyfren Cellwen Town access, off the A4221, is to the east of the site.

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software then synthesis a 15-minute profile (a bell curve) which represents a peak within a peak.

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junctions operate within capacity and do not experience any notable delays or queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2024. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

2024 + Phase 2 Construction Traffic

In 2024 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 23% in the AM peak and 20% in the PM peak. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

2026 Base

5% additional traffic has been forecast between 2020 and 2026. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

2026 + Operational Development Trips

In 2026 the additional traffic through the junction, due to the development, is forecast to be 13% during the AM peak and 11% during the PM peak. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

2031 Base

9% additional traffic has been forecast between 2020 and 2031. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

2031 + Operational Development Trips

In 2031 the additional traffic through the junction, due to the development, is forecast to be 17% during the AM peak and 15% during the PM peak. This has a negligible impact on the junction which continues to operate without any noticeable delays or queues.

AM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.1	6.8		A
Northern Junction - A4221 (W)	0.1	0.52		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	6.05		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2024 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.1	6.78		A
Northern Junction - A4221 (W)	0	0.57		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	6.19		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2024 With Phase 2 Construction Traffic Flows				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.1	7.25		A
Northern Junction - A4221 (W)	0.1	0.51		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	6.22		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2026 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.1	6.54		A
Northern Junction - A4221 (W)	0	0.55		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	6.18		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2026 With Operational Development Trips				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.2	6.87		A
Northern Junction - A4221 (W)	0	0.51		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	6.14		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2031 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.1	6.79		A

Northern Junction - A4221 (W)	0.1	0.66	A
Southern Junction - A4109 Heol Gaer (N)	0	0	A
Southern Junction - A4109 SB Offslip	0.1	6.4	A
Southern Junction - A4109 Heol Gaer (S)	0	0	A
2031 With Operational Development Trips			
Northern Junction - A4109 (E)	0	0	A
Northern Junction - A4109 Heol Gaer (S)	0.2	7.14	A
Northern Junction - A4221 (W)	0	0.46	A
Southern Junction - A4109 Heol Gaer (N)	0	0	A
Southern Junction - A4109 SB Offslip	0.1	5.92	A
Southern Junction - A4109 Heol Gaer (S)	0	0	A

PM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.2	7.54		A
Northern Junction - A4221 (W)	0	0.76		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	5.76		A
Southern Junction - A4109 Heol Gaer (S)	0	0		A
2024 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.2	7.53		A
Northern Junction - A4221 (W)	0	0.75		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	5.94		A
Southern Junction - A4109 Heol Gaer (S)	0	0.01		A
2024 With Phase 2 Construction Traffic Flows				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.3	8.07		A
Northern Junction - A4221 (W)	0.1	0.59		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	5.58		A
Southern Junction - A4109 Heol Gaer (S)	0	0.01		A
2026 Base				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.2	7.63		A
Northern Junction - A4221 (W)	0.1	0.76		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	5.8		A
Southern Junction - A4109 Heol Gaer (S)	0	0.02		A
2026 With Operational Development Trips				
Northern Junction - A4109 (E)	0	0		A
Northern Junction - A4109 Heol Gaer (S)	0.3	8.01		A
Northern Junction - A4221 (W)	0.1	0.63		A
Southern Junction - A4109 Heol Gaer (N)	0	0		A
Southern Junction - A4109 SB Offslip	0.1	5.78		A
Southern Junction - A4109 Heol Gaer (S)	0	0.05		A
2031 Base				
Northern Junction - A4109 (E)	0	0		A

Northern Junction - A4109 Heol Gaer (S)	0.2	7.77	A
Northern Junction - A4221 (W)	0	0.75	A
Southern Junction - A4109 Heol Gaer (N)	0	0	A
Southern Junction - A4109 SB Offslip	0.1	5.8	A
Southern Junction - A4109 Heol Gaer (S)	0	0	A
2031 With Operational Development Trips			
Northern Junction - A4109 (E)	0	0	A
Northern Junction - A4109 Heol Gaer (S)	0.3	7.99	A
Northern Junction - A4221 (W)	0.1	0.67	A
Southern Junction - A4109 Heol Gaer (N)	0	0	A
Southern Junction - A4109 SB Offslip	0.1	5.49	A
Southern Junction - A4109 Heol Gaer (S)	0	0	A

