APPENDIX 10.1

LVIA SECONDARY VEIWPOINTS

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Viewpoint A - R352 at Tullyvoghan junction

The intervening hill will block views of the proposed development. Although there are views towards the site, between the road and the electricity line, there are no proposed buildings located within this southern part of the site.

Viewpoint B - R352, at entrance to Rath Ban Housing Development

This view demonstrates that intervening landforms and vegetation will screen views of the proposed development from this location and surrounding area.

Viewpoint C - Junction of L 4608 (Ballymacahil Road) and R352, and opposide side of R352

This view demonstrates that intervening built forms and vegetation will screen views of the proposed development from this location and surrounding area.

Viewpoint D - Within Rath Ban Housing Development - centre section, at the eastern extreme of the development

This view demonstrates that boundary fencing and intervening vegetation adjacent to the eastern edge of development will screen views of the proposed development from this location.

Viewpoint E - Within Rath Ban Housing Development - Northern end section, at the eastern extreme of the development

This view demonstrates that intervening vegetation adjacent to the eastern edge of development will screen views of the proposed development from this location.

Viewpoint F - Ballymachill Road

This view is taken from a field gateway forming a break in the roadside hedgerow thereby allowing more open distant views. The view demonstrates that at the very least intervening vegetation will restrict visibility of the proposed development.

Viewpoint G - Gort Leamhain Housing Development , Eastern extreme of the development

The view demonstrates that boundary walls combined with intervening vegetation will screen views towards the proposed development from this location and the surrounding area.

Viewpoint H - Knockanean National School

The view is taken from the track to the east of the school and towards the rear of the school. It demonstrates that intervening vegetation will screen views towards the proposed development from this location and the surrounding area.

Viewpoint I - Cappagh Beg

The view demonstrates that intervening hedgerow vegetation will screen views towards the proposed development from this location and the surrounding area.

Viewpoint J - Cappagh Beg

The view is taken from Google Streetview as it was not possible to safely take a photograph from the motorway. The view demonstrates that intervening vegetation will at least restrict views towards the proposed development.

Viewpoint K - M18, at Rail line Passover

The view is taken from Google Streetview as it was not possible to safely take a photograph from the motorway. The view demonstrates that intervening vegetation will screen towards the proposed development.

Viewpoint L - R469 (Quin Road), at Fergus River

The view demonstrates that intervening trees along the eastern riverbank will screen towards the proposed development.

Viewpoint M - N85, at Railway Line

The view demonstrates that intervening that blocks of woodland to the east of the Fergus River will screen towards the proposed development.

APPENDIX 11.1

LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE
IAC

Protection of Cultural Heritage
The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht, and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource
The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments
The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments
Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders
Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places
Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht, and the Islands (now the Minister for the Department of Housing, Local Government, and Heritage) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the

state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989,* Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological, and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000
Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Clare County Development Plan, 2017-2023
It is an objective:

CDP15.8

a. To safeguard sites, features and objects of archaeological interest generally;

b. To secure the preservation (i.e. preservation in situ or in exceptional cases preservation by record) of all archaeological monuments included in the Record of Monuments and Places as established under Section 12 of the National Monuments (Amendment) Act, 1994, and of sites, features and objects of archaeological and historical interest generally (in securing such preservation, the Council will have regard to the advice and recommendations of the Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs);

c. To permit development only where the Planning Authority is satisfied that the proposals will not interfere with: • items of archaeological or historical importance; • the areas in the vicinity of archaeological sites; • the appreciation or the study of such items.

d. To have regard to the government publication ‘Framework and Principles for the Protection of the Archaeological Heritage 1999’ in relation to protecting sites, features and objects of archaeological interest;

e. To advocate for greater financial assistance for the maintenance and improvement of features of archaeological interests in County Clare.

CDP15.9
To protect and preserve archaeological sites discovered since the publication of the Record of Monuments and Places.

CDP15.10
To protect the Zones of Archaeological Potential located within both urban and rural areas as identified in the Record of Monuments and Places.

CDP15.11
To have regard to archaeological concerns when considering proposed service schemes (including electricity, sewerage, telecommunications and water supply) and proposed roadworks (both realignments and new roads) located in close proximity to Recorded Monuments and Places and Zones of Archaeological Potential.

CDP15.12
a. To raise awareness of and improve practice in relation to archaeology in County Clare. Guidance material will be produced setting out the requirements for archaeological protection in the County;

b. To promote the care and conservation of historic graveyards throughout the County.

CDP15.13
a. To protect and preserve the archaeological value of underwater archaeological sites in rivers, lakes, intertidal and sub-tidal environments;

b. To support the further exploration of the underwater archaeology of County Clare, including the San Marcos project, and any subsequent projects that may arise during the lifetime of this Plan.

APPENDIX 11.2

Legislation Protecting The Architectural Resource

The main laws protecting the built heritage are the *Architectural Heritage (National Inventory) and National Monuments (Miscellaneous Provisions) Act 1999* and the *Local Government (Planning and Development) Acts 1963–1999*, which has now been superseded by the *Planning and Development Act, 2000*. The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The background to this legislation derives from Article 2 of the 1985 Convention for the Protection of Architectural Heritage (Granada Convention). This states that:

For the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member state will undertake to maintain inventories of that architectural heritage.

The National Inventory of Architectural Heritage (NIAH) was established in 1990 to fulfil Ireland's obligation under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architecture of Ireland (NIAH Handbook 2005:2). As inclusion in the inventory does not provide statutory protection, the survey information is used in conjunction with the *Architectural Heritage Protection Guidelines for Planning Authorities* to advise local authorities on compilation of a Record of Protected Structures as required by the *Planning and Development Act, 2000*.

Protection Under the Record of Protected Structures and County Development Plan
Structures of architectural, cultural, social, scientific, historical, technical, or archaeological interest can be protected under the Planning and Development Act, 2000, where the conditions relating to the protection of the architectural heritage are set out in Part IV of the act. This act superseded the Local Government (Planning and Development) Act, 1999, and came into force on 1st January 2000.

The act provides for the inclusion of Protected Structures into the planning authorities' development plans and sets out statutory regulations regarding works affecting such structures. Under new legislation, no distinction is made between buildings formerly classified under development plans as List 1 and List 2. Such buildings are now all regarded as 'Protected Structures' and enjoy equal statutory protection. Under the act the entire structure is protected, including a structure's interior, exterior, attendant grounds and also any structures within the attendant grounds.

The act defines a Protected Structure as (a) a structure, or (b) a specified part of a structure which is included in a Record of Protected Structures (RPS), and, where that record so indicates, includes any specified feature which is in the attendant grounds of the structure and which would not otherwise be included in this definition. Protection of the structure, or part thereof, includes conservation, preservation, and improvement compatible with maintaining its character and interest. Part IV of the act deals with architectural heritage, and Section 57 deals specifically with works affecting the character of Protected Structures or proposed Protected Structures and states that no works should materially affect the character of the structure or any element of the structure that contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The act does not provide specific criteria for assigning a special interest to a structure; however, the National Inventory of Architectural Heritage (NIAH) offers guidelines to its field workers as to how to designate a building with a special interest, which are not mutually exclusive. This offers guidance by example rather than by definition:

Archaeological
It is to be noted that the NIAH is biased towards post-1700 structures. Structures that have archaeological features may be recorded, providing the archaeological features are incorporated within post-1700 elements. Industrial fabric is considered to have technical significance and should only be attributed archaeological significance if the structure has pre-1700 features.

Architectural
A structure may be considered of special architectural interest under the following criteria:

- Good quality or well executed architectural design;
- The work of a known and distinguished architect, engineer, designer, craftsman;
- A structure that makes a positive contribution to a setting, such as a streetscape or rural setting;
- Modest or vernacular structures may be considered to be of architectural interest, as they are part of the history of the built heritage of Ireland; and
- Well-designed decorative features, externally and/or internally.

Historical
A structure may be considered of special historical interest under the following criteria:

- A significant historical event associated with the structure;
- An association with a significant historical figure;
- Has a known interesting and/or unusual change of use, e.g. a former workhouse now in use as a hotel; and
- A memorial to a historical event.

Technical
A structure may be considered of special technical interest under the following criteria:

- Incorporates building materials of particular interest, i.e. the materials or the technology used for construction;
- It is the work of a known or distinguished engineer;
- Incorporates innovative engineering design, e.g. bridges, canals, or mill weirs;
- A structure which has an architectural interest may also merit a technical interest due to the structural techniques used in its construction, e.g. a curvilinear glasshouse, early use of concrete, cast-iron prefabrication; and
- Mechanical fixtures relating to a structure may be considered of technical significance.

Cultural
A structure may be considered of special cultural interest under the following criteria:

- An association with a known fictitious character or event, e.g. Sandycove Martello Tower, which featured in Ulysses; and

- Other structure that illustrate the development of society, such as early schoolhouses, swimming baths or printworks.

Scientific
A structure may be considered of special scientific interest under the following criteria:

- A structure or place which is considered to be an extraordinary or pioneering scientific or technical achievement in the Irish context, e.g. Mizen Head Bridge, Birr Telescope.

Social
A structure may be considered of special social interest under the following criteria:

- A focal point of spiritual, political, national, or other cultural sentiment to a group of people, e.g. a place of worship, a meeting point, assembly rooms;

- Developed or constructed by a community or organisation, e.g. the construction of the railways or the building of a church through the patronage of the local community; and

- Illustrates a particular lifestyle, philosophy, or social condition of the past, e.g. the hierarchical accommodation in a country house, philanthropic housing, vernacular structures.

Artistic
A structure may be considered of special artistic interest under the following criteria:

- Work of a skilled craftsman or artist, e.g. plasterwork, wrought-iron work, carved elements or details, stained glass, stations of the cross; and

- Well-designed mass-produced structures or elements may also be considered of artistic interest.

(From the NIAH Handbook 2003 & 2005 pages 15–20)

The Local Authority has the power to order conservation and restoration works to be undertaken by the owner of the protected structure if it considers the building to need repair. Similarly, an owner or developer must make a written request to the Local Authority to carry out any works on a protected structure and its environs, which will be reviewed within three months of application. Failure to do so may result in prosecution.

Clare County Development Plan, 2017-2023
It is an objective:

CDP15.1

a. To ensure the protection of the architectural heritage of County Clare through the identification of Protected Structures, the designation of Architectural Conservation Areas, the safeguarding of historic gardens, and the recognition of structures and elements that contribute positively to the vernacular and industrial heritage of the County;

b. To ensure that the architectural heritage of the County is not damaged either through direct destruction or by unsympathetic developments nearby.

CDP15.2

a. To protect, as set out in the Record of Protected Structures, all structures and their settings, which are of special architectural, historical, archaeological, artistic, cultural, scientific, social, or technical interest;

b. To review the Record of Protected Structures periodically and add structures of special interest as appropriate, including significant elements of industrial, maritime or vernacular heritage and any twentieth century structures of merit.

CDP15.3
To protect and preserve buildings and features of industrial heritage such as mills, bridges, lighthouses, harbours, etc. Proposals for refurbishment works to, or redevelopment/ conversion of, these sites will be subject to a full architectural and archaeological assessment.

CDP15.4
a. To seek the retention, appreciation and appropriate revitalisation of the vernacular heritage of County Clare, in both towns and rural areas, by deterring the replacement of good quality vernacular buildings with modern structures and by protecting (through the use of ACAs and the RPS and in the normal course of Development Management) vernacular buildings where they contribute to the character of an area or town and/or where they are rare examples of a structure type;

b. To support proposals to refurbish vernacular structures that are in a run-down or derelict condition, provided that:

- Appropriate traditional building materials and methods are used to carry out repairs to the historic fabric;

- Proposals for extensions to vernacular structures are reflective and proportionate to the existing building and do not erode the setting and design qualities of the original structure which make it attractive;

While direction for the design should be taken from the historic building stock of the area, it can be expressed in contemporary architectural language.

CDP15.5
a. To ensure that new developments within or adjacent to an ACA respect the context of the area and contribute positively to the ACA in terms of design, scale, setting and material finishes;

b. To protect existing buildings, structures, groups of structures, sites, landscapes and features such as street furniture and paving, which are considered to be intrinsic elements of the special character of the ACA, from demolition or removal and non-sympathetic alterations;

c. To ensure that all new signage, lighting, advertising and utilities to buildings within an ACA are designed, constructed and located in a manner that is complementary to the character of the ACA;

d. To ensure that external colour schemes in ACAs enhance the character and amenities of the area and reflect traditional colour schemes.

CDP15.7
a. To advocate for greater financial assistance for the maintenance and improvement of architectural heritage in County Clare;

b. To provide advice and guidance to community groups, owners and occupiers with regard to the maintenance and repair of buildings and structures of architectural heritage importance.

APPENDIX 11.3

IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE

Potential Impacts on Archaeological and Historical Remains
Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2017). They are described as profound, significant, or slight impacts on archaeological remains. They may be negative, positive, or neutral, direct, indirect, or cumulative, temporary, or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected, and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways:

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape;

- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation;

- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits;

- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences, and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value;

- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow;

- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits; and

- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts
The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;

- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected; and

- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

APPENDIX 11.4

MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE

Potential Mitigation Strategies For Cultural Heritage Remains
Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce, or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

Archaeological Resource
The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality, and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

Architectural Resource
The architectural resource is generally subject to a greater degree of change than archaeological sites, as structures may survive for many years, but their usage may change continually. This can be reflected in the fabric of the building, with the addition and removal of doors, windows, and extensions. Due to their often more visible presence within the landscape than archaeological sites, the removal of such structures can sometimes leave a

discernable ‘gap’ with the cultural identity of a population; however, a number of mitigation measures are available to ensure a record is made of any structure that is deemed to be of special interest, which may be removed or altered as part of a proposed development.

Conservation Assessment consists of a detailed study of the history of a building and can include the surveying of elevations to define the exact condition of the structure. These assessments are carried out by Conservation Architects and would commonly be carried out in association with proposed alterations or renovations on a Recorded Structure.

Building Survey may involve making an accurate record of elevations (internal and external), internal floor plans and external sections. This is carried out using an EDM (Electronic Distance Measurer) and GPS technology to create scaled drawings that provide a full record of the appearance of a building at the time of the survey.

Historic Building Assessment is generally specific to one building, which may have historic significance, but is not a Protected Structure or listed within the NIAH. A full historical background for the structure is researched and the site is visited to assess the standing remains and make a record of any architectural features of special interest. These assessments can also be carried out in conjunction with a building survey.

Written and Photographic record provides a basic record of features such as stone walls, which may have a small amount of cultural heritage importance and are recorded for prosperity. Dimensions of the feature are recorded with a written description and photographs as well as some cartographic reference, which may help to date a feature.

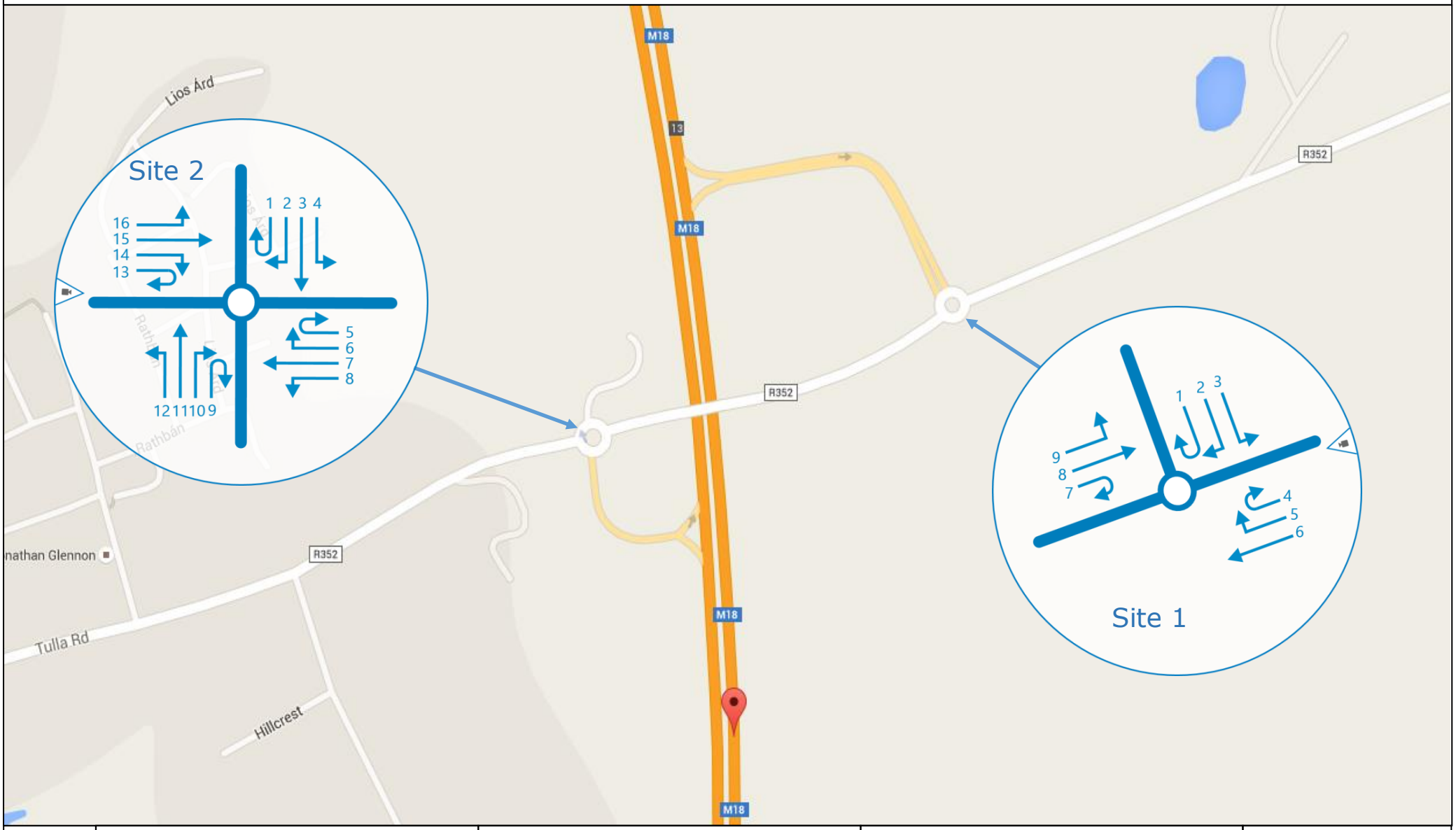
APPENDIX 12.1

CLASSIFIED TURNING COUNT SURVEY DATA

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

East Clare Roundabout and the Tulla Road West Roundabout, AM (07:00 – 10:00) and PM (16:00 – 19:00) peak periods, Tuesday 21st July, 2015 (ABACUS Ltd)

Site Locations/Movement Directions



Job number: Ath/15/070	Job date: 21st July 2015	Drawing No: Ath/15/070-01	abacus Transportation Surveys
Client: Alan Lipscombe Traffic	Job day Tuesday	Author: SPW	

Abacus Transportation Surveys

REF: Ath/15/070 - Ennis

SITE: 1

DAY: Tuesday
DATE: 21st July 2015

LOCATION: M18 Junction 13/R352 Tulla Road/Southerly Slips

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	4	0	0	0	0	4	4	1	0	0	1	0	2	3
7:15	0	0	0	0	0	0	0	3	2	1	0	0	6	7	1	0	1	0	0	2	3
7:30	0	0	0	0	0	0	0	6	2	0	0	0	8	8	6	1	0	0	0	7	7
7:45	2	0	0	0	0	2	2	7	6	0	0	0	13	13	4	0	0	0	0	4	4
8:00	0	0	0	0	0	0	0	10	1	0	0	1	12	13	2	0	0	0	0	2	2
8:15	0	0	0	0	0	0	0	8	2	0	0	0	10	10	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	25	3	0	0	0	28	28	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	15	1	1	0	0	17	18	3	3	0	0	0	6	6
9:00	0	0	0	0	0	0	0	11	2	0	0	0	13	13	2	1	0	0	0	3	3
9:15	0	0	0	0	0	0	0	11	3	1	0	0	15	16	1	1	0	0	0	2	2
9:30	0	0	0	0	0	0	0	15	5	0	0	0	20	20	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	17	4	4	0	0	25	27	4	1	0	0	0	5	5
H/TOT	0	0	0	0	0	0	0	58	7	1	0	1	67	69	5	3	0	0	0	8	8

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	1	0	0	0	1	1	12	0	0	0	0	12	12	3	0	0	0	0	3	3
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17:15	0	0	0	0	0	0	0	15	0	0	0	1	16	17	4	1	0	0	0	5	5
17:30	0	0	0	0	0	0	0	15	2	0	0	0	17	17	5	0	1	0	0	6	7
17:45	3	0	0	0	0	3	3	14	1	0	0	0	15	15	3	2	1	0	0	6	7
18:00	0	0	0	0	0	0	0	15	1	0	0	0	16	16	6	1	0	0	0	7	7
18:15	0	0	0	0	0	0	0	5	3	0	0	0	8	8	7	0	0	0	0	7	7
18:30	1	0	0	0	0	1	1	9	2	0	0	2	13	15	4	0	0	0	0	4	4
18:45	0	0	0	0	0	0	0	14	0	0	0	0	14	14	3	1	0	0	0	4	4
H/TOT	3	0	0	0	0	3	3	53	6	0	0	1	60	61	13	3	2	0	0	18	19

Abacus Transportation Surveys

REF: Ath/15/070 - Ennis

SITE: 1

DAY: Tuesday
DATE: 21st July 2015

LOCATION: M18 Junction 13/R352 Tulla Road/Southerly Slips

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	2	2	0	0	0	4	4	9	1	1	0	0	11	12
7:15	0	0	0	0	0	0	0	3	1	0	0	0	4	4	8	6	1	0	0	15	16
7:30	0	0	0	0	0	0	0	10	2	0	0	0	12	12	22	10	3	0	0	35	37
7:45	0	0	0	0	0	0	0	7	1	0	0	0	8	8	27	4	1	0	0	32	33
8:00	1	0	0	0	0	1	1	7	0	2	0	0	9	10	24	3	0	0	0	27	27
8:15	0	0	0	0	0	0	0	5	0	1	0	0	6	7	35	2	1	1	0	39	41
8:30	0	0	0	0	0	0	0	13	0	0	0	0	13	13	23	7	2	1	0	33	35
8:45	0	0	0	0	0	0	0	7	0	1	0	0	8	9	54	3	1	2	0	60	63
9:00	0	0	0	0	0	0	0	7	1	0	0	0	8	8	35	4	0	0	0	39	39
9:15	0	0	0	0	0	0	0	3	1	0	0	0	4	4	42	4	1	0	1	48	50
9:30	0	0	0	0	0	0	0	5	0	0	0	0	5	5	38	2	3	0	0	43	45
9:45	0	0	0	0	0	0	0	4	1	1	0	0	6	7	34	3	1	2	0	40	43
H/TOT	1	0	0	0	0	1	1	32	0	4	0	0	36	38	136	15	4	4	0	159	166

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	2	0	1	0	0	3	4	24	8	1	1	0	34	36
16:15	0	0	0	0	0	0	0	4	0	0	0	0	4	4	27	0	1	0	1	29	31
16:30	0	0	0	0	0	0	0	1	1	0	0	0	2	2	26	5	0	1	0	32	33
16:45	0	0	0	0	0	0	0	9	1	0	0	0	10	10	60	4	0	2	0	66	69
17:00	0	0	0	0	0	0	0	6	0	1	0	0	7	8	32	4	1	1	0	38	40
17:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	41	7	0	0	1	49	50
17:30	0	0	0	0	0	0	0	5	1	0	0	0	6	6	21	5	0	1	0	27	28
17:45	0	0	0	0	0	0	0	10	2	1	1	0	14	16	27	8	2	1	0	38	40
18:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	24	3	0	1	0	28	29
18:15	0	0	0	0	0	0	0	2	0	0	0	0	2	2	34	3	0	2	0	39	42
18:30	0	0	0	0	0	0	0	4	1	0	0	0	5	5	21	5	0	0	0	26	26
18:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	22	6	0	1	0	29	30
H/TOT	0	0	0	0	0	0	0	22	3	2	1	0	28	30	121	24	3	3	1	152	158

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DAY: Tuesday
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LOCATION: M18 Junction 13/R352 Tulla Road/Southerly Slips

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	11	1	1	0	0	13	14	17	6	2	0	1	26	28
7:15	0	0	0	0	0	0	0	19	2	2	0	0	23	24	32	1	0	0	0	33	33
7:30	0	0	0	0	0	0	0	22	4	2	1	0	29	31	55	6	0	0	0	61	61
7:45	0	0	0	0	0	0	0	16	3	0	0	0	19	19	48	0	0	0	0	48	48
8:00	0	0	0	0	0	0	0	14	3	0	0	0	17	17	56	2	1	0	0	59	60
8:15	0	0	0	0	0	0	0	8	6	1	0	0	15	16	62	4	0	0	0	66	66
8:30	0	0	0	0	0	0	0	12	2	3	0	1	18	21	58	3	0	0	2	63	65
8:45	0	0	0	0	0	0	0	12	4	0	1	0	17	18	50	3	0	0	0	53	53
9:00	0	0	0	0	0	0	0	30	3	0	1	0	34	35	25	3	1	0	0	29	30
9:15	0	0	0	0	0	0	0	25	4	1	0	0	30	31	36	3	0	0	0	39	39
9:30	0	0	0	0	0	0	0	22	4	4	1	1	32	36	16	4	1	0	0	21	22
9:45	0	0	0	0	0	0	0	11	2	3	2	0	18	22	19	2	2	0	0	23	24
H/TOT	0	0	0	0	0	0	0	46	15	4	1	1	67	71	226	12	1	0	2	241	244

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	33	4	2	2	1	42	47	24	3	0	0	1	28	29
16:15	1	0	0	0	0	1	1	38	2	2	1	0	43	45	17	1	0	0	0	18	18
16:30	1	0	0	0	0	1	1	31	5	2	0	1	39	41	18	0	0	0	0	18	18
16:45	0	0	0	0	0	0	0	49	7	3	0	0	59	61	17	2	0	0	0	19	19
17:00	0	0	0	0	0	0	0	49	8	1	0	0	58	59	25	3	1	0	0	29	30
17:15	0	0	0	0	0	0	0	61	6	1	0	0	68	69	19	0	0	0	0	19	19
17:30	0	0	0	0	0	0	0	50	9	2	0	0	61	62	21	5	0	0	0	26	26
17:45	0	0	0	0	0	0	0	51	2	3	0	0	56	58	15	3	0	0	1	19	20
18:00	1	0	0	0	0	1	1	56	9	4	0	0	69	71	9	2	1	0	0	12	13
18:15	0	0	0	0	0	0	0	64	4	1	0	0	69	70	23	2	0	0	0	25	25
18:30	0	0	0	0	0	0	0	40	8	0	0	0	48	48	12	2	0	0	0	14	14
18:45	2	0	0	0	0	2	2	37	2	1	1	0	41	43	12	1	1	0	0	14	15
H/TOT	0	0	0	0	0	0	0	211	25	7	0	0	243	247	80	11	1	0	1	93	95

Abacus Transportation Surveys

REF: Ath/15/070 - Ennis

SITE: 2

DAY: Tuesday
DATE: 21st July 2015

LOCATION: M18 Junction 13/R352 Tulla Road/Northerly Slips

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	4	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Abacus Transportation Surveys

REF: Ath/15/070 - Ennis

SITE: 2

DAY: Tuesday
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LOCATION: M18 Junction 13/R352 Tulla Road/Northerly Slips

	MOVEMENT 5							MOVEMENT 6							MOVEMENT 7							MOVEMENT 8						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	1	0	0	12	13	2	1	0	0	0	3	3
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	2	0	0	16	17	4	1	0	0	0	5	5
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	11	3	0	0	40	42	2	1	0	0	0	3	3
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	10	1	0	0	45	46	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	3	0	0	1	36	37	2	1	0	0	0	3	3
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	4	1	0	0	46	47	2	0	0	1	0	3	4
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	8	2	0	0	55	56	3	2	0	1	0	6	7
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	4	2	1	0	67	69	9	0	0	1	0	10	11
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	6	0	0	0	50	50	2	0	0	0	0	2	2
9:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	6	2	0	1	61	63	1	1	0	0	0	2	2
9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	7	3	0	0	60	62	3	0	0	0	0	3	3
9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	7	5	1	0	58	62	6	0	0	1	0	7	8
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	178	19	5	1	1	204	209	16	3	0	3	0	22	26

	MOVEMENT 5							MOVEMENT 6							MOVEMENT 7							MOVEMENT 8						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	8	1	0	0	44	45	1	0	0	1	0	2	3
16:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	32	4	1	0	2	39	42	3	0	0	0	0	3	3
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	6	0	0	1	39	40	4	0	0	1	0	5	6
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	4	1	2	0	66	69	5	1	0	0	0	6	6
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	7	1	1	0	49	51	1	0	0	0	0	1	1
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	6	0	0	2	55	57	9	1	0	0	0	10	10
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	7	0	1	0	43	44	1	0	0	0	0	1	1
17:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	34	7	1	1	0	43	45	7	1	1	0	0	9	10
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	3	0	1	0	41	42	3	1	0	0	0	4	4
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	6	0	2	0	46	49	1	0	0	0	0	1	1
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	6	0	0	2	38	40	0	1	0	0	0	1	1
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	4	0	0	0	38	38	4	2	0	1	0	7	8
H/TOT	0	0	0	0	0	0	0	0	1	0	0	0	1	1	156	27	2	3	2	190	197	18	2	1	0	0	21	22

Abacus Transportation Surveys

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LOCATION: M18 Junction 13/R352 Tulla Road/Northerly Slips

	MOVEMENT 9							MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	5	0	0	0	0	5	5
7:15	0	0	0	0	0	0	0	6	0	0	0	0	6	6	0	0	0	0	0	0	0	8	2	2	0	0	12	13
7:30	0	0	0	0	0	0	0	5	1	0	1	0	7	8	0	0	0	0	0	0	0	8	5	0	0	0	13	13
7:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	13	3	1	0	0	17	18
8:00	0	0	0	0	0	0	0	7	0	0	0	0	7	7	0	0	0	0	0	0	0	10	2	1	0	0	13	14
8:15	0	0	0	0	0	0	0	4	2	0	0	0	6	6	0	0	0	0	0	0	0	16	3	0	1	0	20	21
8:30	0	0	0	0	0	0	0	5	1	1	0	0	7	8	0	0	0	0	0	0	0	15	0	2	0	0	17	18
8:45	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	25	3	0	0	0	28	28
9:00	0	0	0	0	0	0	0	2	1	1	1	0	5	7	0	0	0	0	0	0	0	24	5	0	0	0	29	29
9:15	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	11	1	1	0	0	13	14
9:30	0	0	0	0	0	0	0	5	0	0	1	0	6	7	0	0	0	0	0	0	0	17	3	2	0	0	22	23
9:45	0	0	0	0	0	0	0	3	0	1	2	0	6	9	0	0	0	0	0	0	0	18	5	1	1	0	25	27
H/TOT	0	0	0	0	0	0	0	16	3	1	1	0	21	23	0	0	0	0	0	0	0	66	8	3	1	0	78	81

	MOVEMENT 9							MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	4	2	0	2	0	8	11	0	0	0	0	0	0	0	29	4	0	0	0	33	33
16:15	0	0	0	0	0	0	0	1	1	2	1	0	5	7	0	0	0	0	0	0	0	24	1	1	0	0	26	27
16:30	0	0	0	0	0	0	0	9	2	0	0	0	11	11	0	0	0	0	0	0	0	26	3	1	0	0	30	31
16:45	1	0	0	0	0	1	1	11	1	0	0	0	12	12	0	0	0	0	0	0	0	45	0	1	0	0	46	47
17:00	0	0	0	0	0	0	0	9	2	0	0	0	11	11	0	0	0	0	0	0	0	42	4	0	0	1	47	48
17:15	0	0	0	0	0	0	0	13	0	0	0	0	13	13	0	0	0	0	0	0	0	66	4	1	0	0	71	72
17:30	0	0	0	0	0	0	0	9	2	1	0	0	12	13	0	0	0	0	0	0	0	59	4	0	0	0	63	63
17:45	0	0	0	0	0	0	0	13	0	0	0	0	13	13	1	0	0	0	0	1	1	55	4	3	0	0	62	64
18:00	0	0	0	0	0	0	0	14	3	1	0	0	18	19	0	0	0	0	0	0	0	56	4	2	0	0	62	63
18:15	0	0	0	0	0	0	0	7	0	0	0	0	7	7	0	0	0	0	0	0	0	58	2	0	0	0	60	60
18:30	0	0	0	0	0	0	0	6	0	0	0	0	6	6	0	0	0	0	0	0	0	29	3	0	0	0	32	32
18:45	0	0	0	0	0	0	0	6	1	1	1	0	9	11	0	0	0	0	0	0	0	32	2	1	0	0	35	36
H/TOT	0	0	0	0	0	0	0	44	4	1	0	0	49	50	1	0	0	0	0	1	1	222	16	4	0	1	243	246

Abacus Transportation Surveys

REF: Ath/15/070 - Ennis

SITE: 2

DAY: Tuesday
DATE: 21st July 2015

LOCATION: M18 Junction 13/R352 Tulla Road/Northerly Slips

	MOVEMENT 13							MOVEMENT 14							MOVEMENT 15							MOVEMENT 16						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
7:00	0	0	0	0	0	0	0	9	3	1	0	0	13	14	24	7	3	0	1	35	38	0	0	0	0	0	0	0
7:15	0	0	0	0	0	0	0	9	2	0	0	0	11	11	45	3	2	0	0	50	51	0	0	0	0	0	0	0
7:30	0	0	0	0	0	0	0	10	1	0	0	0	11	11	72	9	2	0	0	83	84	0	0	0	0	0	0	0
7:45	0	0	0	0	0	0	0	9	1	2	0	0	12	13	64	2	0	0	0	66	66	0	0	0	0	0	0	0
8:00	0	0	0	0	0	0	0	16	3	1	0	1	21	23	63	5	1	0	0	69	70	0	0	0	0	0	0	0
8:15	1	0	0	0	0	1	1	4	1	1	0	0	6	7	66	8	1	0	0	75	76	0	0	0	0	0	0	0
8:30	0	0	0	0	0	0	0	7	5	0	0	1	13	14	65	4	2	0	3	74	78	0	0	0	0	0	0	0
8:45	0	0	0	0	0	0	0	11	1	0	0	0	12	12	62	7	0	0	0	69	69	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	14	1	0	0	0	15	15	53	5	0	0	0	58	58	0	0	0	0	0	0	0
9:15	0	0	0	0	0	0	0	9	2	0	1	0	12	13	57	7	1	0	0	65	66	0	0	0	0	0	0	0
9:30	0	0	0	0	0	0	0	6	0	1	1	1	9	12	33	8	5	0	1	47	51	0	2	0	0	0	2	2
9:45	0	1	0	0	0	1	1	5	0	1	0	0	6	7	27	4	4	0	0	35	37	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	38	10	2	0	2	52	55	256	24	4	0	3	287	292	0	0	0	0	0	0	0

	MOVEMENT 13							MOVEMENT 14							MOVEMENT 15							MOVEMENT 16						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
16:00	0	0	0	0	0	0	0	15	2	2	1	0	20	22	53	5	2	0	2	62	65	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	11	1	2	0	0	14	15	55	2	0	0	0	57	57	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	12	1	1	0	1	15	17	41	3	2	0	1	47	49	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	9	3	1	0	0	13	14	55	8	3	0	0	66	68	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	18	3	2	0	0	23	24	65	9	2	0	0	76	77	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	10	4	0	1	0	15	16	67	6	1	0	0	74	75	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	13	3	0	0	1	17	18	62	12	1	0	0	75	76	0	1	0	0	0	1	1
17:45	0	0	0	0	0	0	0	27	1	0	0	0	28	28	53	5	3	0	1	62	65	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	13	0	0	0	0	13	13	52	8	4	0	0	64	66	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	18	2	0	0	0	20	20	80	6	1	0	0	87	88	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	12	0	0	0	1	13	14	46	10	0	0	0	56	56	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	9	3	0	0	0	12	12	45	2	1	0	0	48	49	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	68	11	2	1	1	83	86	247	32	7	0	1	287	292	0	1	0	0	0	1	1

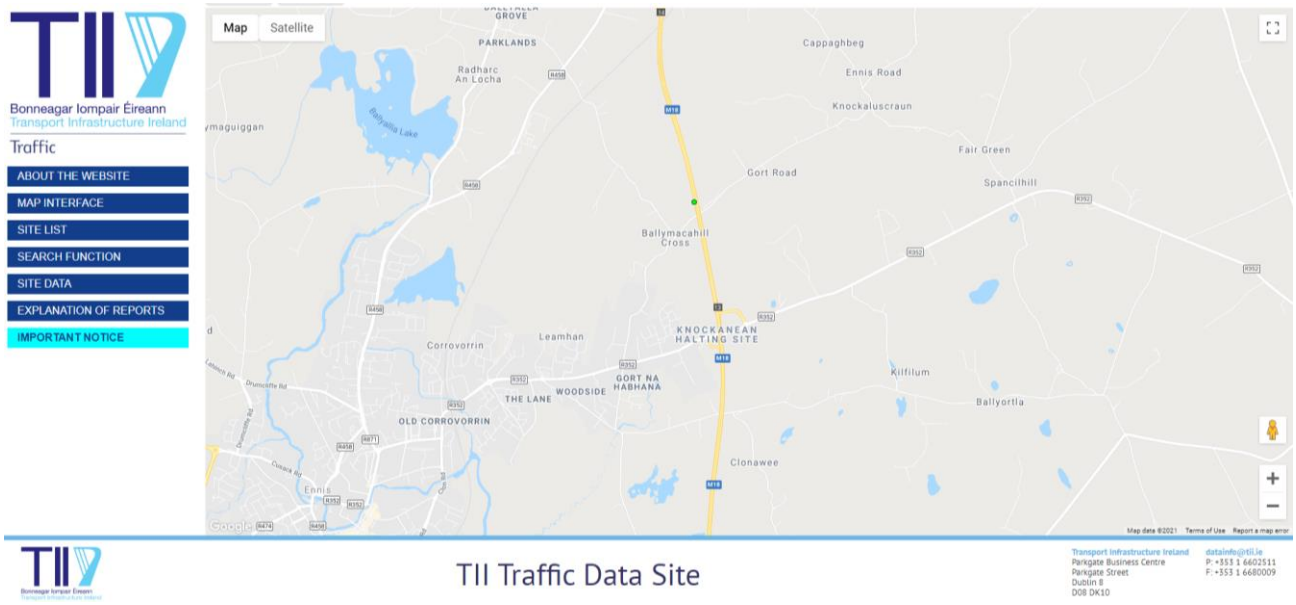
APPENDIX 12.2

AUTOMATIC TRAFFIC COUNT DATA

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

M18 between Junction 13 Tulla Road and Junction 14 Barefield, TII

Transport Infrastructure Ireland Automatic Count Site – M18 located between Junction 13 Tulla Road and Junction 14 Barefield Road



Year 2015 by month

Date	Monday - Friday 12Hr	16Hr	18Hr	24Hr	Monday - Sunday 12Hr	16Hr	18Hr	24Hr	am Peak Hour	Monday - Friday am Peak Flow	pm Peak Hour
Jan 2015	8448	9742	9966	10218	7915	9211	9447	9698	08:05	940	17:04
Feb 2015	9491	11047	11326	11599	8932	10472	10760	11034	08:05	1079	17:02
Mar 2015	9468	11085	11377	11677	8983	10603	10905	11203	08:02	1049	17:06
Apr 2015	9747	11511	11842	12153	9194	10944	11296	11602	08:01	1024	17:05
May 2015	10323	12255	12641	12982	9747	11601	11991	12326	08:02	1085	17:04
Jun 2015	9998	11858	12208	12556	9436	11262	11630	11977	08:04	1034	17:00
Jul 2015	10718	12697	13104	13466	10192	12133	12548	12902	07:58	983	16:54
Aug 2015	10842	12844	13242	13590	10374	12346	12748	13097	07:54	960	17:00
Sep 2015	10447	12308	12653	12986	9820	11696	12059	12385	08:00	1153	17:01
Oct 2015	10641	12512	12851	13187	9987	11793	12142	12480	08:02	1107	17:00
Nov 2015	9904	11557	11854	12176	9322	10951	11260	11580	08:09	1132	16:45
Dec 2015	9172	10640	10933	11249	8638	10072	10370	10682	08:12	862	16:46

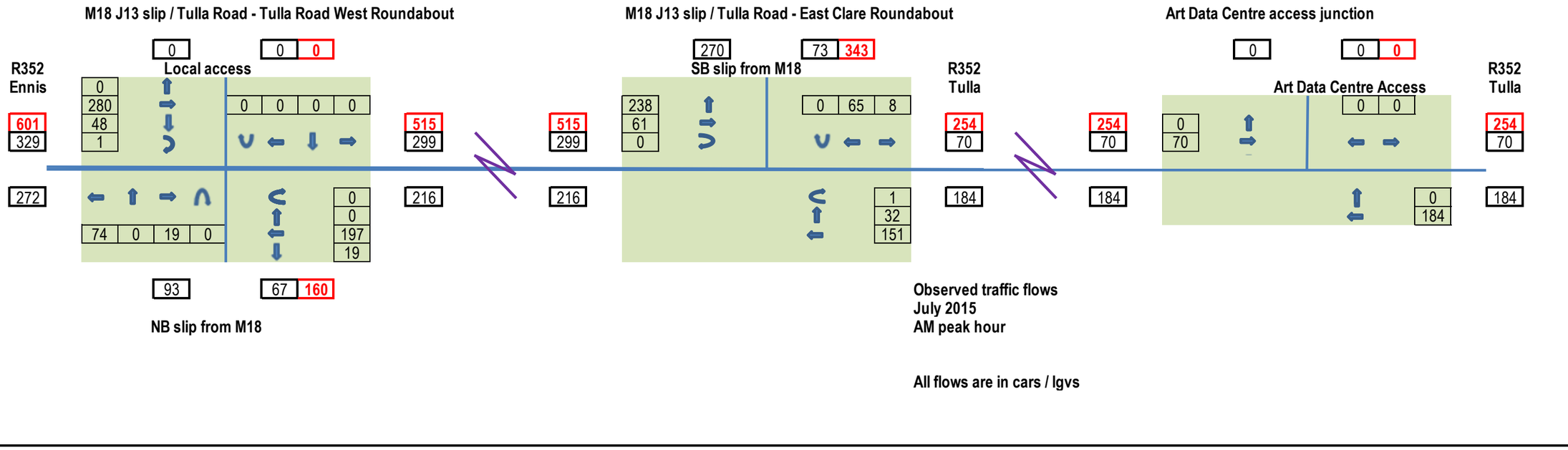
Year 2015 by hour

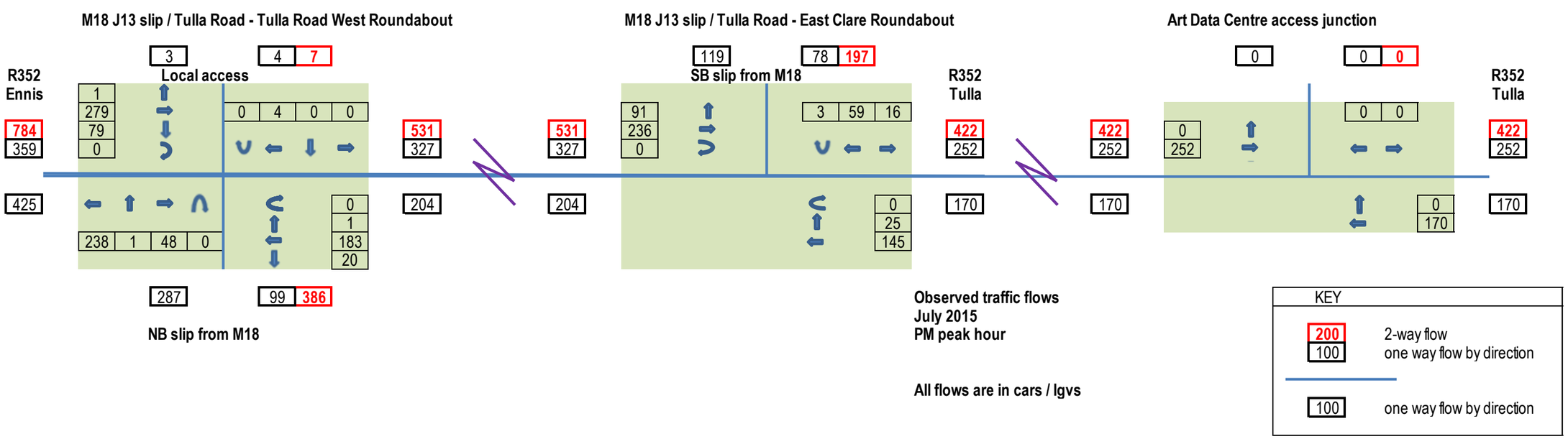
	Northbound 1	Northbound 2	Southbound 2	Southbound 1	Total
00:00	40	2	1	29	72
01:00	22	1	0	18	42
02:00	14	0	0	15	30
03:00	12	0	0	14	27
04:00	13	0	1	26	40
05:00	37	2	4	66	108
06:00	138	20	13	117	288
07:00	228	45	72	272	617
08:00	291	63	109	360	822
09:00	265	46	58	300	670
10:00	255	41	38	258	592
11:00	284	52	44	271	650
12:00	306	62	52	293	712
13:00	323	68	56	304	751
14:00	321	69	61	317	768
15:00	343	83	74	349	848
16:00	387	111	91	380	969
17:00	438	156	101	394	1089
18:00	361	104	80	348	893
19:00	248	47	52	282	630
20:00	185	27	30	208	451
21:00	163	22	14	144	344
22:00	106	11	6	91	214
23:00	60	4	3	59	125
07-19	3803	899	835	3844	9382
06-22	4536	1016	945	4596	11093
06-24	4702	1031	954	4746	11432
00-24	4840	1036	961	4914	11750
am Peak	08:00	08:00	08:00	08:00	08:00
Peak Volume	291	63	109	360	822
pm Peak	17:00	17:00	17:00	17:00	17:00
Peak Volume	438	156	101	394	1089

APPENDIX 12.3

TRAFFIC FLOW DIAGRAMS

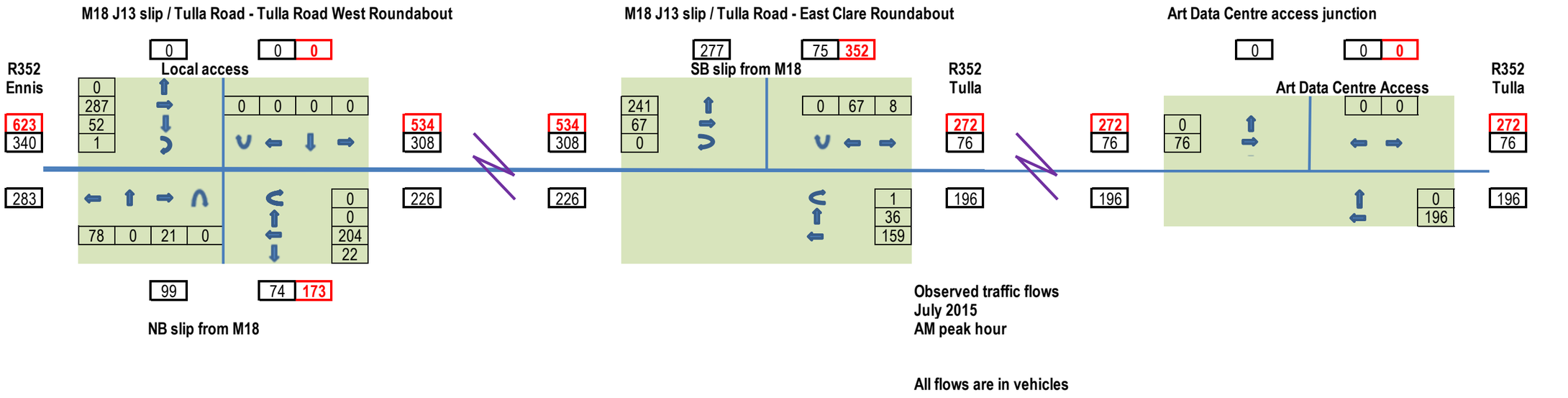
ALAN LIPSCOMBE TRAFFIC AND TRANSPORT





ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

Figure A12.3.1 Observed traffic flows, weekday AM and PM peak hours, July, year 2015 - cars / lgvs



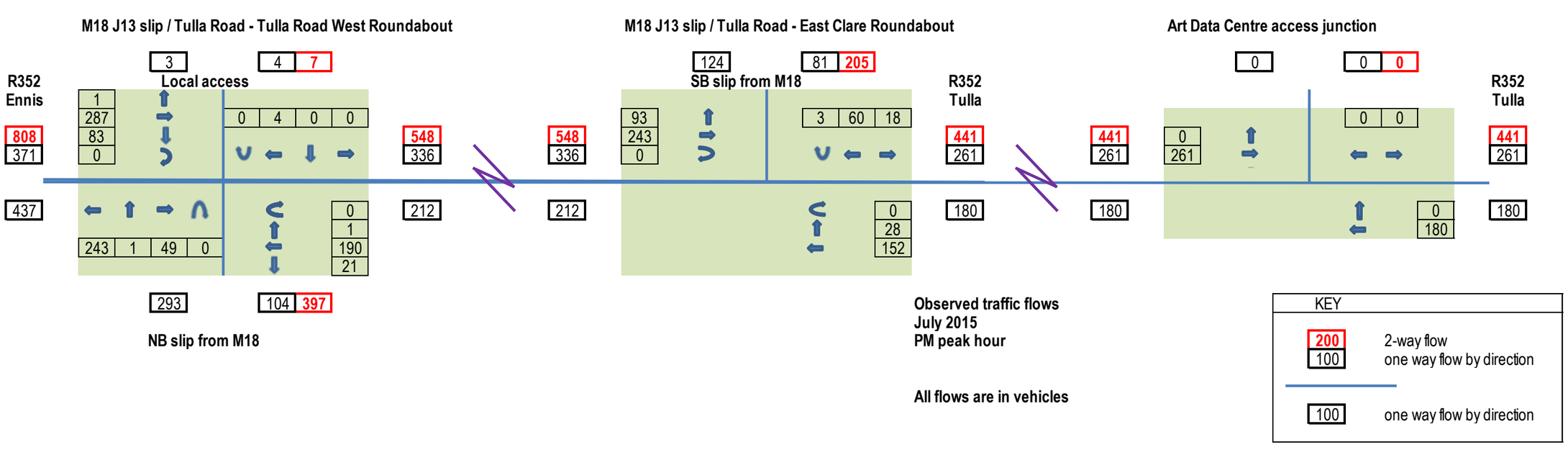


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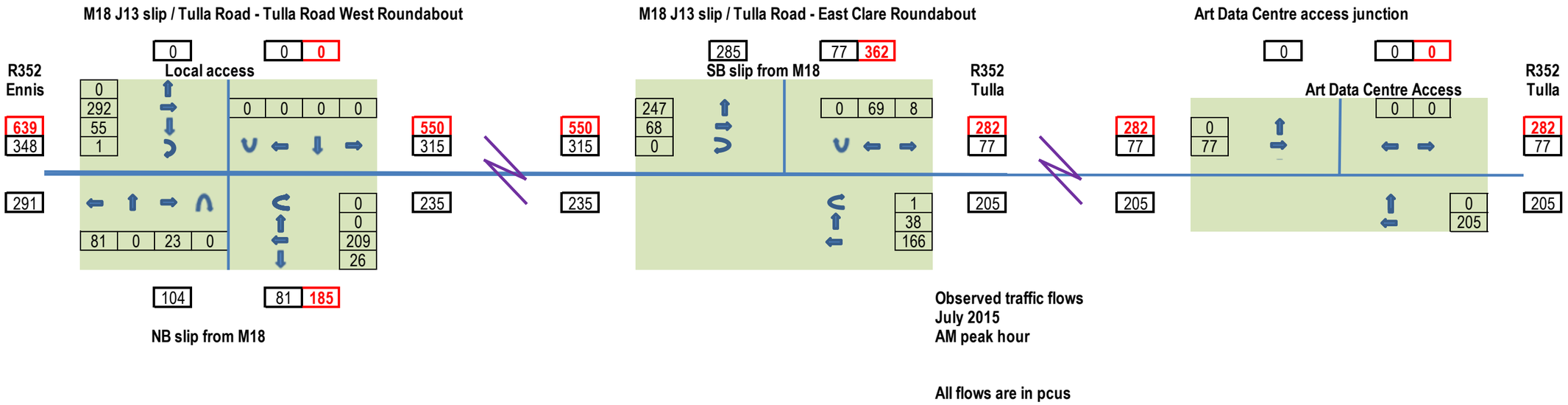
Figure A12.3.2 Observed traffic flows, weekday AM and PM peak hours, July, year 2015 - vehicles



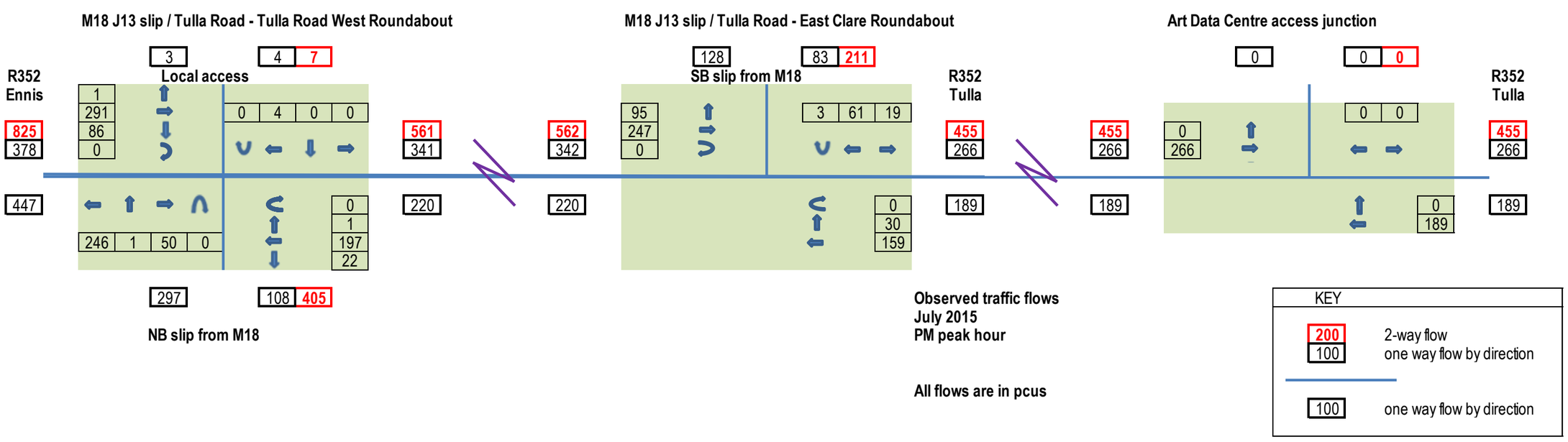


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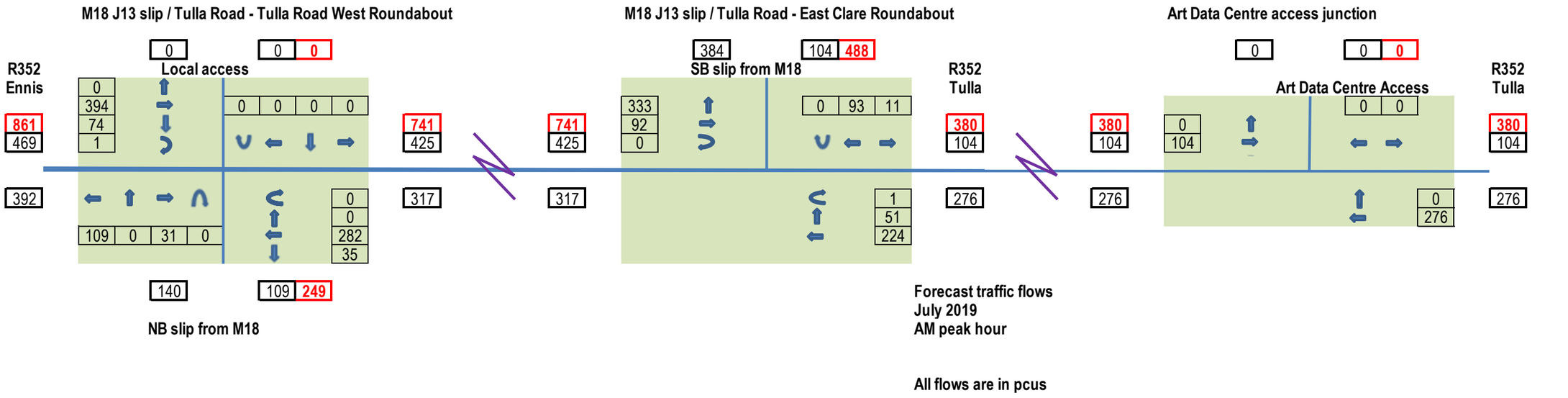
Figure A12.3.3 Observed traffic flows, weekday AM and PM peak hours, July, year 2015 - pcus



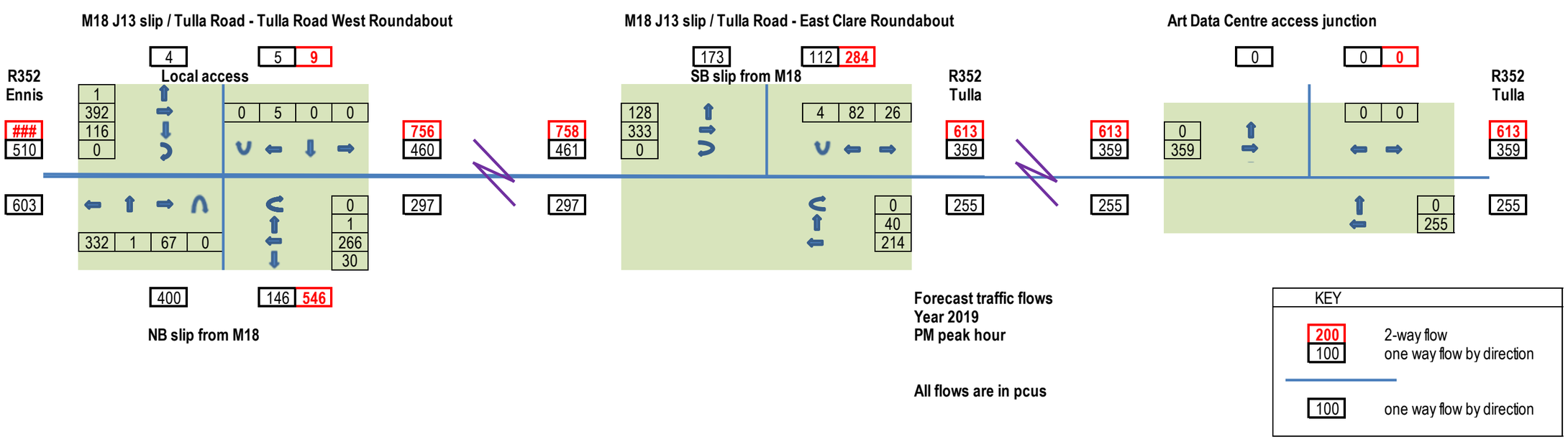


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Figure A12.3.4 Background traffic flows, weekday AM and PM peak hours, year 2019 - pcus