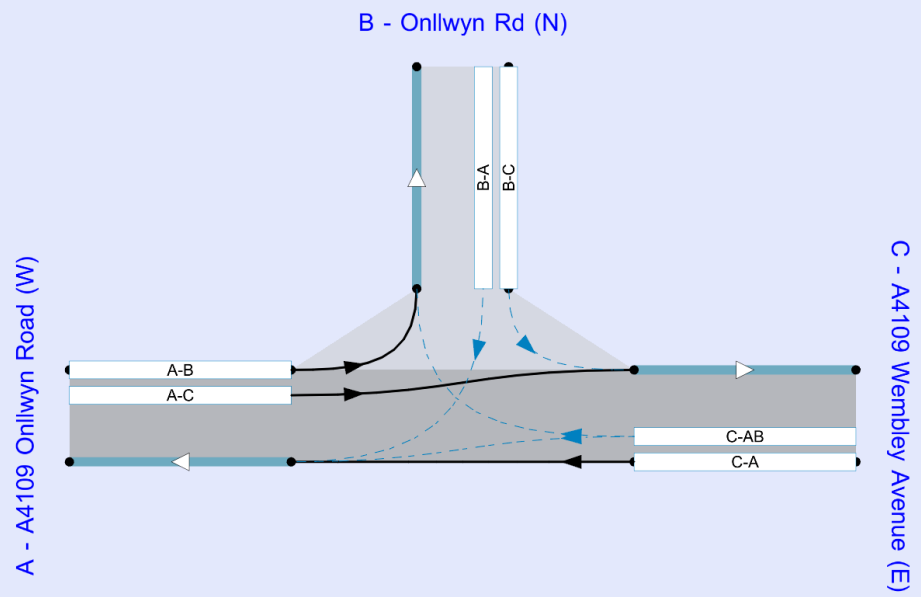
D6 A4109 / Onllwyn Road

Priority T junction modelled in Junctions 9. The site access junction is to the south east corner of the site along the A4109.

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software then synthesis a 15-minute profile (a bell curve) which represents a peak within a peak.

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junction is operating within practical capacity and does not experience any notable queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2022. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2024 + Phase 2 Construction Traffic

In 2024 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 43% in the AM peak and 35% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 Base

5% additional traffic has been forecast between 2020 and 2026. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 + Operational Development Trips

In 2026 the additional traffic through the junction, due to the development, is forecast to be 37% during the AM peak and 31% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 Base

9% additional traffic has been forecast between 2020 and 2031. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 + Operational Development Trips

In 2031 the additional traffic through the junction, due to the development, is forecast to be 41% during the AM peak and 35% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

AM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Onllwyn Road Left Turn	0	7.2	0.01	A
Onllwyn Road Right Turn	0.1	8.06	0.07	A
A4109 Right Turn	0	5.56	0.02	A
2024 Base				
Onllwyn Road Left Turn	0	7.22	0.01	A
Onllwyn Road Right Turn	0.1	8.11	0.08	A
A4109 Right Turn	0	5.57	0.02	A
2024 With Phase 2 Construction Traffic Flows				
Onllwyn Road Left Turn	0	7.44	0.01	A
Onllwyn Road Right Turn	0.1	8.65	0.11	A
A4109 Right Turn	0	5.8	0.02	A
2026 Base				
Onllwyn Road Left Turn	0	7.28	0.01	A
Onllwyn Road Right Turn	0.1	8.2	0.08	A
A4109 Right Turn	0	5.6	0.02	A
2026 With Operational Development Trips				
Onllwyn Road Left Turn	0	7.41	0.01	A
Onllwyn Road Right Turn	0.1	8.49	0.1	A
A4109 Right Turn	0	5.78	0.02	A
2031 Base				
Onllwyn Road Left Turn	0	7.3	0.01	A
Onllwyn Road Right Turn	0.1	8.25	0.08	A
A4109 Right Turn	0	5.61	0.02	A
2031 With Operational Development Trips				
Onllwyn Road Left Turn	0	7.43	0.01	A
Onllwyn Road Right Turn	0.1	8.54	0.1	A
A4109 Right Turn	0	5.79	0.02	A