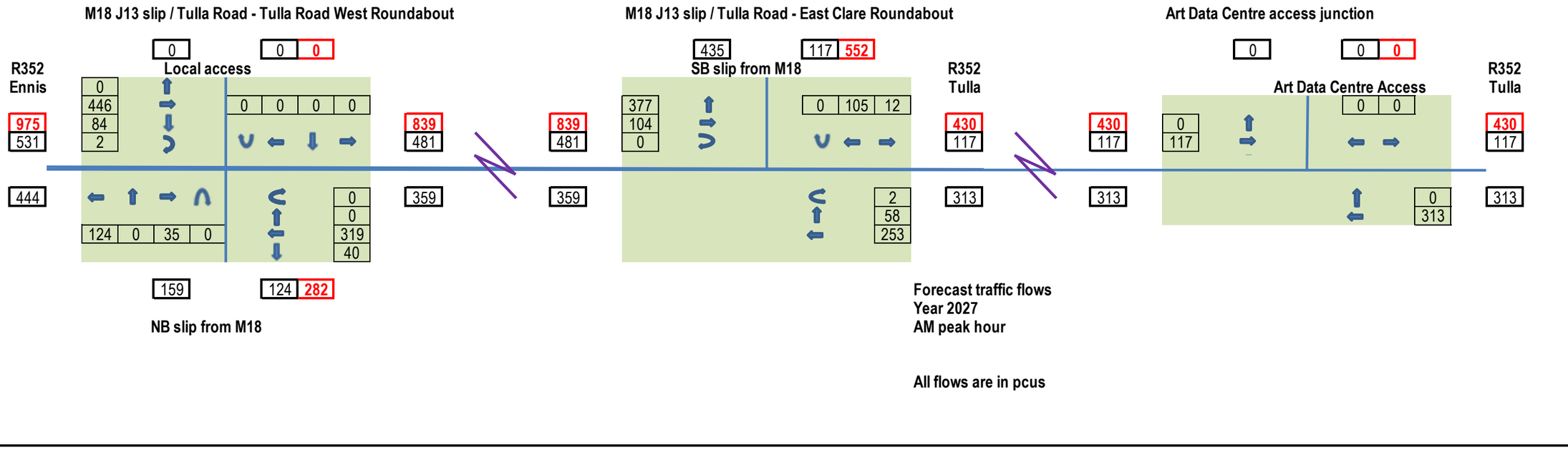

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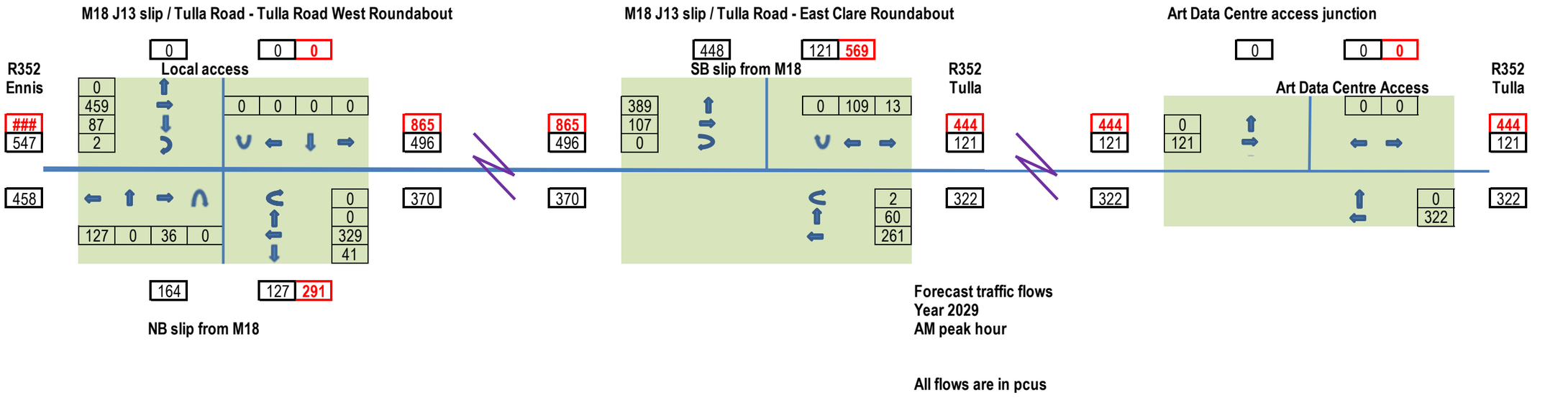
Figure A12.3.5 Background traffic flows, weekday AM and PM peak hours, year 2027 - pcus



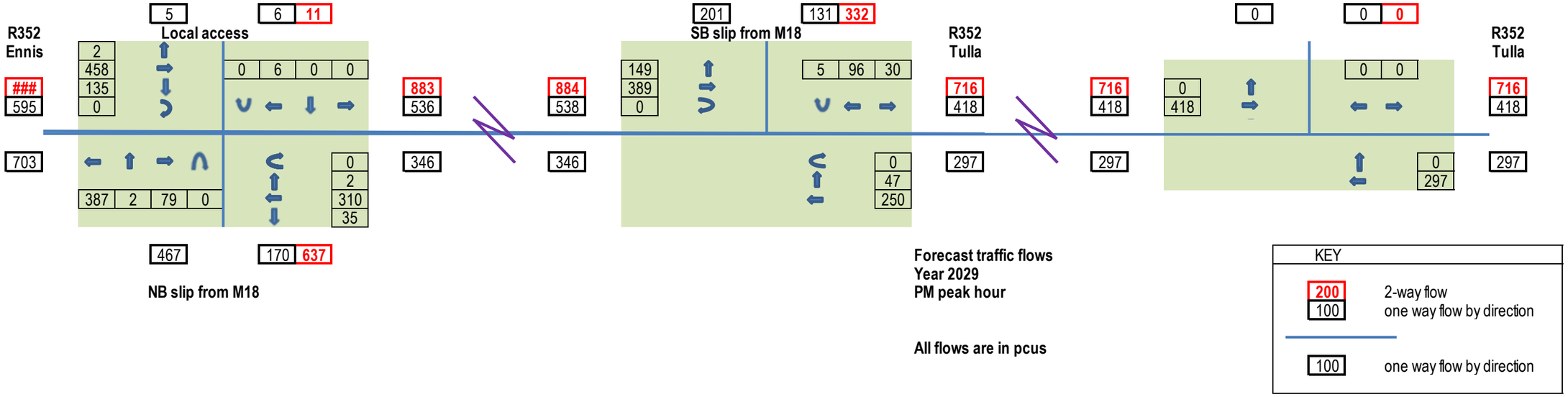


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Figure A12.3.6 Background traffic flows, weekday AM and PM peak hours, year 2029 - pcus

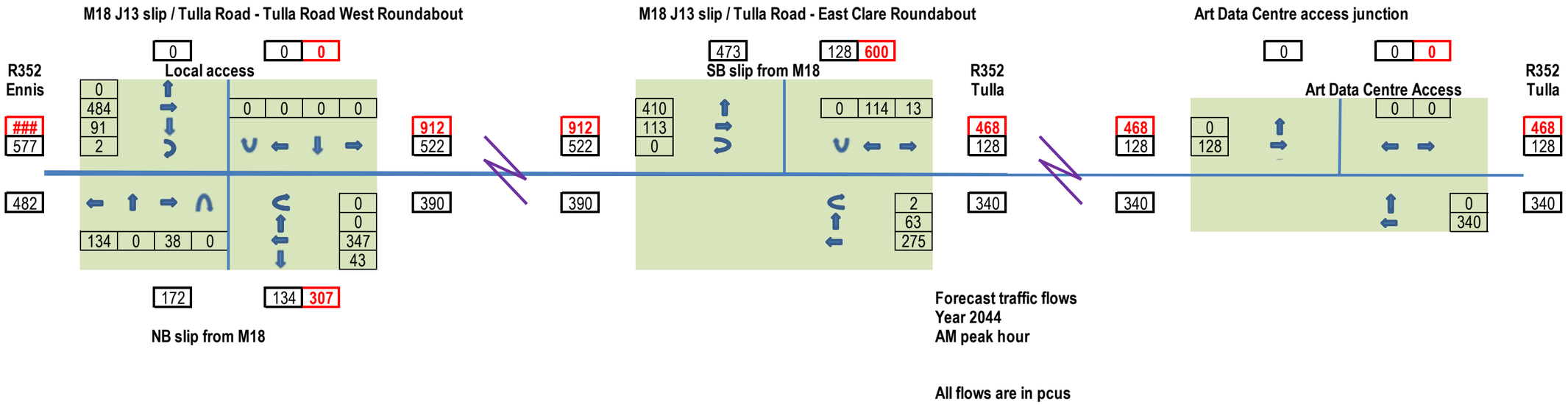

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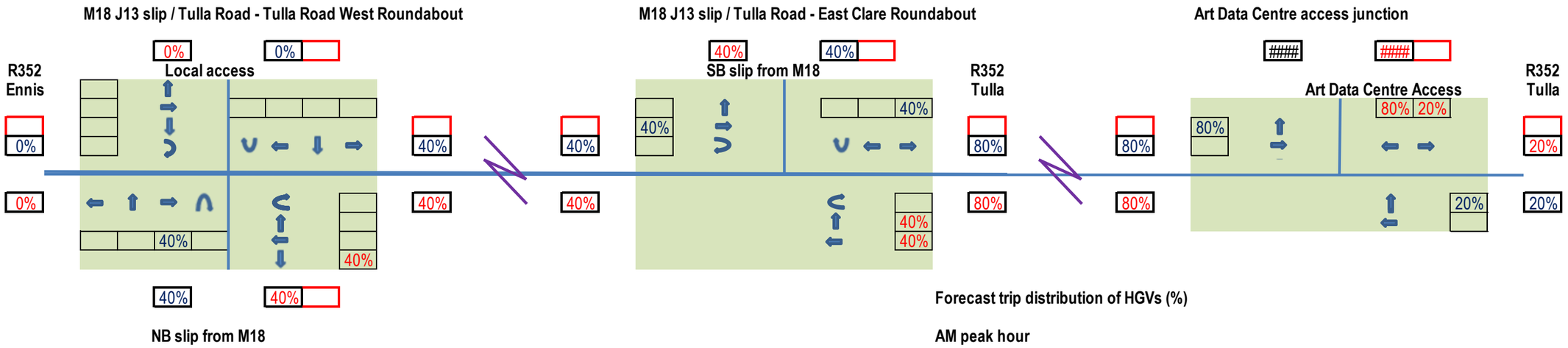
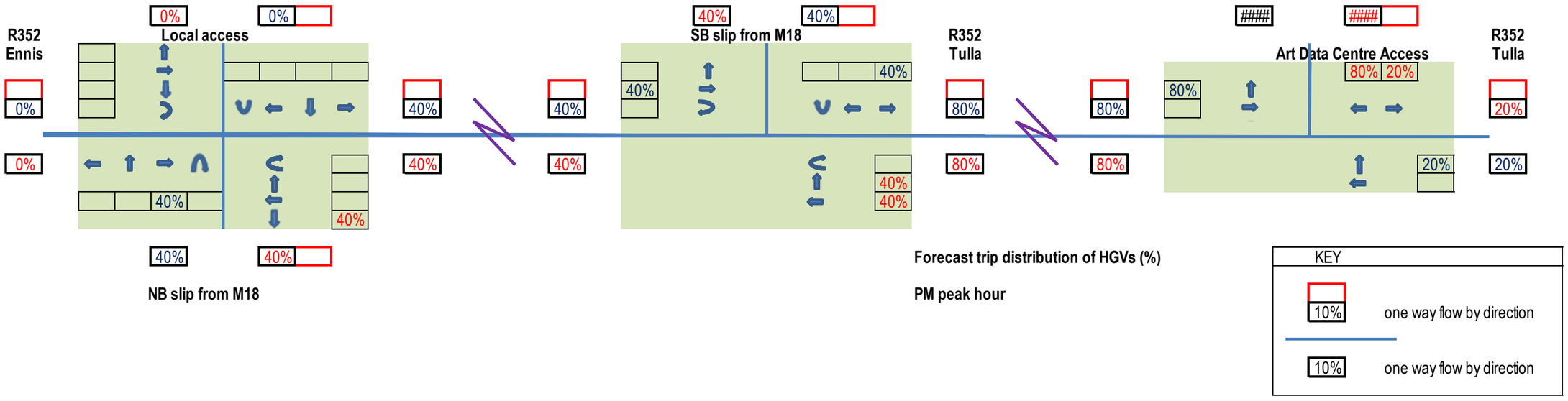
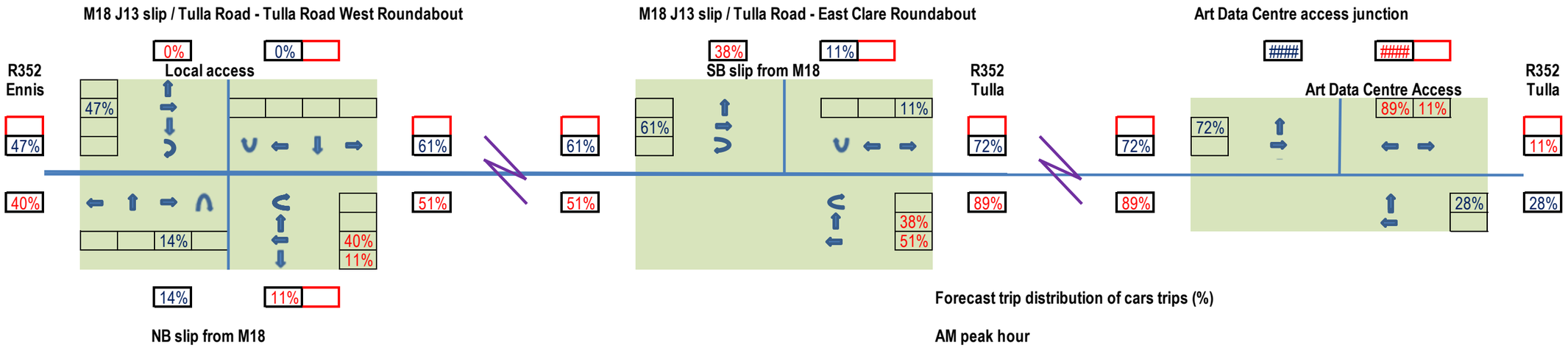
Figure A12.3.7 Background traffic flows, weekday AM and PM peak hours, year 2044 - pcus





ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

Figure A12.3.8 Forecast trip disribution, weekday AM and PM peak hours - Art Data Centre construction HGVs, - % by direction



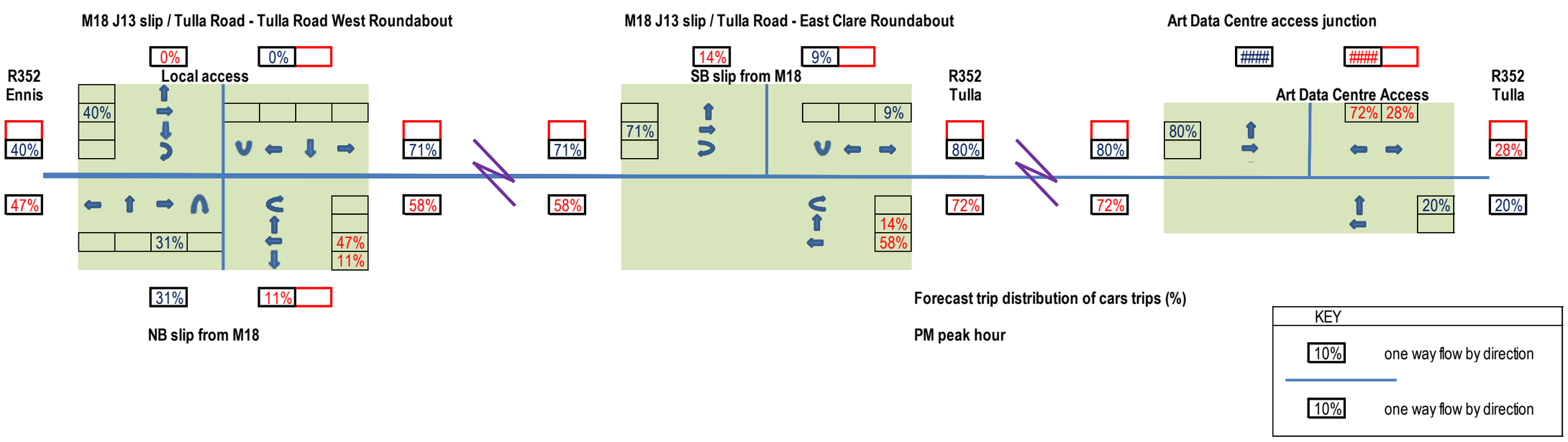


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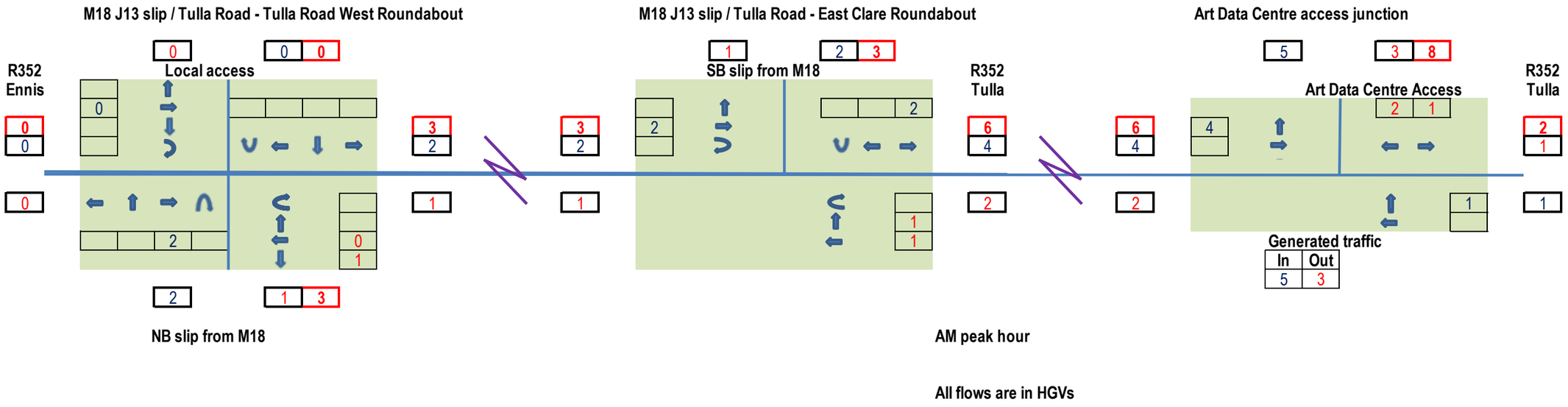
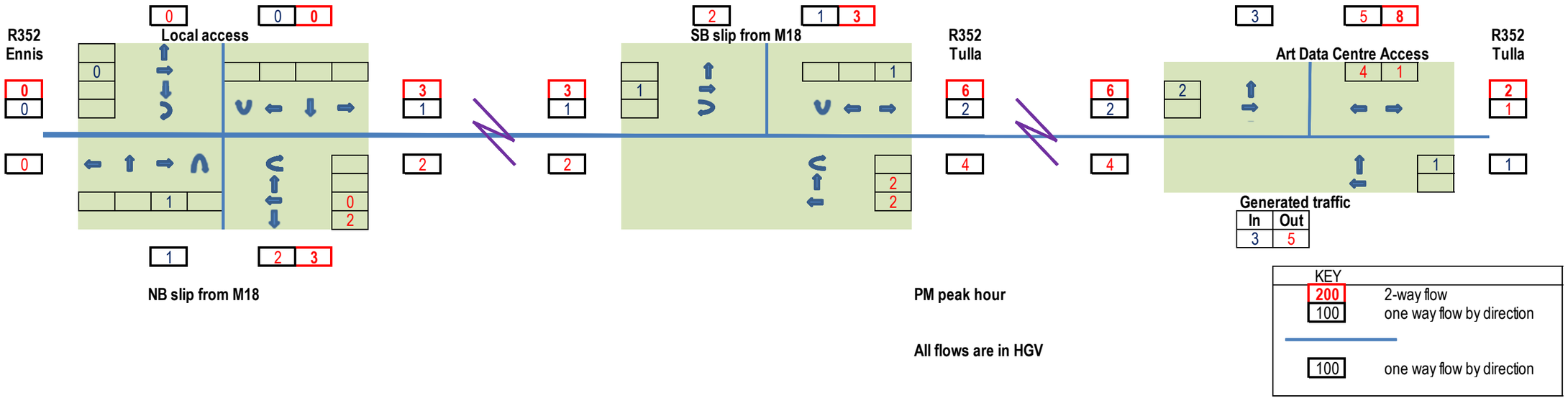
Figure A12.3.9 Forecast trip disribution, weekday AM and PM peak hours - Art Data Centre car trips (staff, visitor) - % by direction





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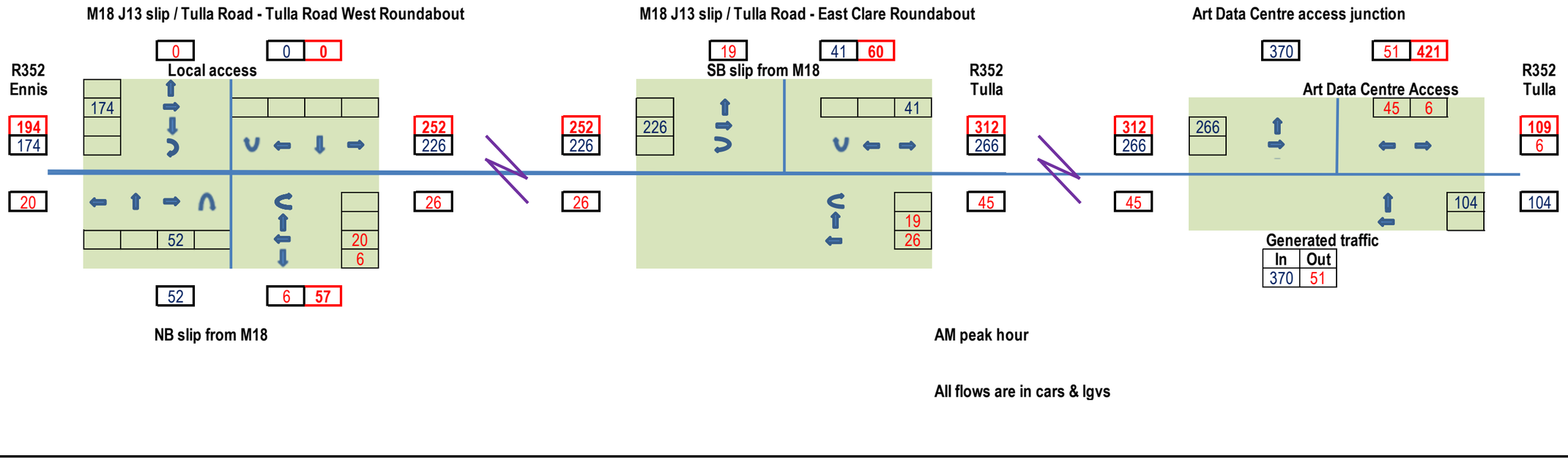
TRAFFIC & TRANSPORT CONSULTANTS

Figure A12.3.10 Generated HGV trips, weekday AM and PM peak hours - Art Data Centre peak construction, year 2027 - HGVs



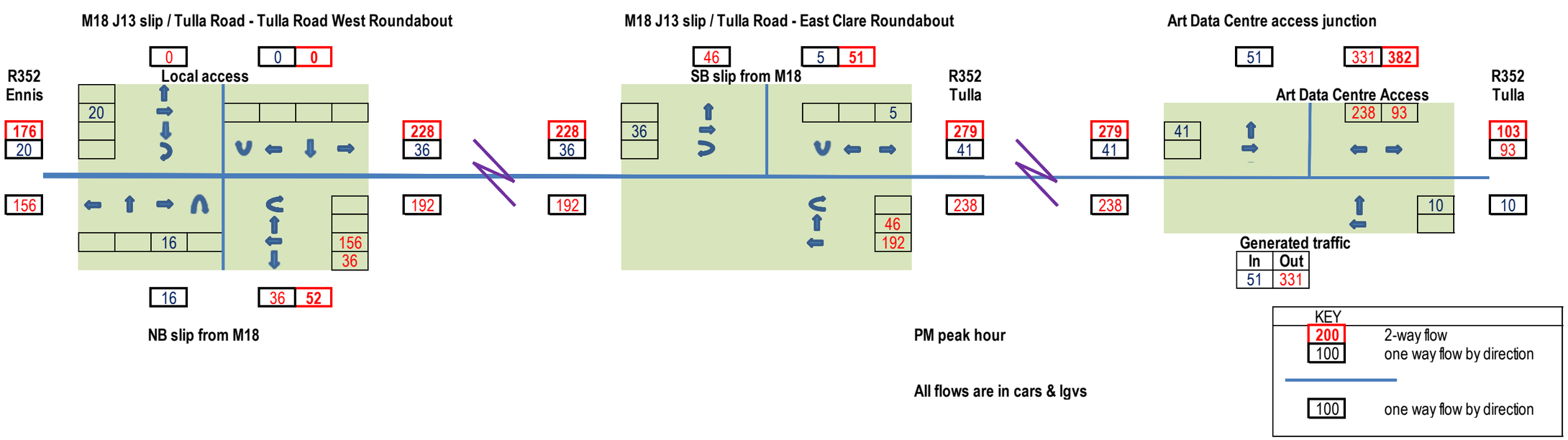


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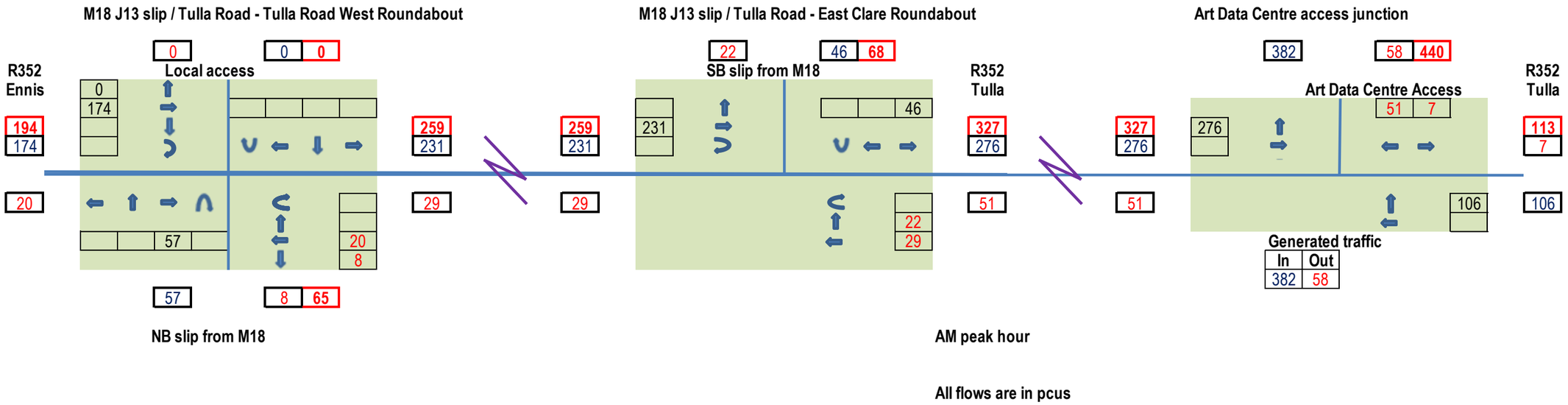
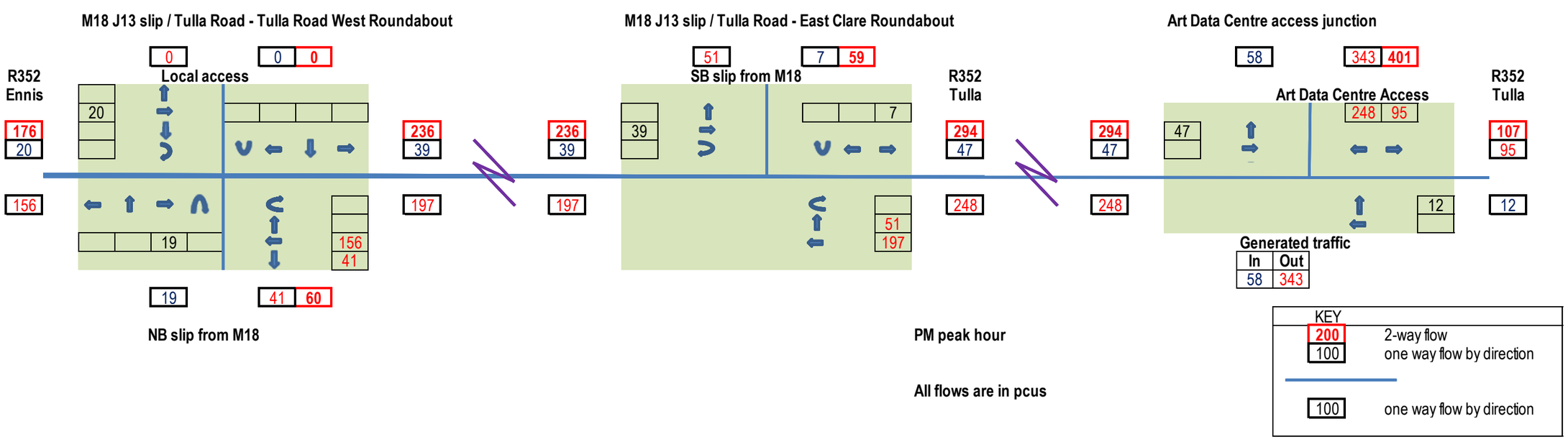
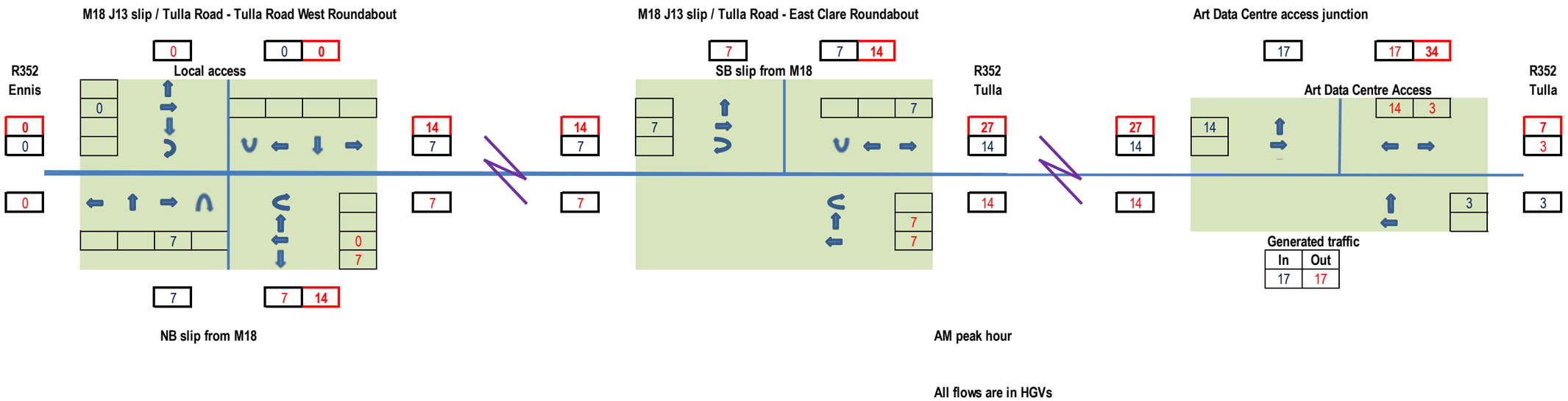
Figure A12.3.11 Generated car/lgv trips, weekday AM and PM peak hours - Art Data Centre peak construction, year 2027 - cars/lgvs

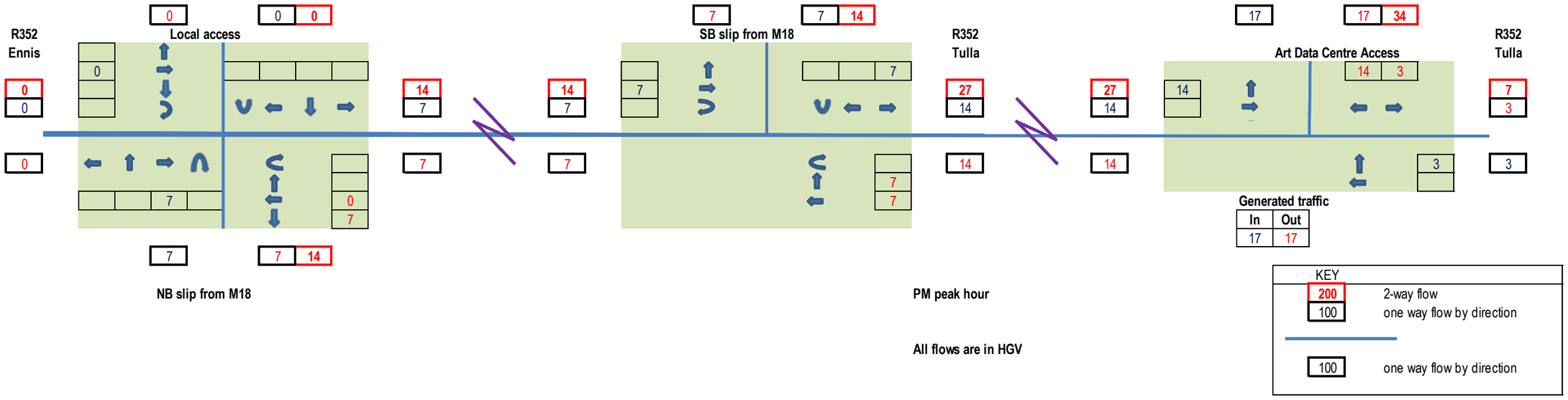




ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

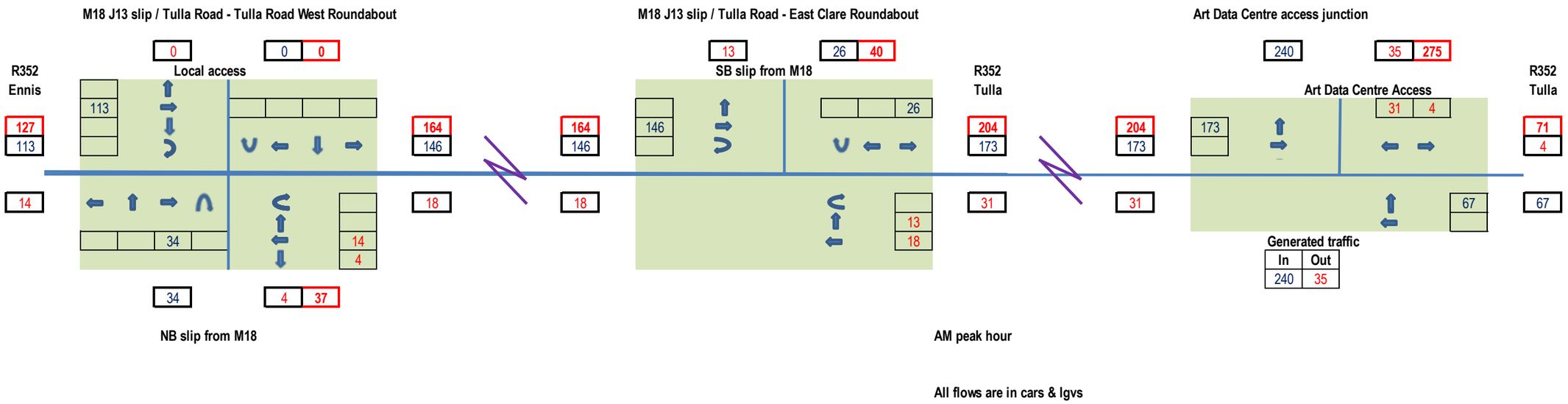
Figure A12.3.12 Generated total trips, weekday AM and PM peak hours - Art Data Centre peak construction, year 2027 - pcus

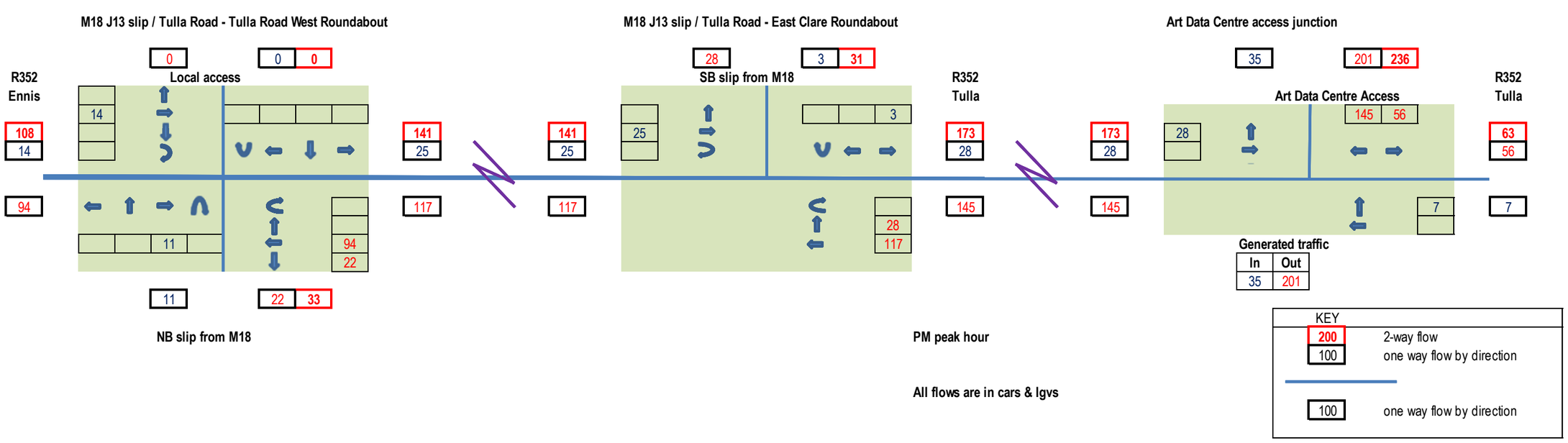




ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

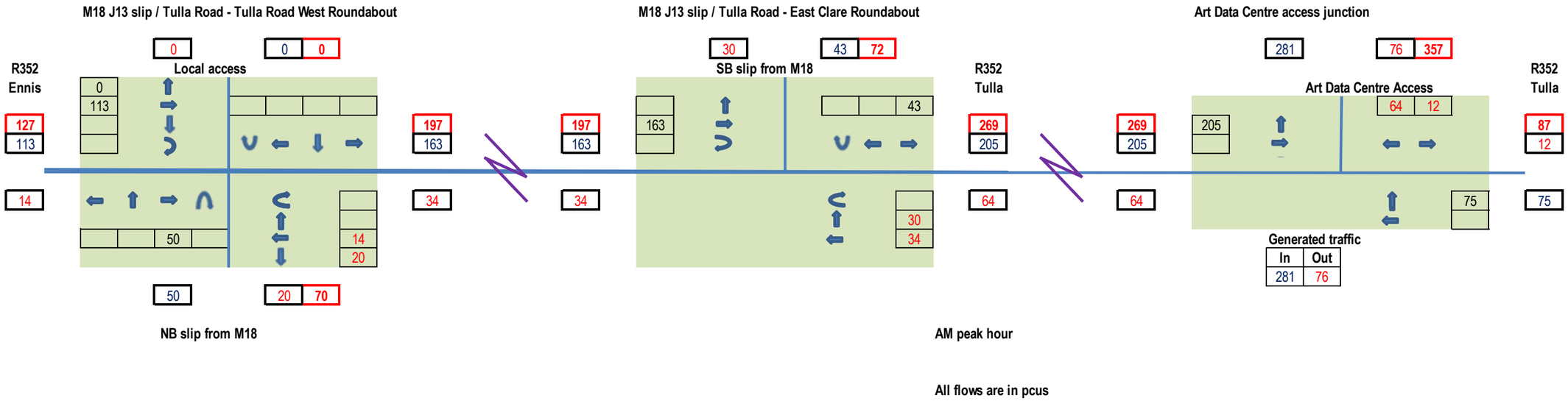
Figure A12.3.13 Generated HGV trips, weekday AM and PM peak hours - Art Data Centre peak construction HGV deliveries, year 2027 - HGVs

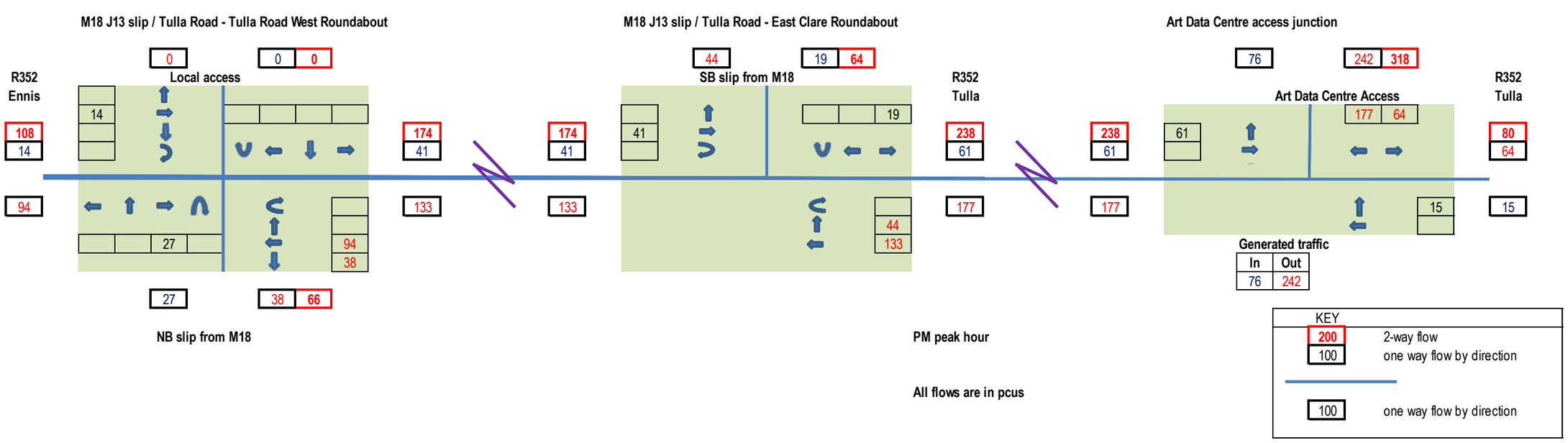




ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

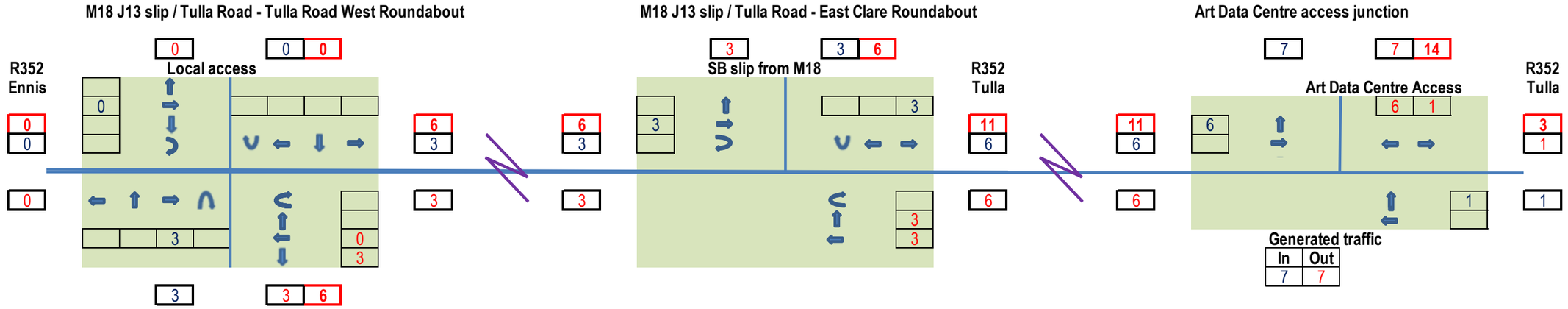
Figure A12.3.14 Generated car/lgv trips, weekday AM and PM peak hours - Art Data Centre peak construction HGV deliveries, year 2027 - cars/lgvs





ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

Figure A12.3.15 Generated total trips, weekday AM and PM peak hours - Art Data Centre peak construction HGV deliveries, year 2027 - pcus



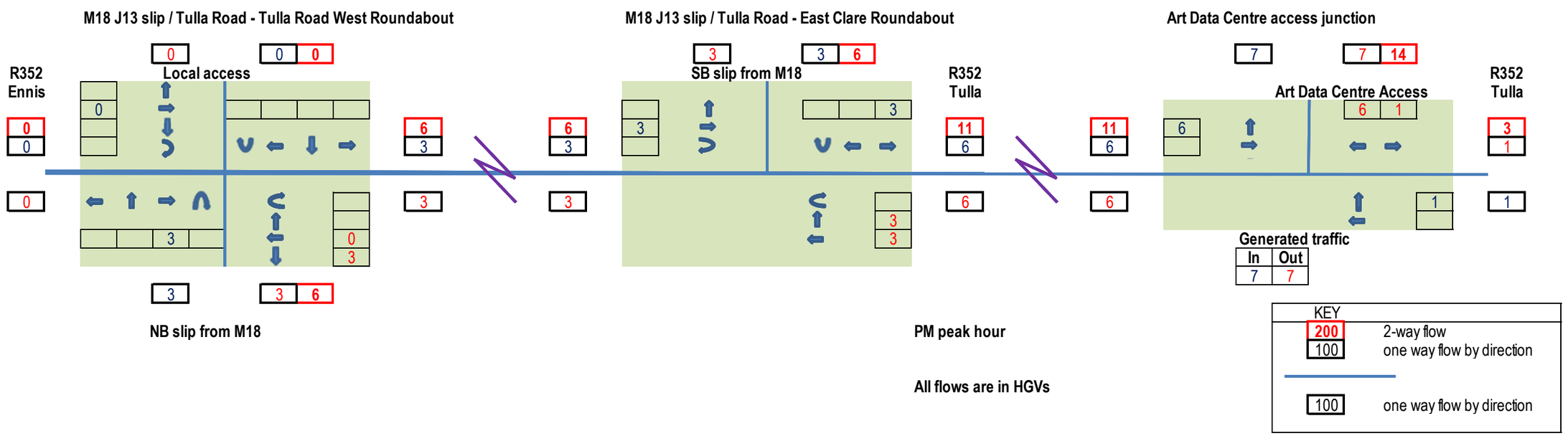


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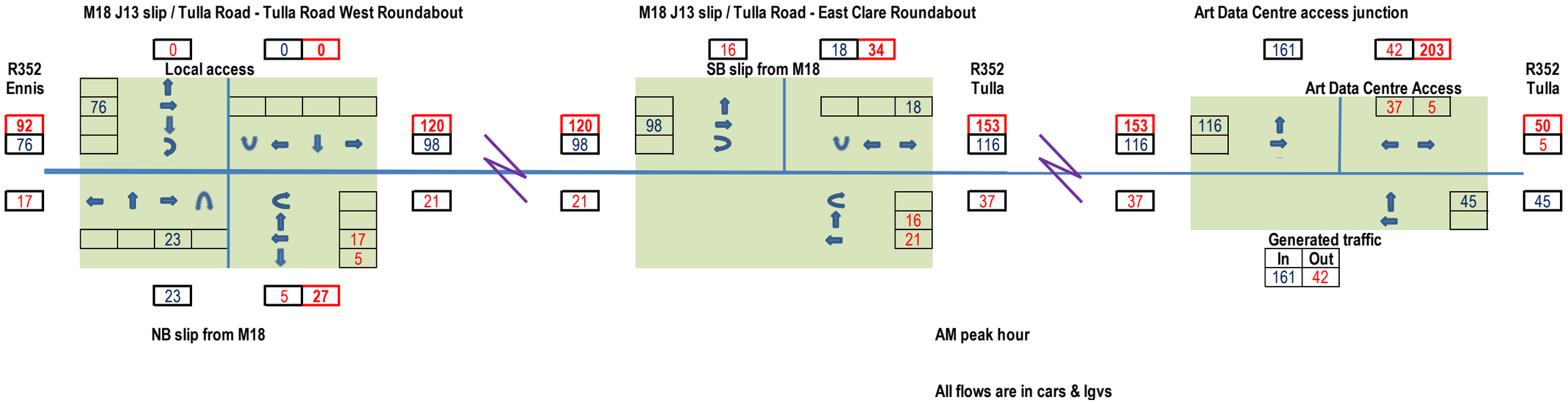
Figure A12.3.16 Generated HGV trips, weekday AM and PM peak hours - Art Data Centre fully operational - HGVs



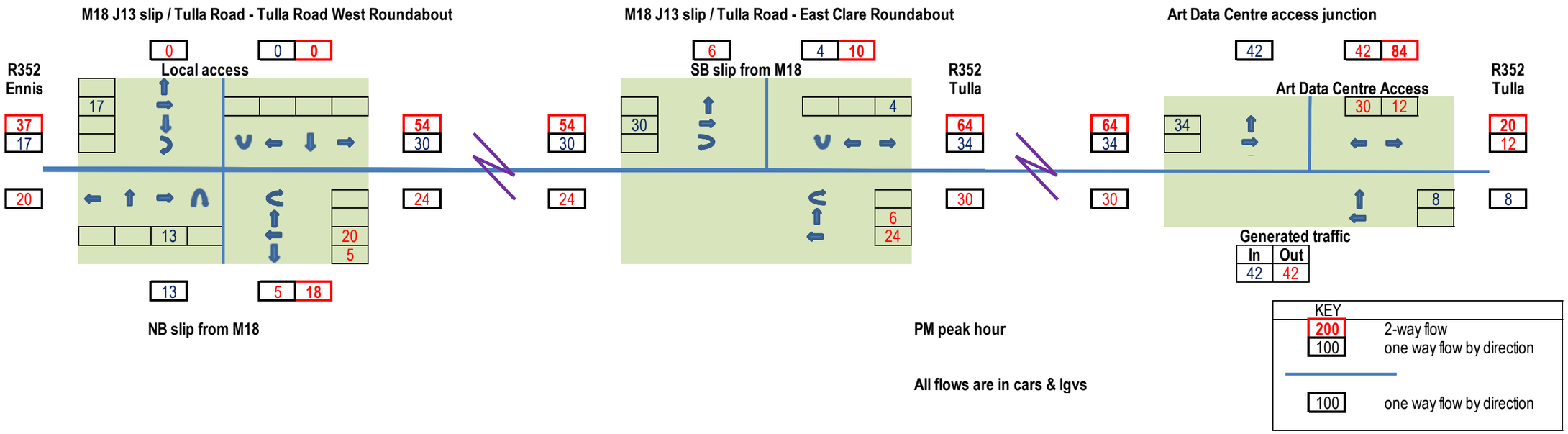


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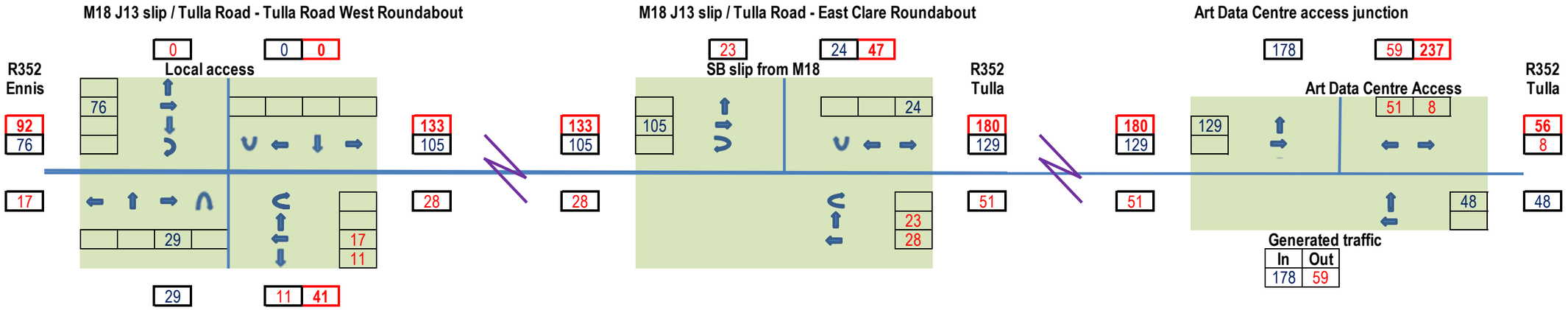
Figure A12.3.17 Generated car/lgv trips, weekday AM and PM peak hours - Art Data Centre fully operational - cars/lgvs



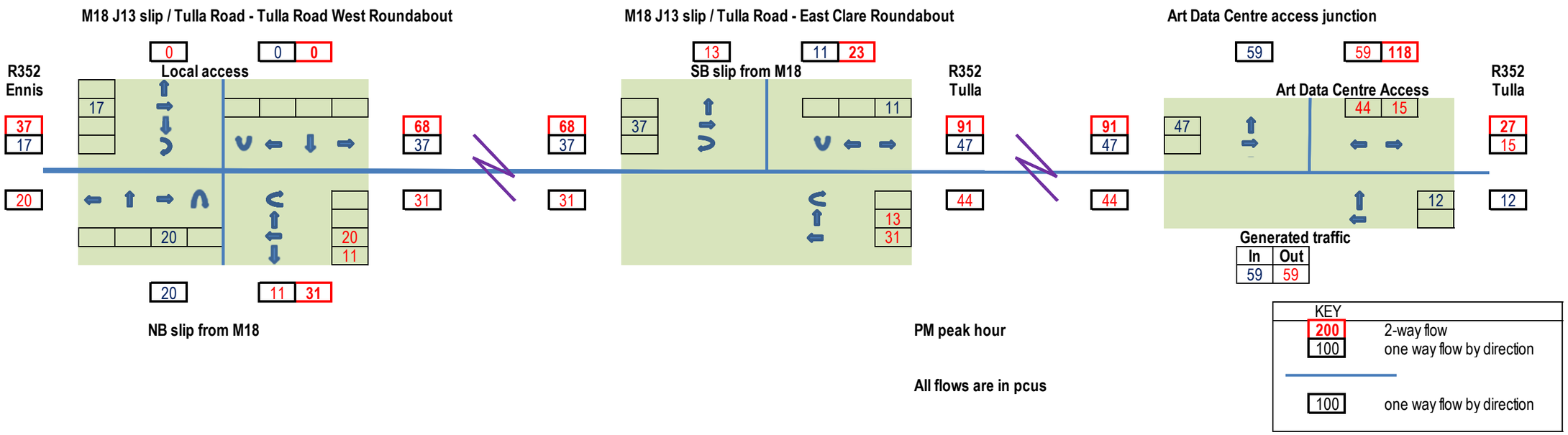


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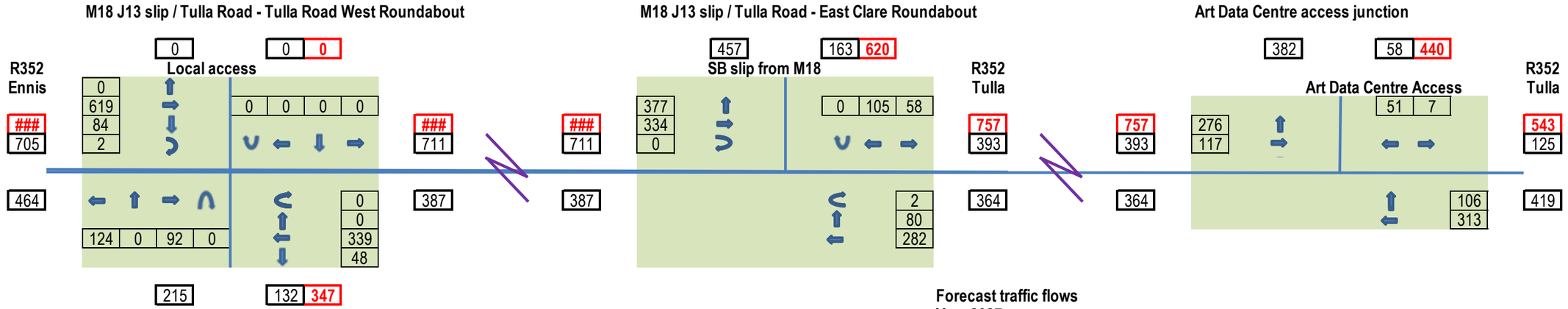
Figure A12.3.18 Generated total trips, weekday AM and PM peak hours - Art Data Centre fully operational, all vehicles - pcus



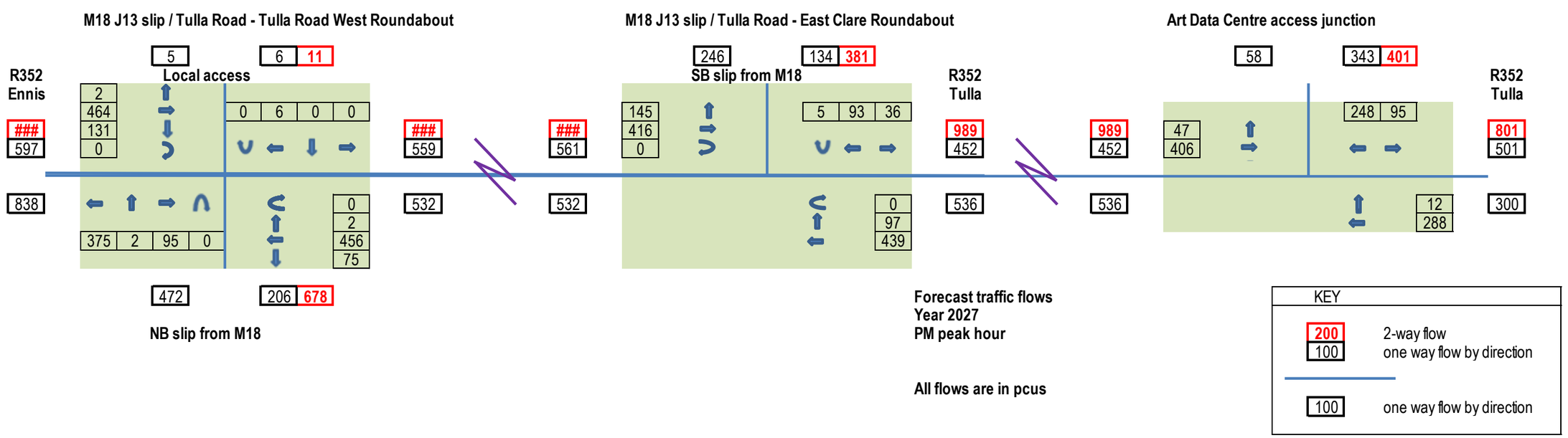


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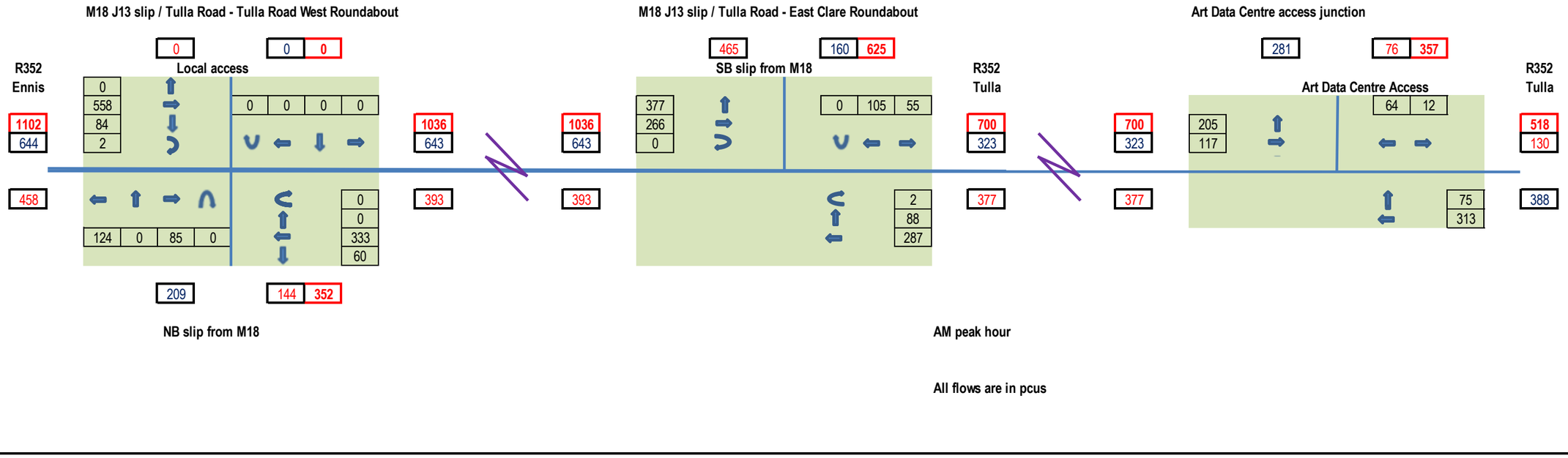
Figure A12.3.19 With Art Data Centre peak construction traffic flows, weekday AM and PM peak hours, year 2027 - pcus