PM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
Onllwyn Road Left Turn	0	5.13	0.01	A
Onllwyn Road Right Turn	0.1	9.13	0.11	A
A4109 Right Turn	0	5.57	0.01	A
2024 Base				
Onllwyn Road Left Turn	0	5.21	0.01	A

Onllwyn Road Right Turn	0.1	9.41	0.12	A
A4109 Right Turn	0	5.63	0.01	A
2024 With Phase 2 Construction Traffic Flows				
Onllwyn Road Left Turn	0	5.65	0.01	A
Onllwyn Road Right Turn	0.5	11.98	0.31	B
A4109 Right Turn	0	5.66	0.01	A
2026 Base				
Onllwyn Road Left Turn	0	5.22	0.01	A
Onllwyn Road Right Turn	0.2	9.45	0.12	A
A4109 Right Turn	0	5.63	0.01	A
2026 With Operational Development Trips				
Onllwyn Road Left Turn	0	5.58	0.01	A
Onllwyn Road Right Turn	0.4	11.65	0.29	B
A4109 Right Turn	0	5.65	0.01	A
2031 Base				
Onllwyn Road Left Turn	0	5.24	0.01	A
Onllwyn Road Right Turn	0.2	9.56	0.13	A
A4109 Right Turn	0	5.66	0.01	A
2031 With Operational Development Trips				
Onllwyn Road Left Turn	0	5.61	0.01	A
Onllwyn Road Right Turn	0.4	11.8	0.3	B
A4109 Right Turn	0	5.67	0.01	A

D7 A4109 / B4242

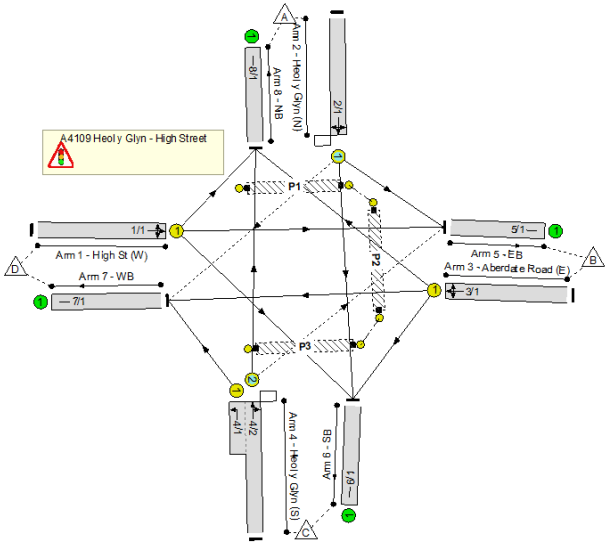
Signalised cross roads modelled in LinSig 3. The junction is located south of the site in Glyn Neath, served by the A465.

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software assumes a flat profile across the hour and optimises the traffic signal times based on those volumes.

The traffic signal phases, stages and cycle time are based on site observations

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junction is operating within practical capacity and does not experience any notable queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2024. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2024 + Phase 2 Construction Traffic

In 2024 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 14% in the AM peak and 12% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 Base

5% additional traffic has been forecast between 2020 and 2026. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 + Operational Development Trips

In 2026 the additional traffic through the junction, due to the development, is forecast to be 10% during the AM peak and 8% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 Base

9% additional traffic has been forecast between 2020 and 2031. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 + Operational Development Trips

In 2031 the additional traffic through the junction, due to the development, is forecast to be 13% during the AM peak and 12% during the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