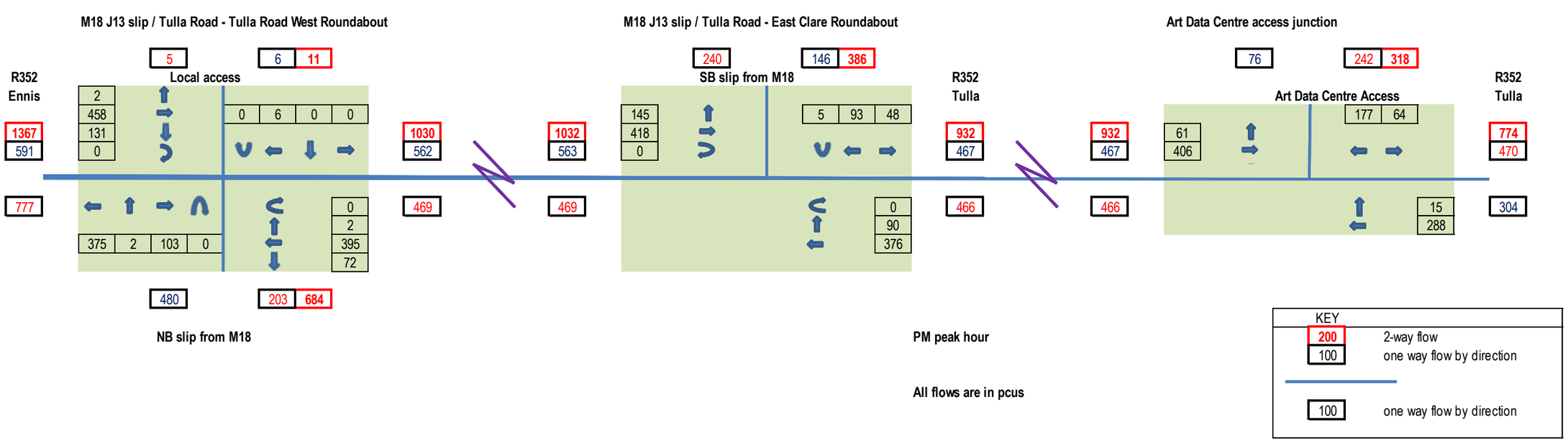


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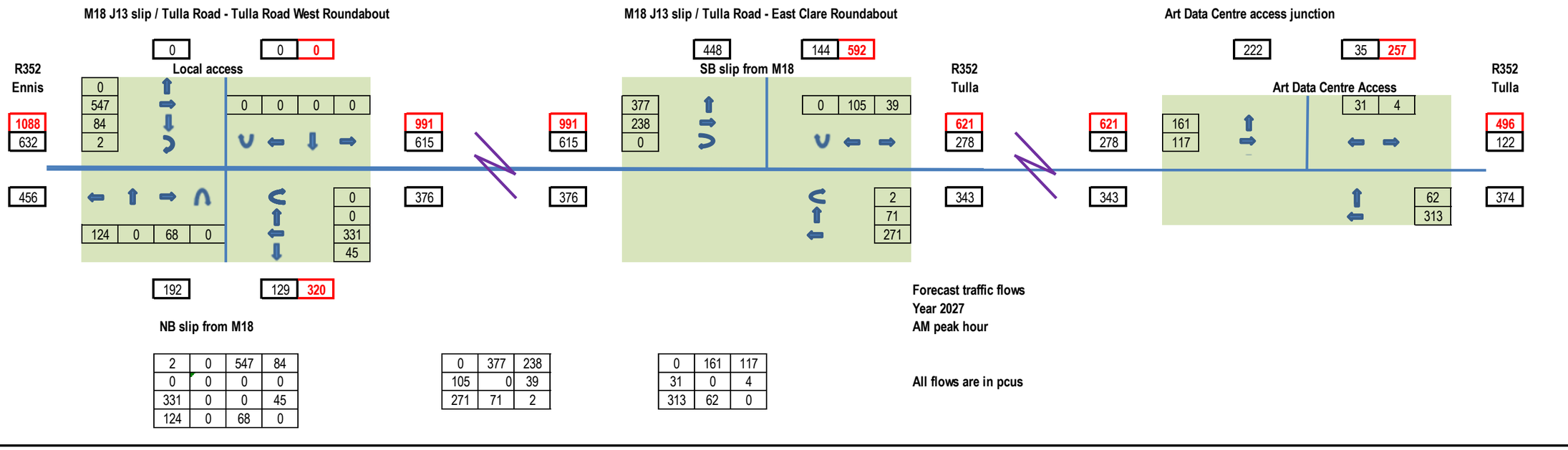
Figure A12.3.20 With Art Data Centre peak construction HGV deliveries traffic flows, weekday AM and PM peak hours, year 2027 - pcus



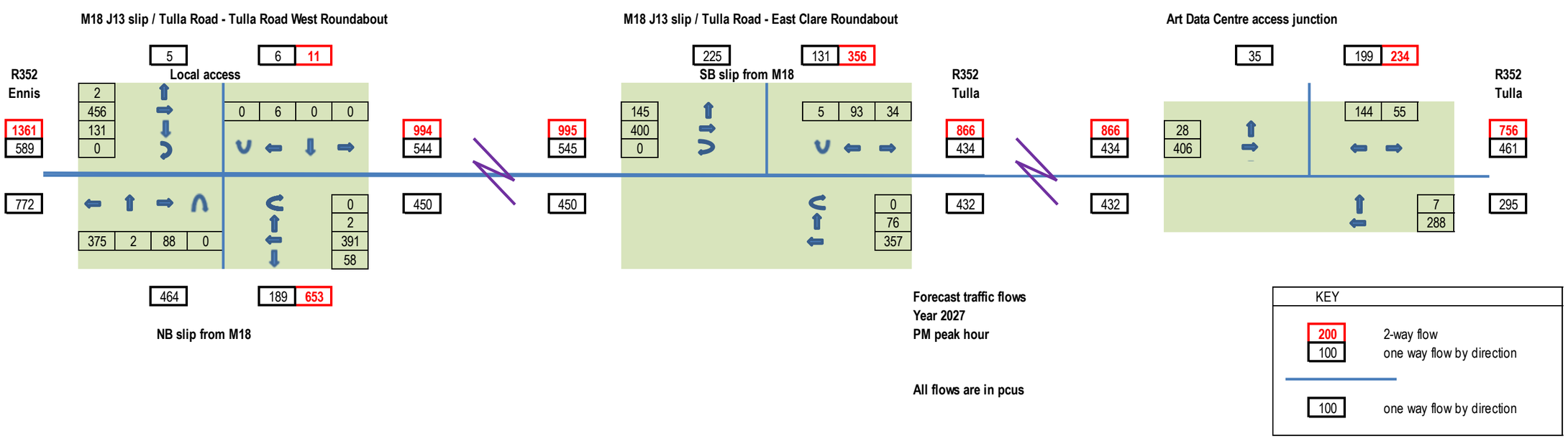


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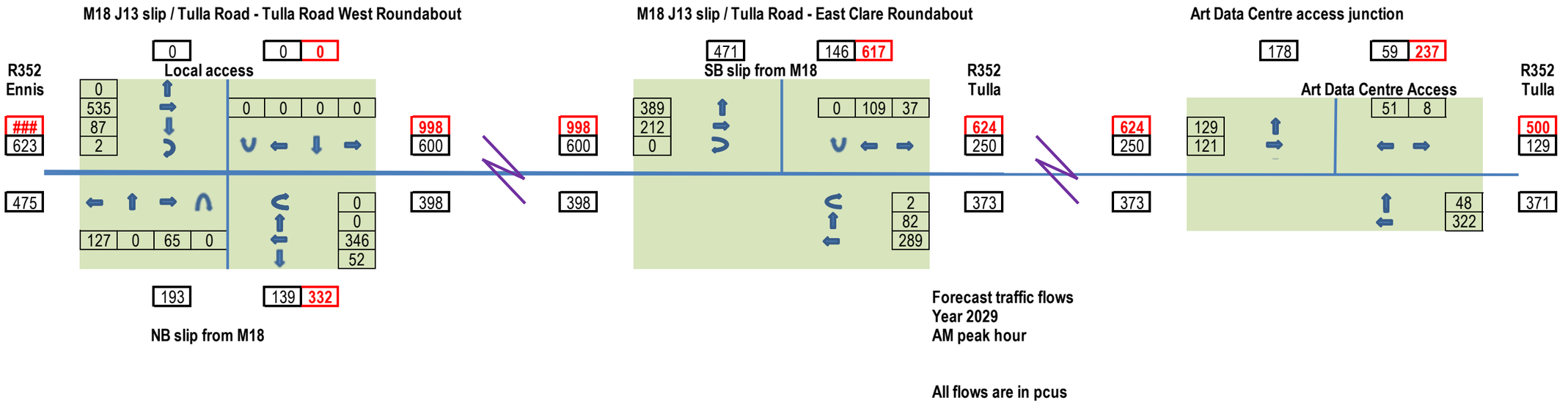
Figure A12.4.21 With Art Data Centre average construction traffic flows, AM and PM peak hours, year 2027 - pcus



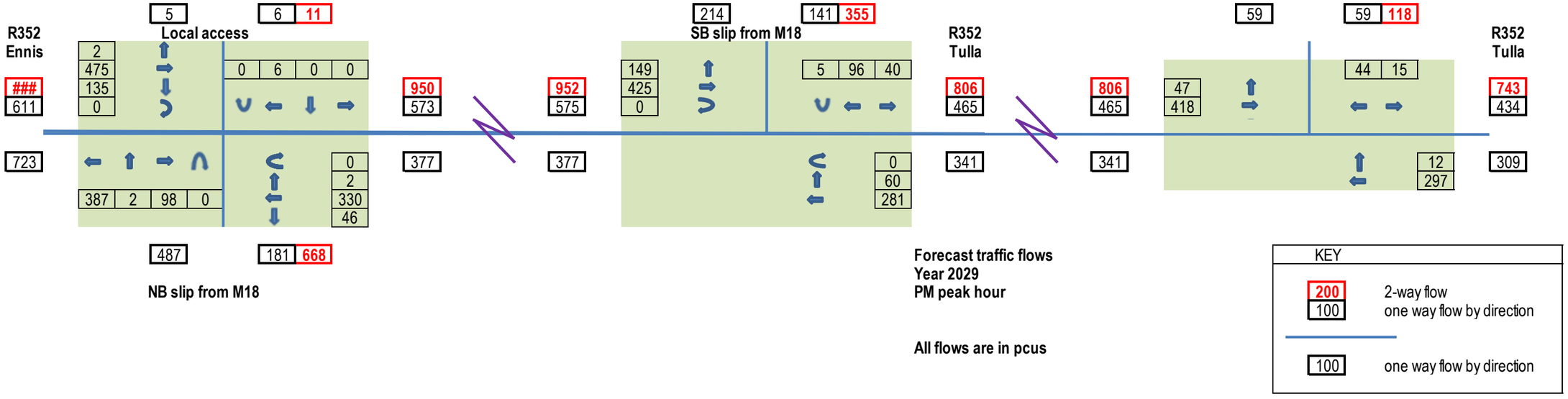


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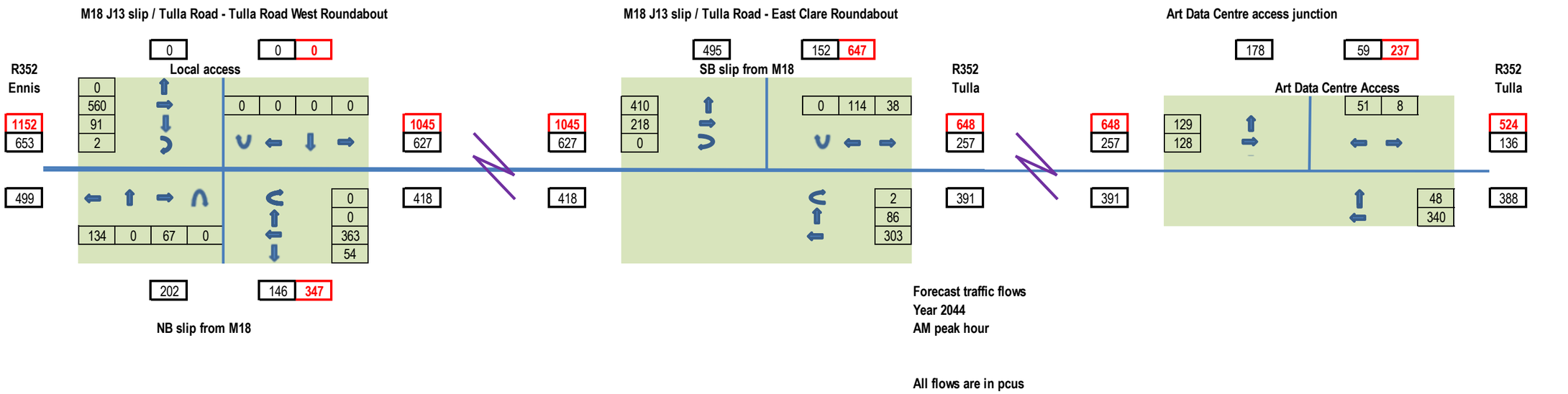
Figure A12.3.22 With Art Data Centre fully operational traffic flows, weekday AM and PM peak hours, year 2029 - pcus



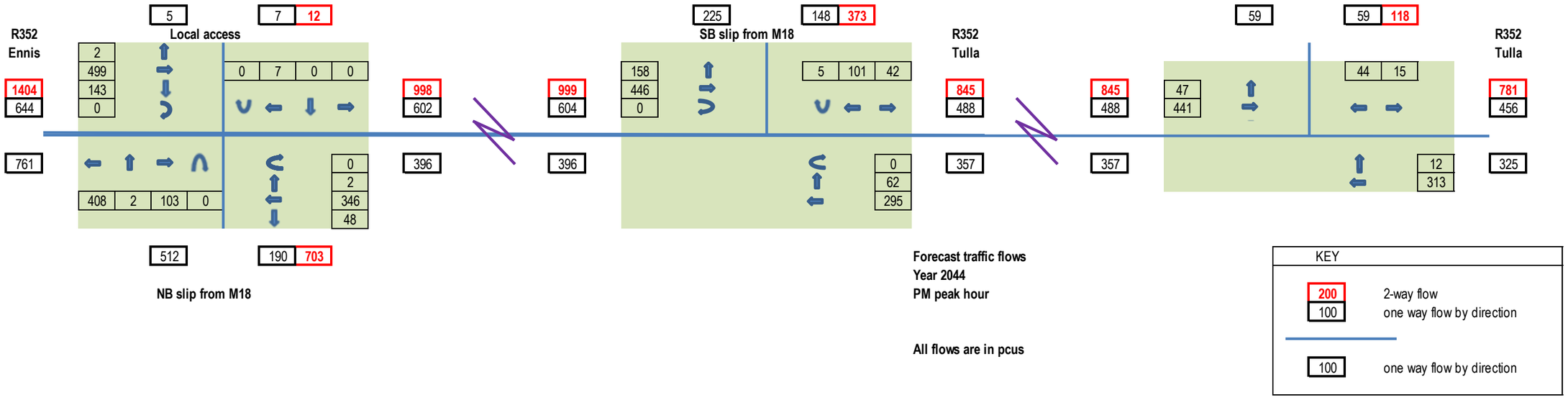


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Figure A12.3.23 With Art Data Centre fully operational traffic flows, weekday AM and PM peak hours, year 2044 - pcus

APPENDIX 12.4

TRAFFIC FLOW TABLES

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

12.16 Forecast link flows, background, development generated, and with development (peak construction traffic), by time period and vehicle type, year 2027

12.17 Forecast link flows, background, development generated, and with development (peak HGV delivery construction traffic), by time period and vehicle type, year 2027

12.18 Forecast link flows, background, development generated, and with development (average construction traffic), by time period and vehicle type, year 2027

12.19 Forecast link flows, background, development generated, and with development (fully operational), by time period and vehicle type, year 2029

12.20 Forecast link flows, background, development generated, and with development (fully operational), by time period and vehicle type, year 2039

Table 12.16 Forecast links flows, background, development generated and with development (peak construction traffic), by time period and vehicle type, year 2027

Time period	Link	Background Year 2027					Additional development traffic 2027					With development 2027				% Difference			
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	PCUs	cars / lgvs	HGVs	All vehs	PCUs
AM peak hour	1 Tulla Road east of site access	388	27	415	7%	453	109	2	111	2%	114	497	29	526	567	28%	7%	27%	25%
	2 Tulla Road west of site access	388	27	415	7%	453	312	6	318	2%	326	700	33	733	780	80%	22%	77%	72%
	3 Ste access	0	0	0	NA	0	421	8	429	2%	440	421	8	429	440	NA	NA	NA	NA
	4 Tulla Road between roundabouts	786	29	815	4%	855	252	3	255	1%	259	1,038	32	1,070	1,115	32%	10%	31%	30%
	5 M18 slip at East Clare roundabout	523	14	537	3%	556	60	3	63	5%	67	583	17	600	624	11%	22%	12%	12%
	6 Ennis Road	917	34	951	4%	998	194	0	194	0%	194	1,111	34	1,145	1,192	21%	0%	20%	19%
	7 Local access road	0	0	0	NA	0	0	0	0	NA	0	0	0	0	0	NA	NA	NA	NA
	8 M18 slip at Tulla Road West roundabout	244	20	264	8%	292	57	3	60	5%	64	301	23	324	356	23%	15%	23%	22%
	9 M18 motorway north of Tulla Road - n/b	510	30	540	6%	583	6	1	7	14%	8	516	31	547	591	1%	3%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	676	40	716	6%	772	41	2	43	5%	46	717	42	759	818	6%	5%	6%	6%
	11 M18 motorway south of Tulla Road - n/b	510	30	540	6%	583	52	2	54	4%	57	562	32	594	639	10%	7%	10%	10%
	12 M18 motorway south of Tulla Road - s/b	676	40	716	6%	772	19	1	20	5%	21	695	41	736	793	3%	2%	3%	3%
PM peak hour	1 Tulla Road east of site access	644	29	673	4%	714	103	2	105	2%	108	747	31	778	821	16%	7%	16%	15%
	2 Tulla Road west of site access	644	29	673	4%	714	279	6	285	2%	293	923	35	958	1,007	43%	21%	42%	41%
	3 Ste access	0	0	0	NA	0	382	8	390	2%	401	382	8	390	401	NA	NA	NA	NA
	4 Tulla Road between roundabouts	810	26	836	3%	873	228	3	231	1%	235	1,038	29	1,067	1,108	28%	12%	28%	27%
	5 M18 slip at East Clare roundabout	301	12	313	4%	330	51	3	54	6%	58	352	15	367	388	17%	25%	17%	18%
	6 Ennis Road	1,196	37	1,233	3%	1284	176	0	176	0%	176	1,372	37	1,409	1,460	15%	0%	14%	14%
	7 Local access road	11	0	11	NA	11	0	0	0	NA	0	11	0	11	11	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	589	17	606	3%	629	52	3	55	5%	59	641	20	661	688	9%	18%	9%	9%
	9 M18 motorway north of Tulla Road - n/b	856	51	906	6%	977	36	2	38	5%	41	892	53	944	1,018	4%	4%	4%	4%
	10 M18 motorway north of Tulla Road - s/b	713	42	755	6%	815	5	1	6	17%	7	718	43	761	822	1%	2%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	856	51	906	6%	977	16	1	17	6%	18	872	52	923	996	2%	2%	2%	2%
	12 M18 motorway south of Tulla Road - s/b	713	42	755	6%	815	46	2	48	4%	51	759	44	803	865	6%	5%	6%	6%
All Day	1 Tulla Road east of site access	6,344	347	6,691	5%	7177	414	16	430	4%	452	6,758	363	7,121	7,630	7%	5%	6%	6%
	2 Tulla Road west of site access	6,344	347	6,691	5%	7177	1,488	62	1,550	4%	1637	7,832	409	8,241	8,814	23%	18%	23%	23%
	3 Ste access	0	0	0	NA	0	1,902	78	1,980	4%	2089	1,902	78	1,980	2,089	NA	NA	NA	NA
	4 Tulla Road between roundabouts	9,816	338	10,154	3%	10627	1,146	31	1,177	3%	1220	10,962	369	11,331	11,847	12%	9%	12%	11%
	5 M18 slip at East Clare roundabout	5,068	160	5,227	3%	5450	342	31	373	8%	416	5,410	191	5,600	5,867	7%	19%	7%	8%
	6 Ennis Road	12,997	432	13,429	3%	14033	827	0	827	0%	827	13,824	432	14,256	14,860	6%	0%	6%	6%
	7 Local access road	66	0	66	NA	66	0	0	0	NA	0	66	0	66	66	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	5,124	225	5,349	4%	5664	319	31	350	9%	393	5,443	256	5,699	6,058	6%	14%	7%	7%
	9 M18 motorway north of Tulla Road - n/b	8,398	498	8,896	6%	9594	105	16	121	13%	143	8,503	514	9,017	9,737	1%	3%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	8,540	507	9,046	6%	9756	95	16	111	14%	133	8,635	523	9,157	9,889	1%	3%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	8,398	498	8,896	6%	9594	214	16	230	7%	252	8,612	514	9,126	9,846	3%	3%	3%	3%
	12 M18 motorway south of Tulla Road - s/b	8,540	507	9,046	6%	9756	247	16	263	6%	285	8,787	523	9,309	10,041	3%	3%	3%	3%

Table 12.17 Forecast links flows, background, development generated and with development (peak HGV construction traffic), by time period and vehicle type, year 2027

Time period	Link	Background Year 2027					Additional development traffic 2027					With development 2027				% Difference			
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	PCUs	cars / lgvs	HGVs	All vehs	PCUs
AM peak hour	1 Tulla Road east of site access	388	27	415	7%	453	71	7	78	9%	88	459	34	493	541	18%	25%	19%	19%
	2 Tulla Road west of site access	388	27	415	7%	453	204	27	231	12%	269	592	54	646	722	53%	98%	56%	59%
	3 Ste access	0	0	0	NA	0	275	34	309	11%	357	275	34	309	357	NA	NA	NA	NA
	4 Tulla Road between roundabouts	786	29	815	4%	855	164	14	178	8%	198	950	43	993	1,053	21%	48%	22%	23%
	5 M18 slip at East Clare roundabout	523	14	537	3%	556	40	14	54	26%	74	563	28	591	630	8%	102%	10%	13%
	6 Ennis Road	917	34	951	4%	998	127	0	127	0%	127	1,044	34	1,078	1,125	14%	0%	13%	13%
	7 Local access road	0	0	0	NA	0	0	0	0	NA	0	0	0	0	0	NA	NA	NA	NA
	8 M18 slip at Tulla Road West roundabout	244	20	264	8%	292	37	14	51	27%	71	281	34	315	362	15%	71%	19%	24%
	9 M18 motorway north of Tulla Road - n/b	510	30	540	6%	583	4	7	11	64%	21	514	37	551	603	1%	23%	2%	4%
	10 M18 motorway north of Tulla Road - s/b	676	40	716	6%	772	26	7	33	21%	43	702	47	749	815	4%	17%	5%	6%
	11 M18 motorway south of Tulla Road - n/b	510	30	540	6%	583	34	7	41	17%	51	544	37	581	633	7%	23%	8%	9%
	12 M18 motorway south of Tulla Road - s/b	676	40	716	6%	772	13	7	20	35%	30	689	47	736	802	2%	17%	3%	4%
PM peak hour	1 Tulla Road east of site access	644	29	673	4%	714	63	7	70	10%	80	707	36	743	793	10%	24%	10%	11%
	2 Tulla Road west of site access	644	29	673	4%	714	173	27	200	14%	238	817	56	873	951	27%	93%	30%	33%
	3 Ste access	0	0	0	NA	0	236	34	270	13%	318	236	34	270	318	NA	NA	NA	NA
	4 Tulla Road between roundabouts	810	26	836	3%	873	141	14	155	9%	175	951	40	991	1,047	17%	54%	19%	20%
	5 M18 slip at East Clare roundabout	301	12	313	4%	330	31	14	45	31%	65	332	26	358	394	10%	115%	14%	20%
	6 Ennis Road	1,196	37	1,233	3%	1284	108	0	108	0%	108	1,304	37	1,341	1,392	9%	0%	9%	8%
	7 Local access road	11	0	11	NA	11	0	0	0	NA	0	11	0	11	11	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	589	17	606	3%	629	33	14	47	30%	67	622	31	653	696	6%	83%	8%	11%
	9 M18 motorway north of Tulla Road - n/b	856	51	906	6%	977	22	7	29	24%	39	878	58	935	1,016	3%	14%	3%	4%
	10 M18 motorway north of Tulla Road - s/b	713	42	755	6%	815	3	7	10	70%	20	716	49	765	834	0%	17%	1%	2%
	11 M18 motorway south of Tulla Road - n/b	856	51	906	6%	977	11	7	18	39%	28	867	58	924	1,005	1%	14%	2%	3%
	12 M18 motorway south of Tulla Road - s/b	713	42	755	6%	815	28	7	35	20%	45	741	49	790	859	4%	17%	5%	6%
All Day	1 Tulla Road east of site access	6,344	347	6,691	5%	7177	206	46	252	18%	316	6,550	393	6,943	7,494	3%	13%	4%	4%
	2 Tulla Road west of site access	6,344	347	6,691	5%	7177	742	184	926	20%	1184	7,086	531	7,617	8,361	12%	53%	14%	16%
	3 Ste access	0	0	0	NA	0	948	230	1,178	20%	1500	948	230	1,178	1,500	NA	NA	NA	NA
	4 Tulla Road between roundabouts	9,816	338	10,154	3%	10627	571	92	663	14%	792	10,387	430	10,817	11,419	6%	27%	7%	7%
	5 M18 slip at East Clare roundabout	5,068	160	5,227	3%	5450	171	92	263	35%	392	5,239	252	5,490	5,842	3%	58%	5%	7%
	6 Ennis Road	12,997	432	13,429	3%	14033	412	0	412	0%	412	13,409	432	13,841	14,445	3%	0%	3%	3%
	7 Local access road	66	0	66	NA	66	0	0	0	NA	0	66	0	66	66	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	5,124	225	5,349	4%	5664	159	92	251	37%	380	5,283	317	5,600	6,044	3%	41%	5%	7%
	9 M18 motorway north of Tulla Road - n/b	8,398	498	8,896	6%	9594	52	46	98	47%	162	8,450	544	8,994	9,756	1%	9%	1%	2%
	10 M18 motorway north of Tulla Road - s/b	8,540	507	9,046	6%	9756	47	46	93	49%	157	8,587	553	9,139	9,913	1%	9%	1%	2%
	11 M18 motorway south of Tulla Road - n/b	8,398	498	8,896	6%	9594	107	46	153	30%	217	8,505	544	9,049	9,811	1%	9%	2%	2%
	12 M18 motorway south of Tulla Road - s/b	8,540	507	9,046	6%	9756	123	46	169	27%	233	8,663	553	9,215	9,989	1%	9%	2%	2%

Table 12.18 Forecast links flows, background, development generated and with development (average construction traffic), by time period and vehicle type, year 2027

Time period	Link	Background Year 2027					Additional development traffic 2027					With development 2027				% Difference			
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	PCUs	cars / lgvs	HGVs	All vehs	PCUs
AM peak hour	1 Tulla Road east of site access	388	27	415	7%	453	64	1	65	2%	67	452	29	480	520	17%	4%	16%	15%
	2 Tulla Road west of site access	388	27	415	7%	453	182	4	186	2%	190	570	31	601	644	47%	13%	45%	42%
	3 Ste access	0	0	0	NA	0	245	5	250	2%	256	245	5	250	256	NA	NA	NA	NA
	4 Tulla Road between roundabouts	786	29	815	4%	855	146	2	148	1%	150	932	31	963	1,006	19%	6%	18%	18%
	5 M18 slip at East Clare roundabout	523	14	537	3%	556	35	2	37	5%	39	558	16	574	596	7%	13%	7%	7%
	6 Ennis Road	917	34	951	4%	998	113	0	113	0%	113	1,030	34	1,064	1,111	12%	0%	12%	11%
	7 Local access road	0	0	0	NA	0	0	0	0	NA	0	0	0	0	0	NA	NA	NA	NA
	8 M18 slip at Tulla Road West roundabout	244	20	264	8%	292	33	2	35	5%	37	277	22	299	329	14%	9%	13%	13%
	9 M18 motorway north of Tulla Road - n/b	510	30	540	6%	583	3	1	4	16%	4	513	31	544	587	1%	2%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	676	40	716	6%	772	24	1	25	5%	27	700	41	741	799	4%	3%	4%	3%
	11 M18 motorway south of Tulla Road - n/b	510	30	540	6%	583	30	1	31	4%	33	540	31	571	615	6%	4%	6%	6%
	12 M18 motorway south of Tulla Road - s/b	676	40	716	6%	772	11	1	12	5%	12	687	41	727	784	2%	1%	2%	2%
PM peak hour	1 Tulla Road east of site access	644	29	673	4%	714	60	1	61	2%	63	704	30	734	776	9%	4%	9%	9%
	2 Tulla Road west of site access	644	29	673	4%	714	162	4	166	2%	170	806	33	838	884	25%	12%	25%	24%
	3 Ste access	0	0	0	NA	0	222	5	227	2%	233	222	5	227	233	NA	NA	NA	NA
	4 Tulla Road between roundabouts	810	26	836	3%	873	133	2	135	1%	137	943	28	971	1,010	16%	7%	16%	16%
	5 M18 slip at East Clare roundabout	301	12	313	4%	330	30	2	32	6%	34	331	14	345	364	10%	14%	10%	10%
	6 Ennis Road	1,196	37	1,233	3%	1284	102	0	102	0%	102	1,298	37	1,335	1,386	9%	0%	8%	8%
	7 Local access road	11	0	11	NA	11	0	0	0	NA	0	11	0	11	11	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	589	17	606	3%	629	30	2	32	6%	34	619	19	638	664	5%	11%	5%	5%
	9 M18 motorway north of Tulla Road - n/b	856	51	906	6%	977	21	1	22	5%	24	877	52	929	1,001	2%	2%	2%	2%
	10 M18 motorway north of Tulla Road - s/b	713	42	755	6%	815	30	1	31	2%	31	743	43	786	846	4%	1%	4%	4%
	11 M18 motorway south of Tulla Road - n/b	856	51	906	6%	977	9	1	10	6%	10	865	51	916	988	1%	1%	1%	1%
	12 M18 motorway south of Tulla Road - s/b	713	42	755	6%	815	27	1	28	4%	30	740	43	784	844	4%	3%	4%	4%
All Day	1 Tulla Road east of site access	6,344	347	6,691	5%	7177	244	9	254	254	267	6,588	357	6,945	7,444	4%	3%	4%	4%
	2 Tulla Road west of site access	6,344	347	6,691	5%	7177	878	37	915	915	966	7,222	384	7,605	8,143	14%	11%	14%	13%
	3 Ste access	0	0	0	NA	0	1,122	46	1,168	1,168	1233	1,122	46	1,168	1,233	NA	NA	NA	NA
	4 Tulla Road between roundabouts	9,816	338	10,154	3%	10627	676	18	694	694	720	10,492	356	10,848	11,347	7%	5%	7%	7%
	5 M18 slip at East Clare roundabout	5,068	160	5,227	3%	5450	202	18	220	220	246	5,269	178	5,447	5,696	4%	11%	4%	5%
	6 Ennis Road	12,997	432	13,429	3%	14033	488	0	488	488	488	13,485	432	13,917	14,521	4%	0%	4%	3%
	7 Local access road	66	0	66	NA	66	0	0	0	0	0	66	0	66	66	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	5,124	225	5,349	4%	5664	188	18	207	207	232	5,312	244	5,556	5,896	4%	8%	4%	4%
	9 M18 motorway north of Tulla Road - n/b	8,398	498	8,896	6%	9594	62	9	71	71	85	8,460	508	8,968	9,678	1%	2%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	8,540	507	9,046	6%	9756	56	9	65	65	79	8,596	516	9,112	9,834	1%	2%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	8,398	498	8,896	6%	9594	126	9	136	136	149	8,524	508	9,032	9,743	2%	2%	2%	2%
	12 M18 motorway south of Tulla Road - s/b	8,540	507	9,046	6%	9756	146	9	155	155	168	8,686	516	9,202	9,924	2%	2%	2%	2%

Table 12.19 Forecast links flows, background, development generated and with development (fully operational), by time period and vehicle type, year 2029

Time period	Link	Background Year 2029					Additional development traffic 2029					With development 2029				% Difference			
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	PCUs	cars / lgvs	HGVs	All vehs	PCUs
AM peak hour	1 Tulla Road east of site access	400	28	428	6.6%	444	50	3	53	6%	57	450	31	481	501	13%	11%	12%	13%
	2 Tulla Road west of site access	400	28	428	6.6%	444	153	11	164	7%	179	553	39	592	623	38%	39%	38%	40%
	3 Ste access	0	0	0	NA	0	203	14	217	6%	237	203	14	217	237	NA	NA	NA	NA
	4 Tulla Road between roundabouts	810	30	840	3.6%	865	120	6	126	5%	134	930	36	966	1,000	15%	20%	15%	16%
	5 M18 slip at East Clare roundabout	540	14	554	2.6%	569	34	6	40	15%	48	574	20	594	618	6%	42%	7%	8%
	6 Ennis Road	945	35	980	3.5%	1,005	92	0	92	0%	92	1,037	35	1,072	1,097	10%	0%	9%	9%
	7 Local access road	0	0	0	NA	0	0	0	0	NA	0	0	0	0	0	NA	NA	NA	NA
	8 M18 slip at Tulla Road West roundabout	252	20	272	7.5%	291	27	6	33	18%	41	279	26	305	332	11%	29%	12%	14%
	9 M18 motorway north of Tulla Road - n/b	526	31	557	5.6%	601	5	3	8	38%	12	531	34	565	613	1%	10%	1%	2%
	10 M18 motorway north of Tulla Road - s/b	696	41	738	5.6%	796	18	3	21	14%	25	714	44	759	821	3%	7%	3%	3%
	11 M18 motorway south of Tulla Road - n/b	526	31	557	5.6%	601	23	3	26	12%	30	549	34	583	631	4%	10%	5%	5%
	12 M18 motorway south of Tulla Road - s/b	696	41	738	5.6%	796	16	3	19	16%	23	712	44	757	819	2%	7%	3%	3%
PM peak hour	1 Tulla Road east of site access	664	30	694	4.3%	716	20	3	23	13%	27	684	33	717	743	3%	10%	3%	4%
	2 Tulla Road west of site access	664	30	694	4.3%	716	84	11	95	12%	110	748	41	789	826	13%	37%	14%	15%
	3 Ste access	0	0	0	NA	0	64	14	78	18%	98	64	14	78	98	NA	NA	NA	NA
	4 Tulla Road between roundabouts	835	27	862	3.1%	884	54	6	60	10%	68	889	33	922	952	6%	22%	7%	8%
	5 M18 slip at East Clare roundabout	310	13	322	3.9%	332	10	6	16	38%	24	320	19	338	356	3%	48%	5%	7%
	6 Ennis Road	1,233	38	1,271	3.0%	1,298	37	0	37	0%	37	1,270	38	1,308	1,335	3%	0%	3%	3%
	7 Local access road	11	0	11	0.0%	11	0	0	0	NA	0	11	0	11	11	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	607	17	625	2.8%	637	18	6	24	25%	32	625	23	649	670	3%	35%	4%	5%
	9 M18 motorway north of Tulla Road - n/b	882	52	934	5.6%	1,008	5	3	8	38%	12	887	55	942	1,020	1%	6%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	735	44	779	5.6%	840	4	3	7	43%	11	739	47	786	851	1%	7%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	882	52	934	5.6%	1,008	13	3	16	19%	20	895	55	950	1,028	1%	6%	2%	2%
	12 M18 motorway south of Tulla Road - s/b	735	44	779	5.6%	840	6	3	9	33%	13	741	47	788	853	1%	7%	1%	2%
All Day	1 Tulla Road east of site access	6,540	358	6,898	5.2%	7,130	201	14	215	7%	235	6,741	372	7,113	7,365	3%	4%	3%	3%
	2 Tulla Road west of site access	6,540	358	6,898	5.2%	7,130	725	56	781	7%	859	7,265	414	7,679	7,990	11%	16%	11%	12%
	3 Ste access	0	0	0	NA	0	926	70	996	7%	1094	926	70	996	1,094	NA	NA	NA	NA
	4 Tulla Road between roundabouts	10,120	348	10,468	3.3%	10,758	558	28	586	5%	625	10,678	376	11,054	11,383	6%	8%	6%	6%
	5 M18 slip at East Clare roundabout	5,224	164	5,389	3.1%	5,544	167	28	195	14%	234	5,391	192	5,584	5,778	3%	17%	4%	4%
	6 Ennis Road	13,399	445	13,844	3.2%	14,164	403	0	403	0%	403	13,802	445	14,247	14,567	3%	0%	3%	3%
	7 Local access road	68	0	68	0.0%	68	0	0	0	NA	0	68	0	68	68	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	5,282	232	5,515	4.2%	5,708	155	28	183	15%	222	5,437	260	5,698	5,930	3%	12%	3%	4%
	9 M18 motorway north of Tulla Road - n/b	8,658	514	9,171	5.6%	9,891	51	14	65	22%	85	8,709	528	9,236	9,975	1%	3%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	8,804	522	9,326	5.6%	10,057	46	14	60	23%	80	8,850	536	9,386	10,137	1%	3%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	8,658	514	9,326	5.5%	9,891	104	14	118	12%	138	8,762	528	9,289	10,028	1%	3%	1%	1%
	12 M18 motorway south of Tulla Road - s/b	8,804	522	9,326	5.6%	10,057	120	14	134	10%	154	8,924	536	9,460	10,211	1%	3%	1%	2%

Table 12.20 Forecast links flows, background, development generated and with development (fully operational), by time period and vehicle type, year 2044

Time period	Link	Background Year 2044					Additional development traffic 2044					With development 2044				% Difference			
		cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	% HGVs	PCUs	cars / lgvs	HGVs	All vehs	PCUs	cars / lgvs	HGVs	All vehs	PCUs
AM peak hour	1 Tulla Road east of site access	421	30	451	6.6%	468	50	3	53	0	57	471	33	504	525	12%	10%	12%	12%
	2 Tulla Road west of site access	421	30	451	6.6%	468	153	11	164	0	179	574	41	615	647	36%	37%	36%	38%
	3 Ste access	0	0	0	NA	0	203	14	217	0	237	203	14	217	237	NA	NA	NA	NA
	4 Tulla Road between roundabouts	854	32	885	3.6%	912	120	6	126	0	134	974	38	1,011	1,046	14%	19%	14%	15%
	5 M18 slip at East Clare roundabout	569	15	584	2.6%	600	34	6	40	0	48	603	21	624	649	6%	40%	7%	8%
	6 Ennis Road	996	36	1,033	3.5%	1,059	92	0	92	0	92	1,088	36	1,125	1,151	9%	0%	9%	9%
	7 Local access road	0	0	0	NA	0	0	0	0	NA	0	0	0	0	0	NA	NA	NA	NA
	8 M18 slip at Tulla Road West roundabout	265	22	287	7.5%	307	27	6	33	0	41	292	28	320	348	10%	28%	12%	13%
	9 M18 motorway north of Tulla Road - n/b	554	33	587	5.6%	633	2	1	3	3	5	556	34	590	638	0%	4%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	734	44	778	5.6%	839	13	1	3	14	16	747	45	792	855	2%	3%	0%	2%
	11 M18 motorway south of Tulla Road - n/b	554	33	587	5.6%	633	17	1	3	18	20	571	34	605	653	3%	4%	1%	3%
	12 M18 motorway south of Tulla Road - s/b	734	44	778	5.6%	839	7	1	3	8	10	741	45	786	849	1%	3%	0%	1%
PM peak hour	1 Tulla Road east of site access	700	32	731	4.3%	754	20	3	23	0	27	720	35	754	782	3%	10%	3%	4%
	2 Tulla Road west of site access	700	32	731	4.3%	754	84	11	95	0	110	784	43	826	865	12%	35%	13%	15%
	3 Ste access	0	0	0	NA	0	64	14	78	0	98	64	14	78	98	NA	NA	NA	NA
	4 Tulla Road between roundabouts	880	28	909	3.1%	932	54	6	60	0	68	934	34	969	1,000	6%	21%	7%	7%
	5 M18 slip at East Clare roundabout	327	13	340	3.9%	350	10	6	16	0	24	337	19	356	374	3%	45%	5%	7%
	6 Ennis Road	1,300	40	1,340	3.0%	1,368	37	0	37	0	37	1,337	40	1,377	1,405	3%	0%	3%	3%
	7 Local access road	12	0	12	0.0%	12	0	0	0	NA	0	12	0	12	12	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	640	18	658	2.8%	671	18	6	24	0	32	658	24	682	704	3%	33%	4%	5%
	9 M18 motorway north of Tulla Road - n/b	930	55	985	5.6%	1,062	3	1	3	4	6	933	56	989	1,068	0%	2%	0%	1%
	10 M18 motorway north of Tulla Road - s/b	775	46	821	5.6%	885	2	1	3	3	5	777	47	824	890	0%	3%	0%	1%
	11 M18 motorway south of Tulla Road - n/b	930	55	985	5.6%	1,062	7	1	3	8	10	937	56	993	1,072	1%	2%	0%	1%
	12 M18 motorway south of Tulla Road - s/b	775	46	821	5.6%	885	4	1	3	5	7	779	47	826	892	1%	3%	0%	1%
All Day	1 Tulla Road east of site access	6,893	377	7,270	5.2%	7,515	201	14	215	7%	235	7,094	391	7,485	7,750	3%	4%	3%	3%
	2 Tulla Road west of site access	6,893	377	7,270	5.2%	7,515	725	56	781	7%	859	7,618	433	8,051	8,374	11%	15%	11%	11%
	3 Ste access	0	0	0	NA	0	926	70	996	7%	1094	926	70	996	1,094	NA	NA	NA	NA
	4 Tulla Road between roundabouts	10,666	367	11,033	3.3%	11,339	558	28	586	5%	625	11,224	395	11,619	11,964	5%	8%	5%	6%
	5 M18 slip at East Clare roundabout	5,506	173	5,680	3.1%	5,843	167	28	195	14%	234	5,673	201	5,875	6,077	3%	16%	3%	4%
	6 Ennis Road	14,122	469	14,591	3.2%	14,928	403	0	403	0%	403	14,525	469	14,994	15,331	3%	0%	3%	3%
	7 Local access road	71	0	71	0.0%	71	0	0	0	NA	0	71	0	71	71	0%	NA	0%	0%
	8 M18 slip at Tulla Road West roundabout	5,567	245	5,812	4.2%	6,016	155	28	183	15%	222	5,722	273	5,995	6,238	3%	11%	3%	4%
	9 M18 motorway north of Tulla Road - n/b	9,125	541	9,666	5.6%	10,424	51	14	65	22%	85	9,176	555	9,731	10,509	1%	3%	1%	1%
	10 M18 motorway north of Tulla Road - s/b	9,279	550	9,830	5.6%	10,600	46	14	60	23%	80	9,325	564	9,890	10,680	0%	3%	1%	1%
	11 M18 motorway south of Tulla Road - n/b	9,125	541	9,830	5.5%	10,424	104	14	118	12%	138	9,229	555	9,784	10,562	1%	3%	1%	1%
	12 M18 motorway south of Tulla Road - s/b	9,279	550	9,830	5.6%	10,600	120	14	134	10%	154	9,399	564	9,964	10,754	1%	3%	1%	1%

APPENDIX 12.5

CHART – CONSTRUCTION PERIOD AND OPERATION BY PHASE, TRIP GENERATION BY MONTH

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

APPENDIX 12.5 - CONSTRUCTION PERIOD AND OPERATION BY PHASE, TRIP GENERATION BY MONTH

Development Phase	2022	Year 2023												Year 2024												Year 2025												Year 2026												Year 2027												Year 2028												Year 2029											
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81				
Pre-Start	1			4
Phase 1 Construction							7																											34
Phase 1 Commission
Phase 2 Construction																																		34																																																		80
Phase 2 Commission																																																																																			81
Phase 3 Construction																																																							55																									80
Phase 3 Commission																																																																																		81

	Pre-start	1			4
2	Pre-start Construction - HGVs per day	2	3	3	0
	Prestart - HGVs pcus per day	6	8	8	1
	Pre start construction staff cars per day	50	50	50	50
	Pre-start construction 2-way pcus	111	117	115	102

				28	29	64	93	115	107	114	65	71	46	50	53	53	59											
							increase to cut & fill																					
Phase 1 Construction generation	7																											34
Phase 1 Construction - HGVs	1	6	10	28	29	64	93	115	107	114	65	71	46	50	53	53	58	47	43	38	39	37	28	21	18	18	16	16
Phase 1 Construction - HGVs pcus	2	14	24	67	69	155	224	276	256	274	157	171	110	120	127	128	140	112	104	92	94	89	68	51	44	43	40	39
Phase 1 Construction staff cars	73	146	219	365	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	182	182	182	182	146	109	73	73
Phase 1 Construction 2-way pcus	150	320	485	863	1087	1258	1396	1500	1461	1497	1262	1290	1167	1188	1203	1204	1228	1173	1156	1132	554	542	500	467	380	305	225	225

Assumed 21.25 days per month (255 working days per year)

Phase 2 Construction generation	34																																													80
Phase 2 Construction - HGVs	1	20	18	17	15	21	31	30	33	36	42	33	37	46	34	35	25	21	24	24	24	17	7	6	6	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Phase 2 Construction - HGVs pcu	3	49	42	41	36	51	75	73	78	86	102	80	90	111	82	84	60	50	58	58	57	41	17	14	13	7	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Phase 2 Construction staff cars	73	146	219	365	365	365	415	415	415	415	474	474	474	474	474	474	474	474	474	395	395	395	395	326	326	326	326	326	326	182	182	182	182	182	146	109	73	73	73	73	73	73	73	73	73	73	73
Phase 2 Construction 2-way pcus	151	389	522	811	802	833	979	976	986	1001	1152	1109	1128	1170	1113	1116	1069	1048	1064	906	903	872	824	681	678	667	655	655	655	367	368	368	368	368	295	222	149	149	150	150	150	149	150	150	150	150	147

	Phase 3 Construction generation	55																									80
23	Phase 3 Construction - HGVs	8	9	9	9	13	22	28	27	31	35	28	34	38	39	34	25	21	32	32	34	25	22	12	13	12	3
	Phase 3 Construction - HGVs pcu	19	21	21	21	32	52	67	65	76	83	68	81	92	93	81	61	49	76	77	83	61	53	29	31	29	7
	Phase 3 Construction staff cars	73	146	219	365	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	182	182	146	109	73	73
	Phase 3 Construction 2-way pcus	183	333	479	770	1012	1053	1082	1077	1099	1115	1084	1110	1132	1134	1109	1069	1047	1100	1101	1113	486	471	350	281	203	160

Phase 1 Operational generation	35
Phase 1 Operational - HGVs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Phase 1 Operational - HGVs pcus	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Phase 1 Operational - cars and lgvs (staff and visitors	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151
Phase 1 Operational total 2-way pcus	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350

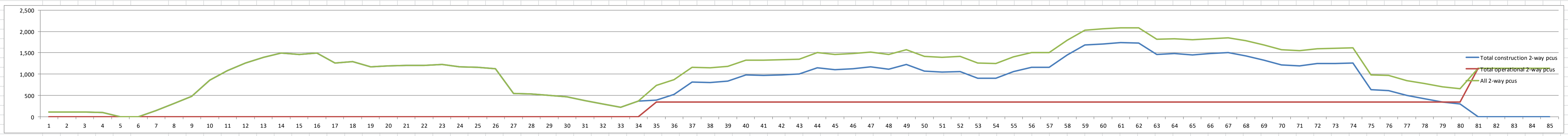
Phase 2 Operational generation	81				
Phase 2 Operational - HGVs	12	12	12	12	12
Phase 2 Operational - HGVs pcus	29	29	29	29	29
Phase 2 Operational - cars and lgvs (staff and visitors	191	191	191	191	191
Phase 2 Operational total 2-way pcus	440	440	440	440	440

Phase 3 Operational generation	81				
Phase 2 Operational - HGVs	10	10	10	10	10
Phase 2 Operational - HGVs pcus	24	24	24	24	24
Phase 2 Operational - cars and lgvs (staff and visitors	151	151	151	151	151
Phase 2 Operational total 2-way pcus	350	350	350	350	350

Development Phase	2022	Year 2023												Year 2024												Year 2025												Year 2026												Year 2027												Year 2028												Year 2029											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Construction HGVs	2	3	3	0	0	0	1	6	10	28	29	64	93	115	107	114	65	71	46	50	53	53	58	47	43	38	39	37	28	21	18	18	16	17	20	18	17	15	21	31	30	33	36	42	33	37	46	34	58	25	21	24	24	24	25	16	15	14	16	23	29	28	32	35	29	34	39	40	34	26	21	32	33	35	26	23	13	14	13	3	0	0	0	0	0
Construction staff cars	50	50	50	50	0	0	73	146	219	365	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	474	182	182	182	182	146	109	73	146	146	219	365	365	365	415	415	415	415	474	474	474	474	474	474	474	474	474	395	395	468	541	545	691	800	800	800	800	656	656	656	656	656	620	583	547	547	547	547	547	255	255	219	182	146	146	0	0	0	0	0
Construction HGVs - 2 way pcus	11	17	15	2	0	0	5	28	47	134	139	310	448	552	513	549	314	342	219	240	255	256	280	225	208	184	189	177	135	102	88	87	79	84	97	85	82	71	103	149	146	157	171	204	160	180	222	165	277	121	99	116	116	113	119	75	70	68	79	108	137	133	154	170	139	166	188	190	165	125	102	155	156	169	125	109	61	66	61	14	0	0	0	0	0
Construction staff cars - 2 way pcus	100	100	100	100	0	0	146	292	438	729	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	948	365	365	365	365	292	219	146	292	292	438	729	731	731	830	830	830	830	948	948	948	948	948	948	948	948	948	790	790	936	1,082	1,089	1,381	1,600	1,600	1,600	1,600	1,312	1,313	1,313	1,313	1,313	1,240	1,167	1,094	1,094	1,094	1,094	1,094	511	511	439	365	293	293	0	0	0	0	0
Total construction 2-way pcus	111	117	115	102	0	0	150	320	485	863	1,087	1,258	1,396	1,500	1,461	1,497	1,262	1,290	1,167	1,188	1,203	1,204	1,228	1,173	1,156	1,132	554	542	500	467	380	305	225	376	389	522	811	802	833	979	976	986	1,001	1,152	1,109	1,128	1,170	1,113	1,225	1,069	1,048	1,064	906	903	1,055	1,157	1,159	1,449	1,678	1,708	1,737	1,732	1,466	1,483	1,452	1,478	1,500	1,429	1,331	1,219	1,196	1,250	1,251	1,263	635	620	499	431	353	307	0	0	0	0	0
Operational HGVs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	32	32	32	32	32
Operational staff cars	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	151	493	493	493	493	493
Operational HGVs - 2 way pcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	154	154	154	154	154
Operational staff cars - 2 way pcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	302	986	986	986	986	986
Total operational 2-way pcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	1,140	1,140	1,140	1,140	1,140
All 2-way pcus	111	117	115	102	0	0	150	320	485	863	1,087	1,258	1,396	1,500	1,461	1,497	1,262	1,290	1,167	1,188	1,203	1,204	1,228	1,173	1,156	1,132	554	542	500	467	380	305	225	376	739	872	1,161	1,152	1,183	1,329	1,326	1,336	1,351	1,502	1,459	1,478	1,520	1,463	1,575	1,419	1,398	1,414	1,256	1,253	1,405	1,507	1,509	1,799	2,028	2,058	2,087	2,082	1,816	1,833	1,802	1,828	1,850	1,779	1,681	1,569	1,546	1,600	1,601	1,613	985	970	849	781	703	657	1,140	1,140	1,140	1,140	1,140

	2022	2023												2024												2025												2026												2027												2028												2029							TOTALS
	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	Augus	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	June	July	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
PRE-START	50	73	67	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200
PHASE ONE	0	0	0	0	0	0	20	126	210	301	321	1,077	1,689	2,149	1,977	2,137	1,098	1,220	678	771	835	842	951	995	921	815	836	784	599	453	391	384	350	348	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	####
PHASE TWO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	431	375	362	316	454	662	647	695	758	902	710	796	983	729	741	535	440	512	514	501	362	150	128	117	66	16	16	15	14	16	14	17	15	15	15	15	16	15	15	16	14	15	15	16	15	3	####
PHASE THREE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	165	182	182	182	282	464	591	572	669	737	601	716	816	825	714	537	437	673	678	731	537	470	253	277	253	60	####
TOTALS	50	73	67	10	0	0	20	126	210	301	321	1,077	1,689	2,149	1,977	2,137	1,098	1,220	678	771	835	842	951	995	921	815	836	784	599	453	391	384	350	371	431	375	362	316	454	662	647	695	758	902	710	796	983	729	741	535	440	512	514	501	527	332	310	299	348	480	607	587	683	753	615	733	831	840	729	552	453	688	693	747	551	485	268	293	268	63	####

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Total construction 2-way pcus	111	117	115	102	0	0	150	320	485	863	1,087	1,258	1,396	1,500	1,461	1,497	1,262	1,290	1,167	1,188	1,203	1,204	1,228	1,173	1,156	1,132	554	542	500	467	380	305	225	376	389	522	811	802	833	979	976	986	1,001	1,152	1,109	1,128	1,170	1,113	1,225	1,069	1,048	1,064	906	903	1,055	1,157	1,159	1,449	1,678	1,708	1,737	1,732	1,466	1,483	1,452	1,478	1,500	1,429	1,331	1,219	1,196	1,250	1,251	1,263	635	620	499	431	353	307	0	0	0	0	0
Total operational 2-way pcus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	1,140	1,140	1,140	1,140	1,140
All 2-way pcus	111	117	115	102	0	0	150	320	485	863	1,087	1,258	1,396	1,500	1,461	1,497	1,262	1,290	1,167	1,188	1,203	1,204	1,228	1,173	1,156	1,132	554	542	500	467	380	305	225	376	739	872	1,161	1,152	1,183	1,329	1,326	1,336	1,351	1,502	1,459	1,478	1,520	1,463	1,575	1,419	1,398	1,414	1,256	1,253	1,405	1,507	1,509	1,799	2,028	2,058	2,087	2,082	1,816	1,833	1,802	1,828	1,850	1,779	1,681	1,569	1,546	1,600	1,601	1,613	985	970	849	781	703	657	1,140	1,140	1,140	1,140	1,140



APPENDIX 12.6

Art Data Centre Outline Travel Plan

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

ALAN LIPSCOMBE
TRAFFIC & TRANSPORT CONSULTANTS

OUTLINE WORK PLACE TRAVEL PLAN

ART DATA CENTRE – ENNIS CAMPUS

Toureen, Ennis, County Clare

Alan Lipscombe Traffic & Transport Consultants Ltd
Claran, Headford, Co Galway

Email -Info@alipscombetraffic.ie
Tel – 093 34777
Mob – 087 9308134

Client: Art Data Centres
July 8th, 2021
AL Project No: 8081

1 INTRODUCTION

A significant development is proposed on the eastern outskirts of Ennis in the townland of Tooreen and Cahernalough, County Clare. The proposed development, referred to as the Art Data Centre, is located on the northern side of the R352 Tulla Road approximately 1 km to the east of the M18 Motorway, which bypasses the town of Ennis to the east, and approximately 4.5 kms to the east of Ennis town centre.

The proposed development will be constructed in 3 phases. It is forecast that Phase 1 will become operational in September 2025, when 151 staff members will be employed on site, Phase 2 will be complete in July 2029, when a total of 342 staff will be employed on site, with the Art Data Centre forecast to be fully operational by July 2029, when it is forecast that 493 staff will be employed on site.

In accordance with the requirements of the current Clare County Council Development Plan 2017 to 2023, the Applicants for the Art Data Centre commit to developing, implementing and maintaining a **Workplace Travel Plan**[1] in accordance with the guidelines set out by the National Transport Authority.

It is proposed that the preparation of a detailed Travel Plan will be prepared and agreed with Clare County Council prior to the completion of Phase 1 of the Art Data Centre, with data from staff surveys conducted on the opening of each phase used to identify feasible alternative travel modes to the private car. It is proposed that the Art Data Centre will apply to the NTA to avail of the **Smarter Travel Work Place Package.** As stated above, with a total of 493 employees forecast for the completed Art Data Centre, the site would exceed the >250 staff members limit on order to benefit from the scheme. During the formulation of the plan the management of the Art Data Centre will work together with the NTA to undertake the following;

- Conduct online staff travel surveys,
- Undertake a review of the Art Data Centre site and surrounds and the existing transport provision,
- Analyse travel survey data and prepare an action plan,

The remainder this documents addressed the following;

- Purpose of a Work Place Travel Plan,

[1] Workplace Travel Plans, A Guide for Implementers, National Transport Authority

- Site Assessment – Measures included in Art Data Centre Design to encourage sustainable travel modes,
- Measures to be considered as part of Work Place Travel Plan
- Commitment to Clare County Council

2 PURPOSE OF A WORK PLACE TRAVEL PLAN

The purpose of a Work Place Travel Plan is to minimise the reliance on the private car for staff travel generated by the proposed development, in particular for car trips with single occupancy. This will be done through the identification and implementation of a series of measures aimed at encouraging the use of more sustainable forms of transport. These alternative modes include cycling, walking and public transport, with more efficient use of the private car, through car-sharing and car-pooling, also to be encouraged. The benefits of the implementation of a successful travel plan are numerous, including;

- Reduced traffic on the local road network, resulting in reduced congestion and emissions,
- Fitter and healthier work force resulting in increased productivity,
- Less valuable land require for parking.