AM Peak			
	Queue (PCU)	Delay (s)	DoS
2020 Base			
High St (W)	3.3	27.4	44.40%
Heol y Glyn (N)	5.1	33.0	63.00%
Aberdate Road (E)	4.7	30.2	57.30%
Heol y Glyn (S) Left + Ahead : Right	3.9	40.8	66.3:66.3%
2024 Base			
High St (W)	1.9	25.0	30.60%
Heol y Glyn (N)	5.3	33.7	64.20%
Aberdate Road (E)	4.8	31.2	60.30%
Heol y Glyn (S) Left + Ahead : Right	3.8	38.5	65.0 : 65.0%
2024 With Phase 2 Construction Traffic Flows			
High St (W)	3.6	31.9	53.80%
Heol y Glyn (N)	7.2	39.0	75.10%
Aberdate Road (E)	5.2	37.7	68.60%
Heol y Glyn (S) Left + Ahead : Right	5.3	40.7	74.1 : 74.1%
2026 Base			
High St (W)	3.4	28.0	46.60%
Heol y Glyn (N)	5.5	33.9	66.40%
Aberdate Road (E)	5	30.2	60.10%
Heol y Glyn (S) Left + Ahead : Right	4.3	42.0	69.9 : 69.9%
2026 With Operational Development Trips			
High St (W)	3.6	29.4	50.90%
Heol y Glyn (N)	6.3	37.4	72.00%
Aberdate Road (E)	5.1	34.2	64.80%
Heol y Glyn (S) Left + Ahead : Right	4.5	39.2	69.4 : 69.4%
2031 Base			
High St (W)	3.6	28.8	50.00%
Heol y Glyn (N)	5.9	35.2	68.80%
Aberdate Road (E)	5.3	33.1	64.60%
Heol y Glyn (S) Left + Ahead : Right	4.3	40.5	69.8 : 69.8%
2031 With Operational Development Trips			
High St (W)	3.7	30.1	52.70%
Heol y Glyn (N)	6.8	39.6	74.80%
Aberdate Road (E)	5.4	34.3	67.30%
Heol y Glyn (S) Left + Ahead : Right	4.8	40.8	71.6 : 71.6%

PM Peak			
	Queue (PCU)	Delay (s)	DoS
2020 Base			
High St (W)	5.1	39.3	68.60%
Heol y Glyn (N)	6	42.5	73.50%
Aberdate Road (E)	3.6	32.4	52.00%
Heol y Glyn (S) Left + Ahead : Right	6.3	37.2	75.6 : 75.6%
2024 Base			
High St (W)	5.4	39.7	70.60%
Heol y Glyn (N)	6.2	44.0	75.80%
Aberdate Road (E)	3.8	33.1	53.90%
Heol y Glyn (S) Left + Ahead : Right	6.8	38.1	77.9 : 77.9%
2024 With Phase 2 Construction Traffic Flows			
High St (W)	5.9	50.8	79.20%
Heol y Glyn (N)	8.7	51.8	84.30%
Aberdate Road (E)	4	36.9	61.30%
Heol y Glyn (S) Left + Ahead : Right	8.8	45.8	85.3 : 85.3%
2026 Base			
High St (W)	5.5	40.5	71.80%
Heol y Glyn (N)	6.5	45.8	77.30%
Aberdate Road (E)	3.8	32.7	54.50%
Heol y Glyn (S) Left + Ahead : Right	7	39.7	78.9 : 78.9%
2026 With Operational Development Trips			
High St (W)	5.8	47.0	76.90%
Heol y Glyn (N)	7.2	45.0	78.50%
Aberdate Road (E)	4	36.5	59.10%
Heol y Glyn (S) Left + Ahead : Right	7.7	42.1	82.1 : 82.1%
2031 Base			
High St (W)	5.6	43.1	74.70%
Heol y Glyn (N)	7.3	49.4	80.20%
Aberdate Road (E)	3.9	33.2	56.60%
Heol y Glyn (S) Left + Ahead : Right	7.5	42.0	81.6 : 81.6%
2031 With Operational Development Trips			
High St (W)	6.4	50.8	80.00%
Heol y Glyn (N)	7.7	47.2	80.80%
Aberdate Road (E)	4.3	36.9	61.50%
Heol y Glyn (S) Left + Ahead : Right	8.5	46.3	84.9 : 84.9%