3 PROVISION FOR SUSTAINABLE TRAVEL MODES BY DESIGN

The provision of sustainable modes of travel as feasible alternatives to the private car for staff trips to and from the Art Data Centre was a central consideration throughout the design of the campus. Specific measures proposed to encourage these alternative modes of travel include the following.

Walking and cycling

As part of the Art Data Centre development it is proposed to provide a shared footpath and cycle lane on the northern side of the R352 Tulla road from the proposed Art Data Centre access junction, westwards to the Clare East Clare Roundabout. It is also proposed to upgrade the existing footpath on the southern side of the road to a shared footpath and cycle lane. An informal uncontrolled pedestrian crossing facility, comprising dropped kerbs, tactile paving and a centre island is proposed across the R352 Tulla Road just to the east of the East Clare Roundabout, in order to provide a continuous pedestrian link between the Art Data Centre and Ennis Town Centre.

Pedestrian access into the site is provided by means of a footpath adjacent to the main proposed vehicle access junction, with continuous footpaths provided within the campus to all individual buildings on the campus. Dropped kerbs and tactile paving are provided at all crossing points. Cycle lanes are provided on the main access road serving the campus.

Covered cycle parking is distributed at various locations throughout the site with a total number of 126 spaces provided. This equates to 1 cycle parking space for every 2 of the 256 employees that may be on

site at one time (due to shift patterns), which is in excess of the 1 space per 10% of employees suggested in the NTA Cycle manual.

Showers and changing facilities are included in each of the data centre buildings in order to further encourage walking and cycling.

Public transport

There are currently no local bus services in Ennis, so at present bus would not be a mode of transport available for staff or visitors to the proposed site. It is, however, noted that the provision of local bus services on key routes in Ennis is fundamental to the National Transport Authorities Smarter Travel program, which requires the availability and the promotion of sustainable alternative modes of travel to the private car, as adopted in the current Clare Development Plan 2017 to 2023. While the assessment of the viability of a local Ennis bus route on the R352 Tulla Road is outside the remit of the current development proposal, given the quantum of residential and other development on the route between the site and Ennis Town Centre, it is considered that the Tulla Road route would be an ideal location to pilot a local bus service. Given the additional numbers of staff that will be expected to travel to the Art Data Centre from Ennis, the proposed development would serve to enhance the viability of such a service. The Applicant would fully support the introduction of a local bus service on the R352 Tulla Road and would also consider the potential for the future bus route to terminate at the Art Data Centre campus. An area for a future bus turning area is included in the proposed development access junction on the R352 Tulla Road.

4 KEY ELEMENTS OF THE ARTS DATA CENTRE WORK PLACE TRAVEL PLAN

The key stages in the development of the Art Data Centre Work Place Travel Plan will include the following;

Appointment of a Travel Plan Co-Ordinator

It will be essential that the plan is given support and priority by the senior Art Data Centre management for it be successful, and it is equally important that it is developed and introduced as far as is possible on opening, prior to staff settling into the habit of driving to work. A senior member of the management staff will be allocated the roll of the travel plan co-ordinator, with responsibility for the development, implementation and monitoring of the plan.

The key steps that will be followed are set out in the document “Workplace Travel Plans, A guide for Implementers, National Transport Authority, with some of the key tasks summarised as follows.

Undertake staff surveys

This will include staff travel surveys to establish where staff live and how and why they travel in order to establish any key issues or common factors relating to those that travel by car.

Site audit

A detailed travel audit will be undertaken for the site and surrounding network. This will assess the availability and the quality of transport provision for the various modes of travel in order to identify any improvements that may be made.

Identify and Implement Actions

The next step will be to develop measures that will have an impact in terms of encouraging the use of sustainable nodes of travel based on findings of the staff surveys and site transport audit.

As stated previously, it is intended that the staff surveys, data analysis and formulation of an action plan would be done in association with the NTA as part of the **Smarter Travel Work Place Package.**

Monitoring the Travel Plan

The plan will be monitored by the designated travel plan co-ordinator, which will include periodic repeat staff travel surveys in order to establish the mode share being achieved, and to identify additional measures that may be included in the plan.

5 COMMITMENT TO CLARE COUNTY COUNCIL

The Applicant, Art Data Centre Ennis, commit to Clare County Council to develop and implement a staff travel plan in association with the NTA as part of the **Smarter Travel Work Place Package.** The Applicant also commits to monitoring and updating the Travel Plan on a regular basis.

APPENDIX 12.7

JUNCTION MODE OUTPUTS

ALAN LIPSCOMBE TRAFFIC AND TRANSPORT

Proposed Art Data Centre access junction on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

East Clare Roundabout on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

Tulla Road West Roundabout on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

Proposed Art Data Centre access junction on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

PICADY
GUI Version: 5.1 AD Analysis Program Release: 4.0 (SEPT 2008)
For sales and distribution information, program advice and maintenance, contact:
TRL Limited Crowthorne House Nine Mile Ride Wokingham, Berks. RG40 3GA, UK Tel: +44 (0)1344 770758 Fax:+44 (0)1344 770864 E-mail: software@trl.co.uk Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	C:\..\Picady - Art Data\Development access junction PM 2027 peak con.vpi
Date Run	08 July 2021
Time Run	21:24:29
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	R352 Ennis	100
Arm B	Development access	100
Arm C	R352 Tulla	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Art Data Centre access junction R352 Tulla Road
Location	Ennis
Date	16 April 2021
Enumerator	adl [ADL-PC]
Job Number	8810
Status	TIA
Client	Art Data Centre
Description	-

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

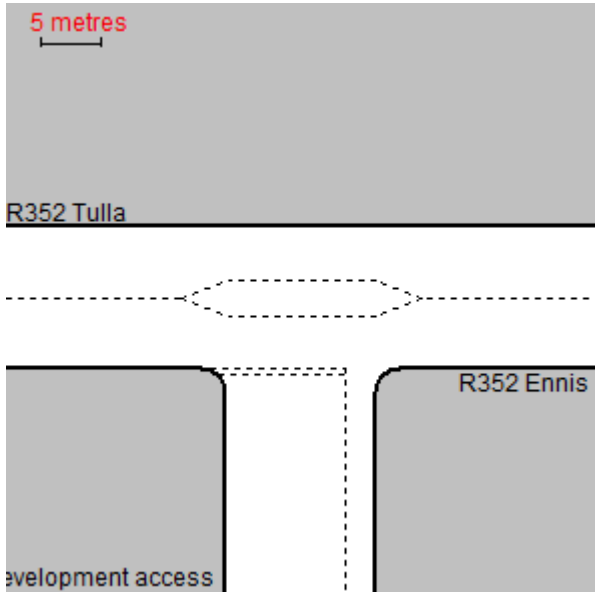
Parameter	Minor Arm B
Major Road Carriageway Width (m)	9.00
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	3.00
Minor Road Width 0m Back from Junction (m)	10.00
Minor Road Width 5m Back from Junction (m)	7.70
Minor Road Width 10m Back from Junction (m)	4.70
Minor Road Width 15m Back from Junction (m)	3.75
Minor Road Width 20m Back from Junction (m)	3.75
Minor Road Derived Flare Length (PCU)	2.000
Minor Road Visibility To Right (m)	70
Minor Road Visibility To Left (m)	70
Major Road Right Turn Visibility (m)	100
Major Road Right Turn Blocks Traffic	No

Slope and Intercept Values

Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	0.000	0.000	0.000	0.000	0.000
B-C	0.000	0.000	0.000	-	-
C-B	686.890	0.231	0.231	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	16:45-18:15	90	15

ODTAB Turning Counts

Demand Set: Art Data Centre access junction R352 Tulla Road
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	47.0	406.0
Arm B	248.0	0.0	95.0
Arm C	288.0	12.0	0.0

ODTAB Synthesised Flows

Demand Set: Art Data Centre access junction R352 Tulla Road
Modelling Period: 16:45-18:15

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	17:00	5.662	17:30	8.494	18:00	5.662
Arm B	17:00	4.287	17:30	6.431	18:00	4.287
Arm C	17:00	3.750	17:30	5.625	18:00	3.750

Heavy Vehicles Percentages

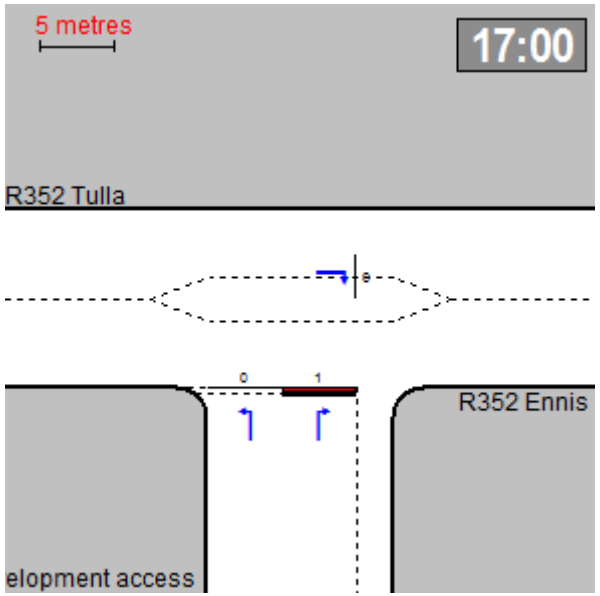
Demand Set: Art Data Centre access junction R352 Tulla Road
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	0.0	0.0
Arm B	0.0	-	0.0
Arm C	0.0	0.0	-

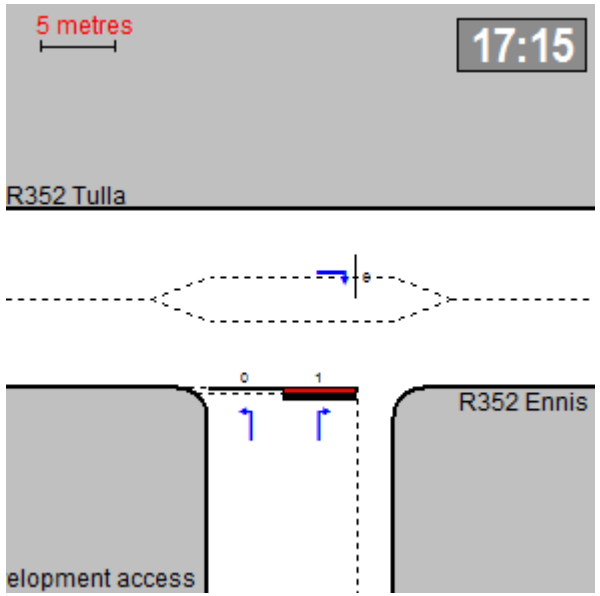
Queue Diagrams

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15
View Extent: 40m

Queue Interval 1: 16:45-17:00

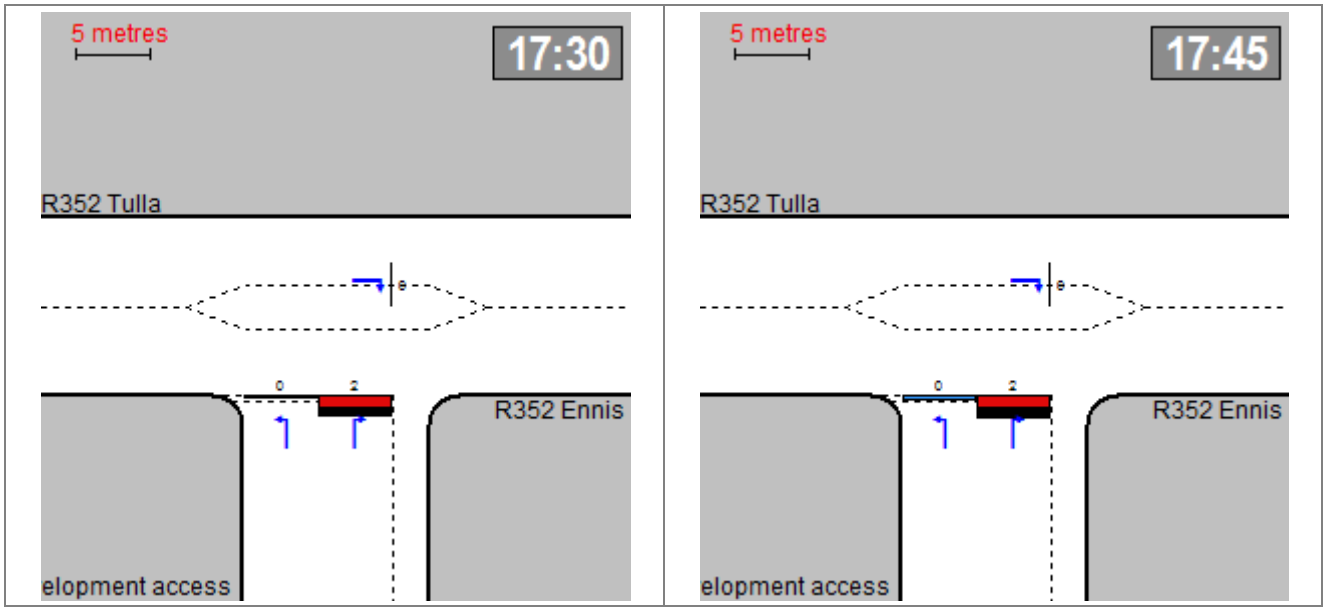


Queue Interval 2: 17:00-17:15

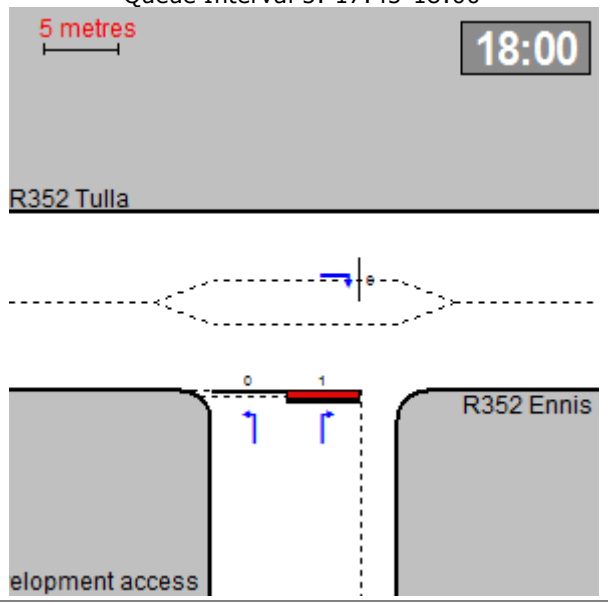


Queue Interval 3: 17:15-17:30

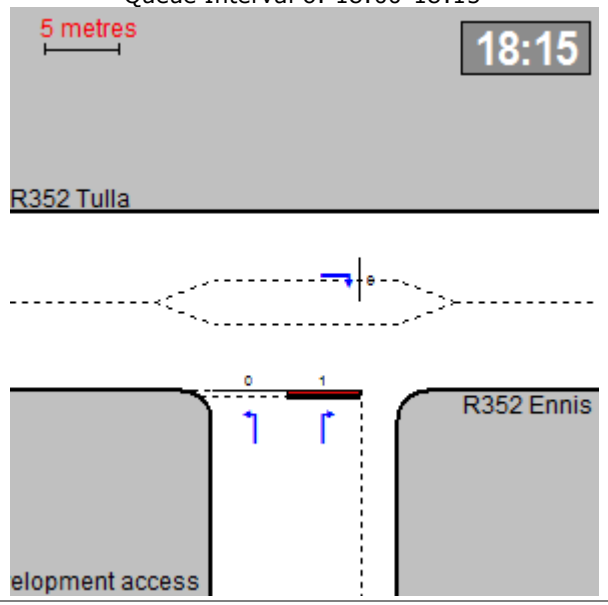
Queue Interval 4: 17:30-17:45


5 metres
17:30
R352 Tulla
R352 Ennis
elopment access
5 metres
17:45
R352 Tulla
R352 Ennis
elopment access

Queue Interval 5: 17:45-18:00

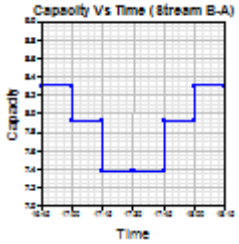


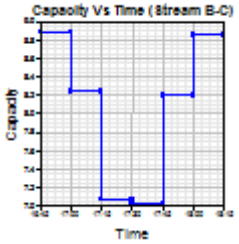
Queue Interval 6: 18:00-18:15

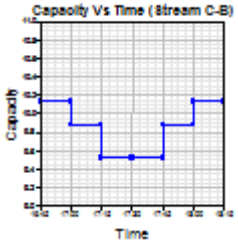


Capacity Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15

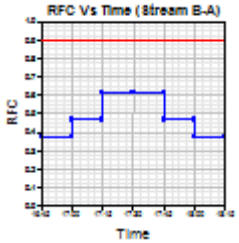


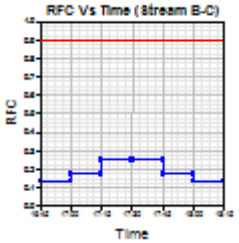


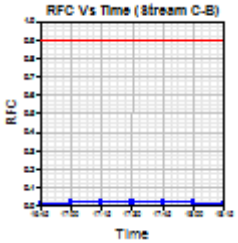


RFC Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15

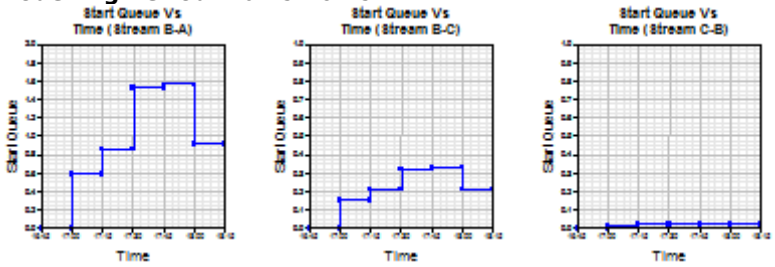






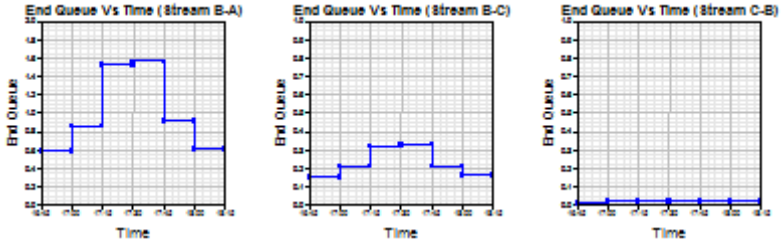
Start Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15



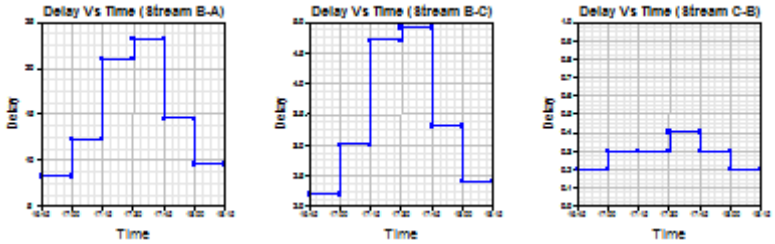
End Queue Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15



Delay Graph

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15



Queues & Delays

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	3.11	8.30	0.375	-	0.00	0.59	-	8.3	0.19
	B-C	1.19	8.88	0.134	-	0.00	0.15	-	2.2	0.13
	C-A	3.61	-	-	-	-	-	-	-	-
	C-B	0.15	10.13	0.015	-	0.00	0.01	-	0.2	0.10
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	5.09	-	-	-	-	-	-	-	-
Segment	**Stream**	**Demand (veh/min)**	**Capacity (veh/min)**	**RFC**	**Ped. Flow (ped/min)**	**Start Queue (veh)**	**End Queue (veh)**	**Geometric Delay (veh.min/ segment)**	**Delay (veh.min/ segment)**	**Mean Arriving Vehicle Delay (min)**
17:00-17:15	B-A	3.72	7.92	0.469	-	0.59	0.86	-	12.3	0.24
	B-C	1.42	8.24	0.173	-	0.15	0.21	-	3.0	0.15
	C-A	4.32	-	-	-	-	-	-	-	-
	C-B	0.18	9.88	0.018	-	0.01	0.02	-	0.3	0.10
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	6.08	-	-	-	-	-	-	-	-
Segment	**Stream**	**Demand (veh/min)**	**Capacity (veh/min)**	**RFC**	**Ped. Flow (ped/min)**	**Start Queue (veh)**	**End Queue (veh)**	**Geometric Delay (veh.min/ segment)**	**Delay (veh.min/ segment)**	**Mean Arriving Vehicle Delay (min)**
17:15-17:30	B-A	4.55	7.38	0.616	-	0.86	1.52	-	21.0	0.34
	B-C	1.74	7.07	0.247	-	0.21	0.32	-	4.7	0.19
	C-A	5.28	-	-	-	-	-	-	-	-

	C-B	0.22	9.52	0.023	-	0.02	0.02	-	0.3	0.11
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	7.45	-	-	-	-	-	-	-	-

Segment	Stream	Demand(veh/min)	Capacity(veh/min)	RFC	Ped.Flow(ped/min)	Start Queue(veh)	End Queue(veh)	Geometric Delay(veh.min/segment)	Delay(veh.min/segment)	Mean ArrivingVehicle Delay(min)
17:30-17:45	B-A	4.55	7.38	0.616	-	1.52	1.56	-	23.2	0.35
	B-C	1.74	7.02	0.248	-	0.32	0.33	-	4.9	0.19
	C-A	5.28	-	-	-	-	-	-	-	-
	C-B	0.22	9.52	0.023	-	0.02	0.02	-	0.4	0.11
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	7.45	-	-	-	-	-	-	-	-

Segment	Stream	Demand(veh/min)	Capacity(veh/min)	RFC	Ped.Flow(ped/min)	Start Queue(veh)	End Queue(veh)	Geometric Delay(veh.min/segment)	Delay(veh.min/segment)	Mean ArrivingVehicle Delay(min)
17:45-18:00	B-A	3.72	7.92	0.469	-	1.56	0.91	-	14.5	0.24
	B-C	1.42	8.20	0.174	-	0.33	0.21	-	3.3	0.15
	C-A	4.32	-	-	-	-	-	-	-	-
	C-B	0.18	9.88	0.018	-	0.02	0.02	-	0.3	0.10
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	6.08	-	-	-	-	-	-	-	-

Segment	Stream	Demand(veh/min)	Capacity(veh/min)	RFC	Ped.Flow(ped/min)	Start Queue(veh)	End Queue(veh)	Geometric Delay(veh.min/segment)	Delay(veh.min/segment)	Mean ArrivingVehicle Delay(min)
18:00-18:15	B-A	3.11	8.30	0.375	-	0.91	0.61	-	9.6	0.19
	B-C	1.19	8.85	0.135	-	0.21	0.16	-	2.4	0.13
	C-A	3.61	-	-	-	-	-	-	-	-
	C-B	0.15	10.13	0.015	-	0.02	0.02	-	0.2	0.10
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	5.09	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 16:45 - 18:15
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	341.4	227.6	88.8	0.3	88.8	0.3
B-C	130.8	87.2	20.5	0.2	20.5	0.2
C-A	396.4	264.3	-	-	-	-
C-B	16.5	11.0	1.7	0.1	1.7	0.1
A-B	64.7	43.1	-	-	-	-
A-C	558.8	372.6	-	-	-	-

All	**1508.6**	**1005.7**	**111.0**	**0.1**	**111.0**	**0.1**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

East Clare Roundabout on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

ARCADY 6

GUI Version: 6.00 AF Interim
Analysis Program: Release 4.0 (FEBRUARY 2006)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
Email: softwarebureau@ trl.co.uk
Web:www.trlsoftware.co.uk

Run Information

Run with file:- **C:\AL Traffic jobs\Arcady - Ennis Data Centre\East Clare PM 2027 with peak cons.vai**
At: **21:12:04 on Thursday, July 08, 2021**
Mode: **Drive On The Left**
Units: **Metric**

Arm Labelling

Arm	Full Arm Names
Arm A	R352 Ennis
Arm B	SB slip from M18
Arm C	R352 Tulla

Flow Scaling Factor

Arm	Flow Scaling Factor (%)
Arm A	100
Arm B	100
Arm C	100

File Properties

Run Title	Clare East Roundabout
Location	Ennis
Date	07/07/2021
Client	Art Data Centres
Enumerator	adl [ADL-PC]
Job Number	8810
Status	TIA
Description	

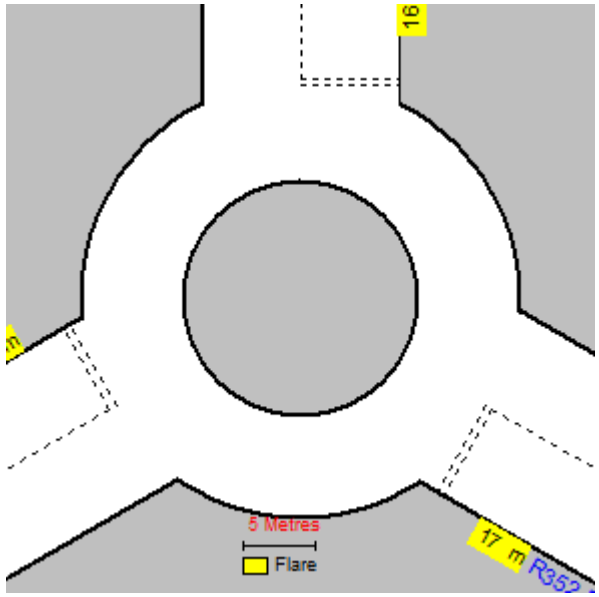
Errors and Warnings

[No errors or warnings]

Geometric Data

Data Item	Arm A	Arm B	Arm C
Approach Road Half-Width (m)	4.00	4.00	4.00
Entry Width (m)	6.70	6.40	6.70
Flare Length (m)	17.00	16.00	16.00
Entry Radius (m)	20.00	20.00	20.00
Inscribed Circle Diameter (m)	30.00	30.00	30.00
Entry Angle (degrees)	19.00	21.00	20.00
Slope	0.695	0.679	0.690
Intercept (PCU/Min)	30.356	29.276	30.062

Junction Diagram: (View Extent = 40m)



Angles Between Arms (Degrees): Arm A(120) Arm B(120) Arm C(120)

Demand Data

Demand Profiles are Synthesised using **ODTAB** Data
Period of interest (for Queue and Delay calculations): **16:45 to 18:15**
Length of Time Period: **90 min**
Length of Time Segment: **15 min**

Total Traffic Demand (Vehicles/Hour) for Demand Set: M18 Junction 13 east roundabout

From/To	Arm A	Arm B	Arm C
Arm A	0.0	145.0	416.0
Arm B	93.0	5.0	36.0
Arm C	439.0	97.0	0.0

Entry Flow Data for Demand Set: M18 Junction 13 east roundabout

Arms	Number of Minutes From Start When			Rate of flow (Veh/Min)		
	Flow Starts To Rise	Top of Peak is Reached	Flow Stops Falling	Before Peak	At Top of Peak	After Peak
Arm A	15.00	45.00	75.00	7.01	10.52	7.01
Arm B	15.00	45.00	75.00	1.67	2.51	1.67
Arm C	15.00	45.00	75.00	6.70	10.05	6.70

Turning Proportions

ODTAB Demand Data type is used, no turning proportions available.