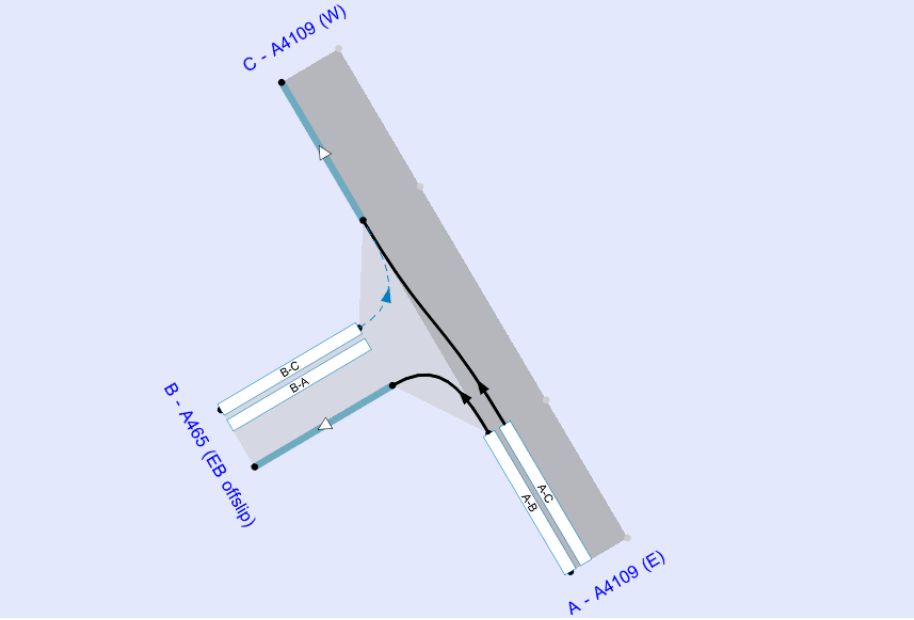
D8 A465 / A4109

Priority T junction modelled in Junctions 9. The grade separated junction is located south of the site along the A465 (Heads of the Valleys Road).

The AM peak period was observed between 08:00 to 09:00 and the PM peak period was observed between 15:00 to 16:00.

The traffic volumes were input into the traffic model as an hourly flow. The software then synthesis a 15-minute profile (a bell curve) which represents a peak within a peak.

The traffic model and/ or additional results are available upon request.



2020 Base

During both the AM and PM peak the junction is operating within practical capacity and does not experience any notable queues.

2024 Base

3% additional traffic has been forecast between 2020 and 2022. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2024 + Phase 2 Construction Traffic

In 2024 the additional traffic through the junction, due to the Phase 2 construction, is forecast to be 21% in the AM peak and 20% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 Base

5% additional traffic has been forecast between 2020 and 2025. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2026 + Operational Development Trips

In 2026 the additional traffic through the junction, due to the development, is forecast to be 12% in the AM peak and 11% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 Base

9% additional traffic has been forecast between 2020 and 2031. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

2031 + Operational Development Trips

In 2031 the additional traffic through the junction, due to the development, is forecast to be 16% in the AM peak and 15% in the PM peak. This has a negligible impact on the junction which continues to operate within capacity and without any noticeable queues.

AM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
A465 EB Off-slip	0.4	8.27	0.23	A
2022 Base				
A465 EB Off-slip	0.4	8.36	0.24	A
2024 With Phase 2 Construction Traffic Flows				
A465 EB Off-slip	0.5	9.11	0.3	A
2026 Base				
A465 EB Off-slip	0.4	8.41	0.24	A
2026 With Operational Development Trips				
A465 EB Off-slip	0.5	8.88	0.28	A
2031 Base				
A465 EB Off-slip	0.4	8.53	0.25	A
2031 With Operational Development Trips				
A465 EB Off-slip	0.5	9.02	0.29	A

PM Peak				
	Queue (PCU)	Delay (s)	RFC	LOS
2020 Base				
A465 EB Off-slip	0.8	10.41	0.39	B
2024 Base				
A465 EB Off-slip	0.8	10.64	0.4	B
2024 With Phase 2 Construction Traffic Flows				
A465 EB Off-slip	1	11.65	0.45	B
2026 Base				
A465 EB Off-slip	0.8	10.76	0.4	B

2026 With Operational Development Trips				
A465 EB Off-slip	0.9	11.37	0.44	B
2031 Base				
A465 EB Off-slip	0.9	11.08	0.42	B
2031 With Operational Development Trips				
A465 EB Off-slip	1	11.73	0.45	B