Heavy Vehicle Percentages for Demand Set: M18 Junction 13 east roundabout

Vehicle percentages constant over time and entry

Time Period	From/To	Arm A	Arm B	Arm C
16:45 to 18:15	Arm A	(3.0)	(3.0)	(3.0)
	Arm B	(3.0)	(3.0)	(3.0)
	Arm C	(3.0)	(3.0)	(3.0)

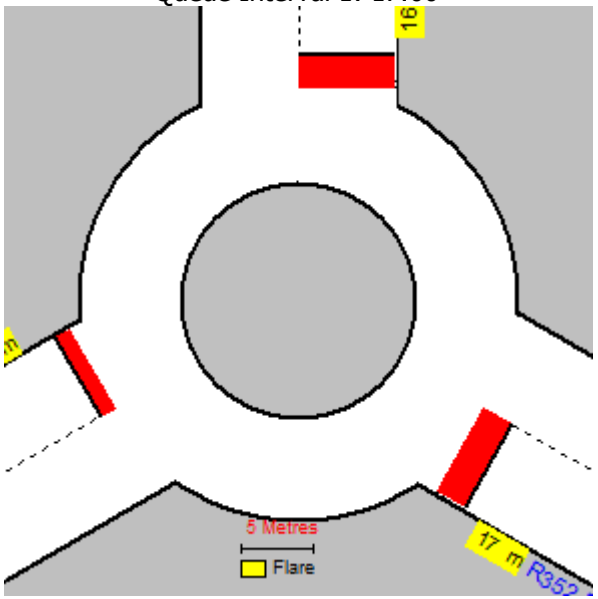
Queue Diagrams: (View Extent = 40m)

Queue Length	Colour
Mean Queue	
5 th % ile	
90 th % ile	

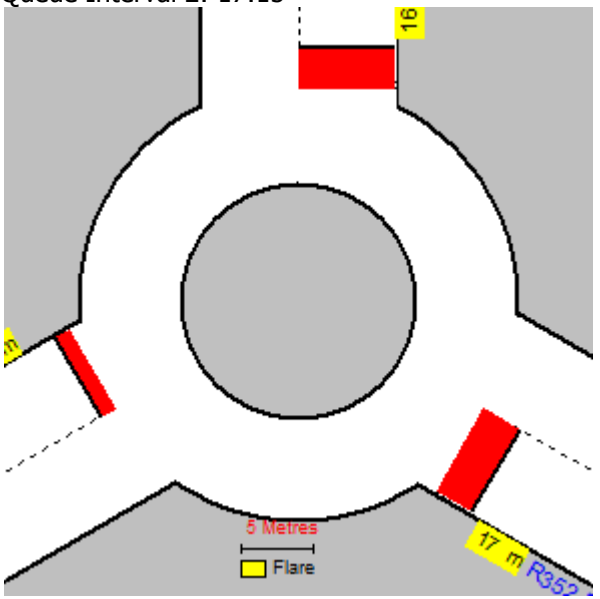
95 th % ile	

Start Time: 16:45---> End Time: 18:15

Queue Interval 1: 17:00

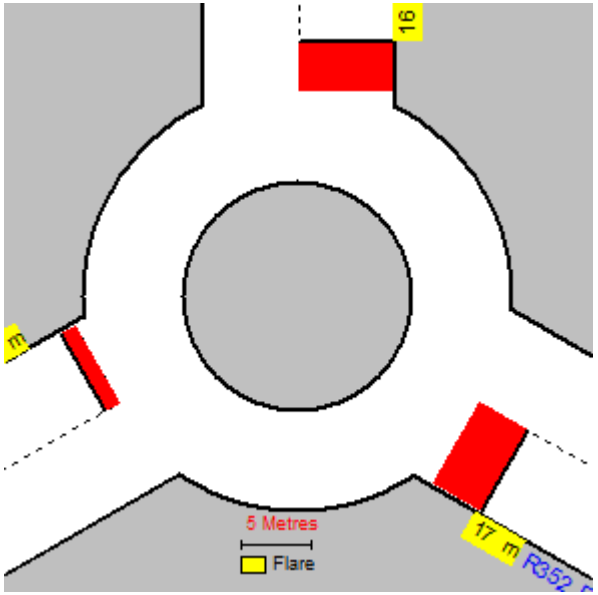


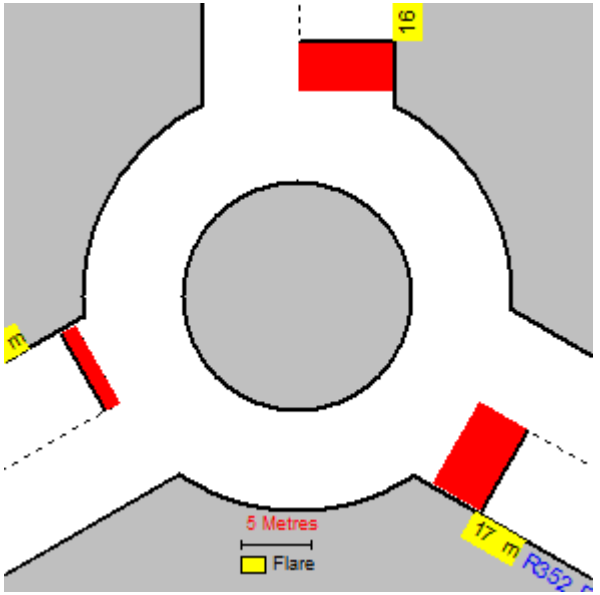
Queue Interval 2: 17:15



Queue Interval 3: 17:30

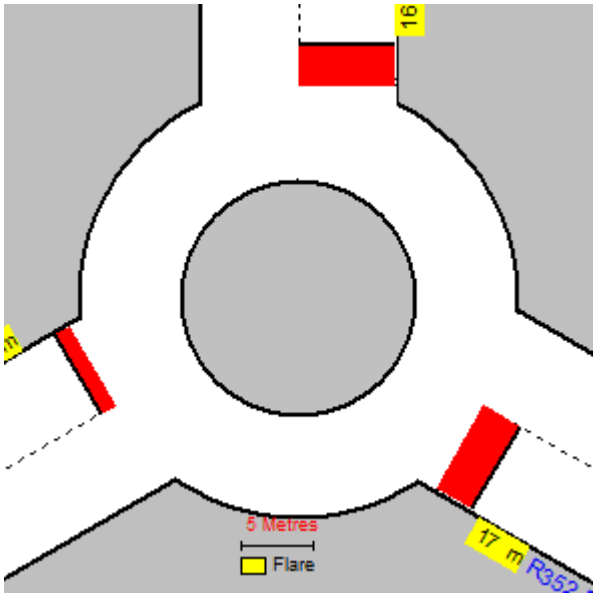
Queue Interval 4: 17:45

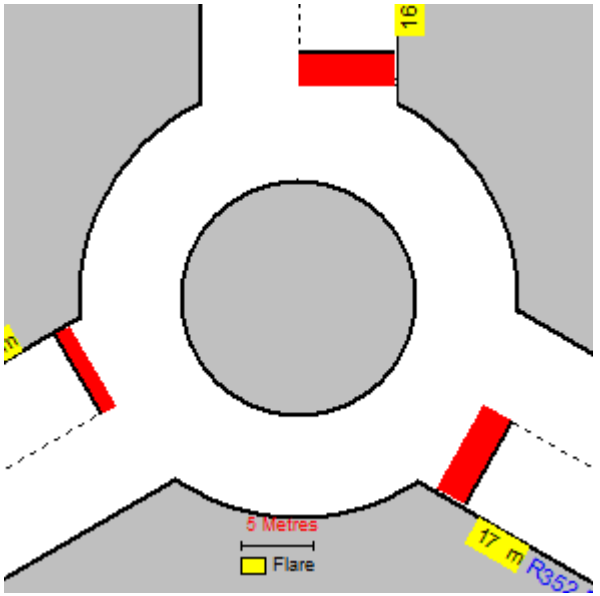




Queue Interval 5: 18:00

Queue Interval 6: 18:15



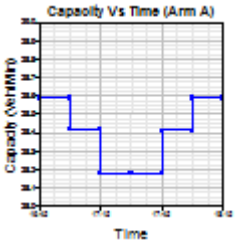


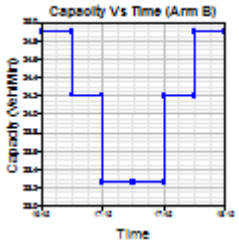
Demand Data Graphs

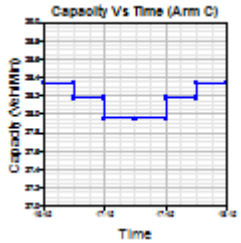
No graph available

Capacity (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)

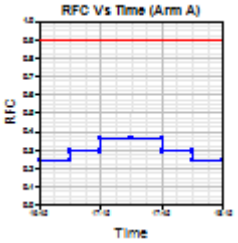


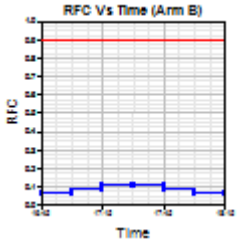


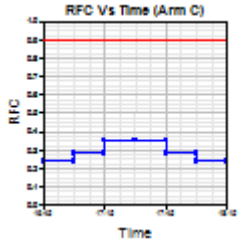


RFC (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)

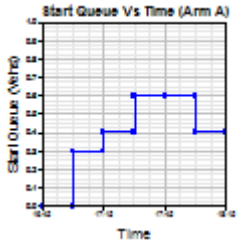


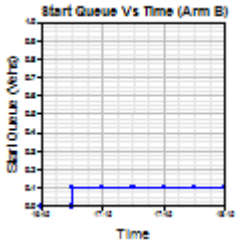


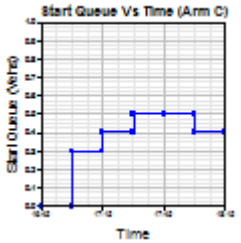


Start Queue (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)

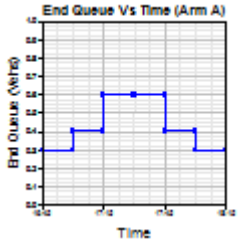


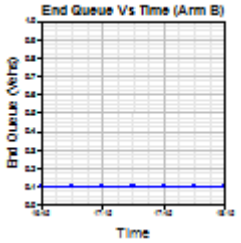


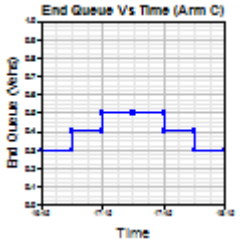


End Queue (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)





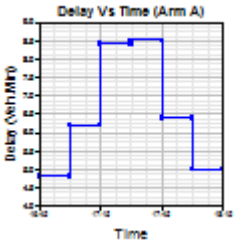


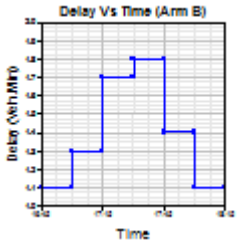
Geometric Delay Graph

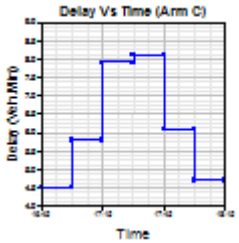
No Data. Please select 'Geometric Delay' in 'Principal Options' and try again.

Delay (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)







Queues and Delay:

Segment	Arm	Demand (Veh / Min)	Capacity (Veh / Min)	Demand / Capacity (RFC)	Ped Flow (Ped / Min)	Start Queue (Veh)	End Queue (Veh)	Delay (Veh.Min / Time Segment)	Geometric Delay (Veh.Min / Time Segment)	Arrival Delay (Min / Veh)
Segment : 1 - 16:45 to 17:00	A	7.01	28.59	0.245	-	0.0	0.3	4.8	-	0.05
	B	1.67	24.90	0.067	-	0.0	0.1	1.1	-	0.04
	C	6.70	28.34	0.236	-	0.0	0.3	4.5	-	0.05
Segment : 2 - 17:00 to 17:15	A	8.37	28.42	0.295	-	0.3	0.4	6.2	-	0.05
	B	2.00	24.21	0.083	-	0.1	0.1	1.3	-	0.05
	C	8.00	28.18	0.284	-	0.3	0.4	5.8	-	0.05
Segment : 3 - 17:15 to 17:30	A	10.26	28.18	0.364	-	0.4	0.6	8.4	-	0.06
	B	2.45	23.26	0.105	-	0.1	0.1	1.7	-	0.05
	C	9.80	27.95	0.351	-	0.4	0.5	7.9	-	0.06
Segment : 4 - 17:30 to 17:45	A	10.26	28.18	0.364	-	0.6	0.6	8.5	-	0.06
	B	2.45	23.26	0.105	-	0.1	0.1	1.8	-	0.05
	C	9.80	27.95	0.351	-	0.5	0.5	8.1	-	0.06
Segment : 5 - 17:45 to 18:00	A	8.37	28.41	0.295	-	0.6	0.4	6.4	-	0.05
	B	2.00	24.20	0.083	-	0.1	0.1	1.4	-	0.05
	C	8.00	28.18	0.284	-	0.5	0.4	6.1	-	0.05
Segment : 6 - 18:00 to 18:15	A	7.01	28.59	0.245	-	0.4	0.3	5.0	-	0.05
	B	1.67	24.89	0.067	-	0.1	0.1	1.1	-	0.04
	C	6.70	28.34	0.236	-	0.4	0.3	4.7	-	0.05

Queuing Delay Information Over Whole Period

Arm	Total Demand		Queueing Delay		Inclusive Queueing Delay	
	(Veh)	(Veh/Hr)	(Min)	(Min/Veh)	(Min)	(Min/Veh)
A	769.2	512.8	39.2	0.05	39.2	0.05
B	183.7	122.5	8.4	0.05	8.4	0.05
C	735.0	490.0	37.2	0.05	37.2	0.05
ALL	1688.0	1125.3	84.7	0.05	84.7	0.05

Delay is that occuring only within the time period.
Inclusive delay includes delay suffered by vehicles that are still queueing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

Accident Data

No Data, please select the 'Accident Analysis' option in 'Principal Options' and try again.

Accident Results

No Data, please select the 'Accident Analysis' option in 'Principal Options' and try again.

Tulla Road West Roundabout on the R352 Tulla Road Peak construction, PM peak hour, Year 2027

ARCADY 6

GUI Version: 6.00 AF Interim
Analysis Program: Release 4.0 (FEBRUARY 2006)

For sales and distribution information, program advice and maintenance, contact:

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Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
Email: softwarebureau@ trl.co.uk
Web:www.trlsoftware.co.uk

Run Information

Run with file:- **C:\AL Traffic jobs\Arcady - Ennis Data Centre\Tulla West PM 2027 peak con.vai**
At: **21:16:12 on Thursday, July 08, 2021**
Mode: **Drive On The Left**
Units: **Metric**

Arm Labelling

Arm	Full Arm Names
Arm A	R352 Ennis
Arm B	Local access
Arm C	R352 Tulla
Arm D	M18 slip

Flow Scaling Factor

Arm	Flow Scaling Factor (%)
Arm A	100
Arm B	100
Arm C	100
Arm D	100

File Properties

Run Title	Tulla Road West Roundabout
Location	Ennis
Date	16/04/2021
Client	Art Data Centre
Enumerator	adl [ADL-PC]
Job Number	8810
Status	TIA
Description	

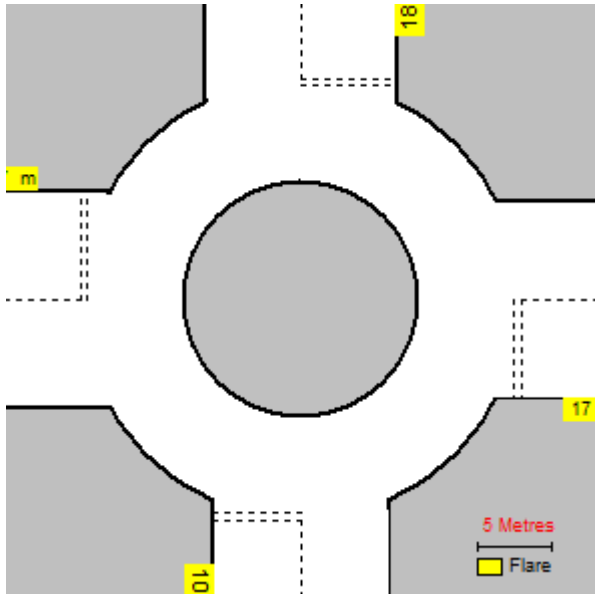
Errors and Warnings

[No errors or warnings]

Geometric Data

Data Item	Arm A	Arm B	Arm C	Arm D
Approach Road Half-Width (m)	4.00	3.50	4.00	3.60
Entry Width (m)	6.70	6.00	7.30	6.50
Flare Length (m)	17.00	10.00	27.00	18.00
Entry Radius (m)	20.00	10.00	20.00	10.00
Inscribed Circle Diameter (m)	30.00	30.00	30.00	30.00
Entry Angle (degrees)	40.00	29.00	44.00	29.00
Slope	0.646	0.585	0.671	0.622
Intercept (PCU/Min)	28.226	23.567	30.616	26.578

Junction Diagram: (View Extent = 40m)



Angles Between Arms (Degrees): Arm A(90) Arm B(90) Arm C(90) Arm D(90)

Demand Data

Demand Profiles are Synthesised using **ODTAB** Data
Period of interest (for Queue and Delay calculations): **16:45 to 18:15**
Length of Time Period: **90 min**
Length of Time Segment: **15 min**

Total Traffic Demand (Vehicles/Hour) for Demand Set: M18 Junction 12 east roundabout

From/To	Arm A	Arm B	Arm C	Arm D
Arm A	0.0	2.0	464.0	131.0

Arm B	6.0	0.0	0.0	0.0
Arm C	456.0	2.0	0.0	75.0
Arm D	375.0	2.0	95.0	0.0

Entry Flow Data for Demand Set: M18 Junction 12 east roundabout

Arms	Number of Minutes From Start When			Rate of flow (Veh/Min)		
	Flow Starts To Rise	Top of Peak is Reached	Flow Stops Falling	Before Peak	At Top of Peak	After Peak
Arm A	15.00	45.00	75.00	7.46	11.19	7.46
Arm B	15.00	45.00	75.00	0.08	0.11	0.08
Arm C	15.00	45.00	75.00	6.66	9.99	6.66
Arm D	15.00	45.00	75.00	5.90	8.85	5.90

Turning Proportions

ODTAB Demand Data type is used, no turning proportions available.

Heavy Vehicle Percentages for Demand Set: M18 Junction 12 east roundabout

Vehicle percentages constant over time and entry

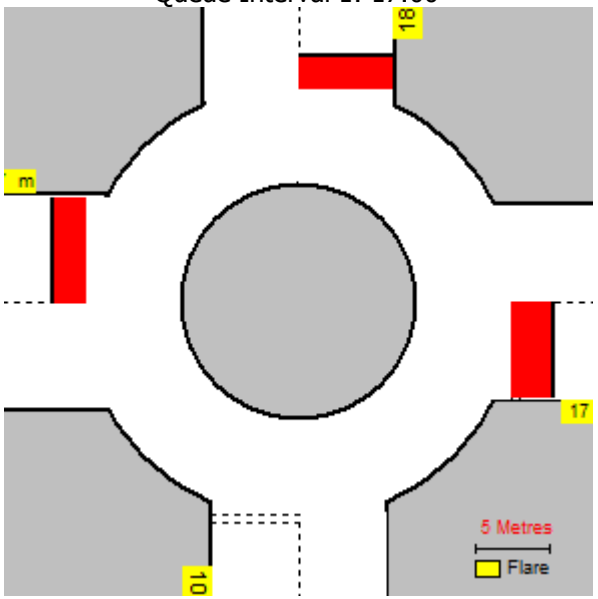
Time Period	From/To	Arm A	Arm B	Arm C	Arm D
16:45 to 18:15	Arm A	(0.0)	(0.0)	(0.0)	(0.0)
	Arm B	(0.0)	(0.0)	(0.0)	(0.0)
	Arm C	(0.0)	(0.0)	(0.0)	(0.0)
	Arm D	(0.0)	(0.0)	(0.0)	(0.0)

Queue Diagrams: (View Extent = 40m)

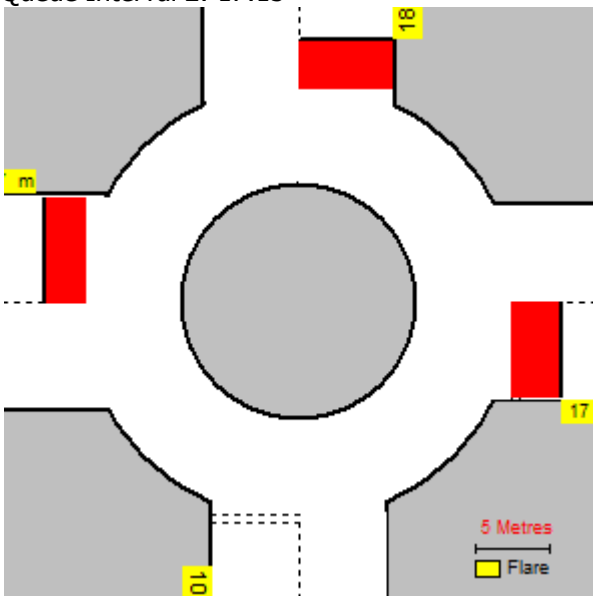
Queue Length	Colour
Mean Queue	
5 th % ile	
90 th % ile	
95 th % ile	

Start Time: 16:45---> End Time: 18:15

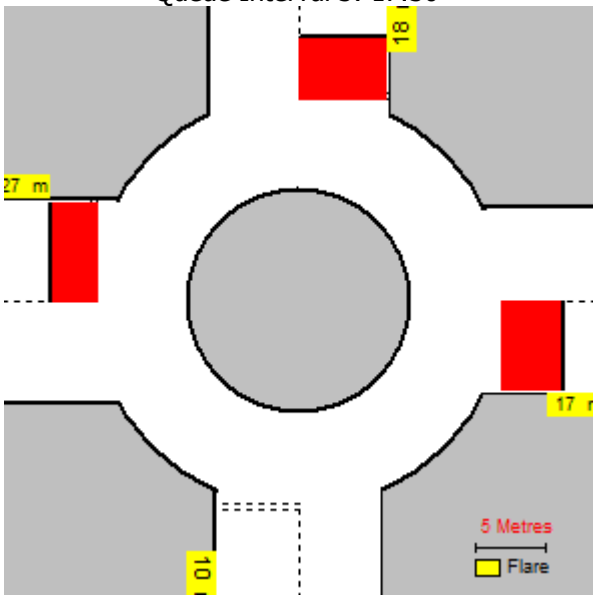
Queue Interval 1: 17:00



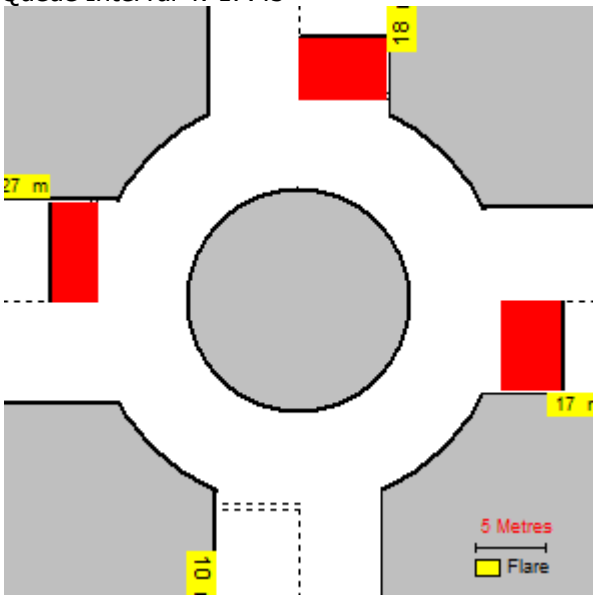
Queue Interval 2: 17:15



Queue Interval 3: 17:30

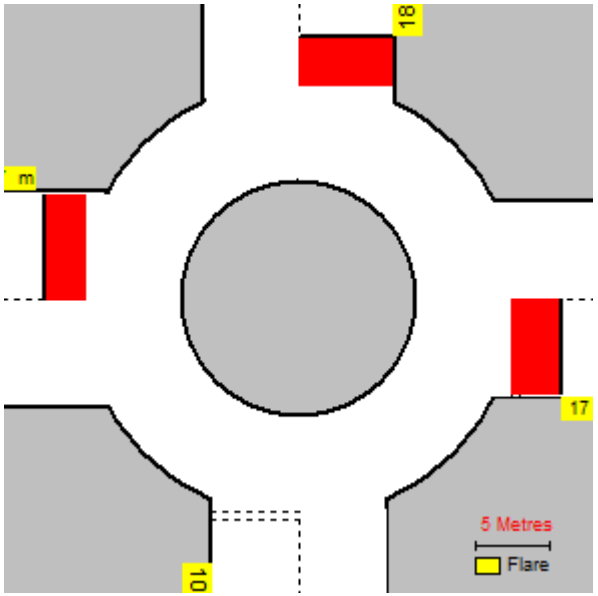


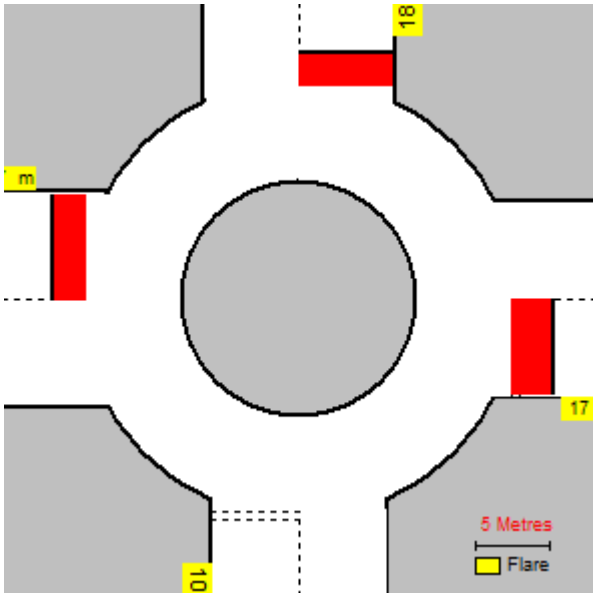
Queue Interval 4: 17:45



Queue Interval 5: 18:00

Queue Interval 6: 18:15



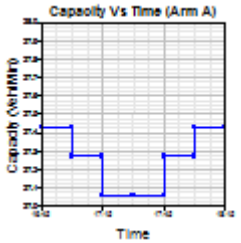


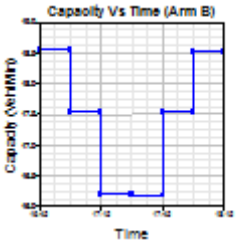
Demand Data Graphs

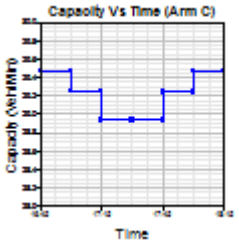
No graph available

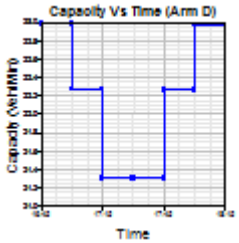
Capacity (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)



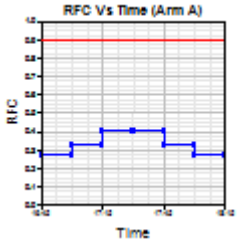


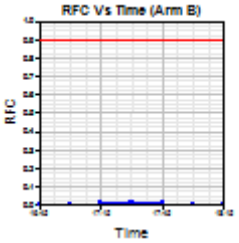


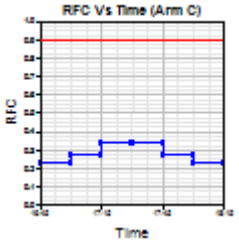


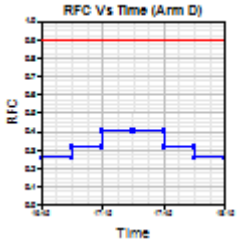
RFC (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)



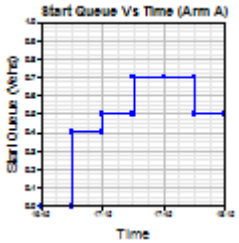


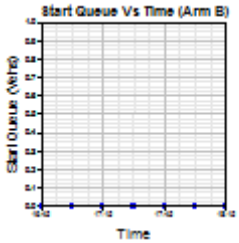


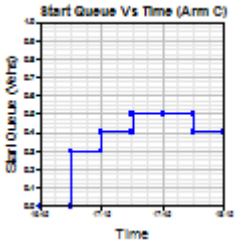


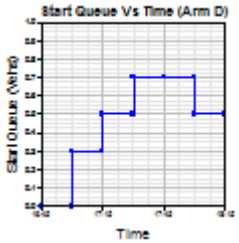
Start Queue (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)



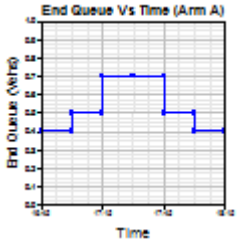


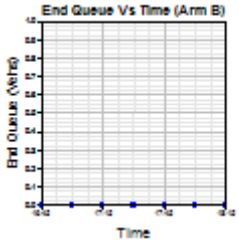


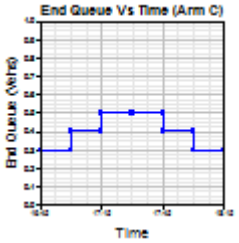


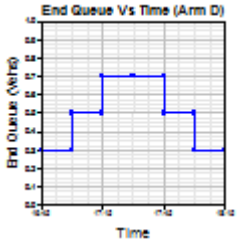
End Queue (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)







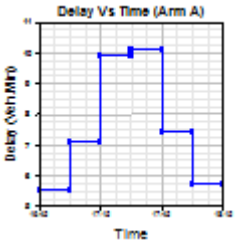


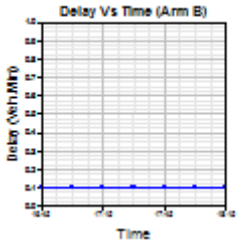
Geometric Delay Graph

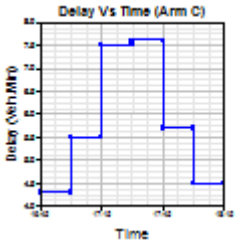
No Data. Please select 'Geometric Delay' in 'Principal Options' and try again.

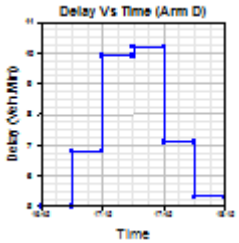
Delay (against Time) Graphs, for each 15min Interval (16:45 - 18:15)

(QUEUEING DELAY INFORMATION OVER WHOLE PERIOD)









Queues and Delay:

Segment	Arm	Demand (Veh / Min)	Capacity (Veh / Min)	Demand / Capacity (RFC)	Ped Flow (Ped / Min)	Start Queue (Veh)	End Queue (Veh)	Delay (Veh.Min / Time Segment)	Geometric Delay (Veh.Min / Time Segment)	Arrival Delay (Min / Veh)
Segment : 1 - 16:45 to 17:00	A	7.46	27.43	0.272	-	0.0	0.4	5.5	-	0.05
	B	0.08	18.54	0.004	-	0.0	0.0	0.1	-	0.05
	C	6.66	29.47	0.226	-	0.0	0.3	4.3	-	0.04
	D	5.90	22.98	0.257	-	0.0	0.3	5.0	-	0.06
Segment : 2 - 17:00 to 17:15	A	8.91	27.27	0.327	-	0.4	0.5	7.1	-	0.05
	B	0.09	17.54	0.005	-	0.0	0.0	0.1	-	0.06
	C	7.96	29.25	0.272	-	0.3	0.4	5.5	-	0.05
	D	7.05	22.27	0.316	-	0.3	0.5	6.8	-	0.07
Segment : 3 - 17:15 to 17:30	A	10.91	27.06	0.403	-	0.5	0.7	9.9	-	0.06
	B	0.11	16.19	0.007	-	0.0	0.0	0.1	-	0.06
	C	9.74	28.94	0.337	-	0.4	0.5	7.5	-	0.05
	D	8.63	21.30	0.405	-	0.5	0.7	9.9	-	0.08
Segment : 4 - 17:30 to 17:45	A	10.91	27.06	0.403	-	0.7	0.7	10.1	-	0.06
	B	0.11	16.18	0.007	-	0.0	0.0	0.1	-	0.06
	C	9.74	28.94	0.337	-	0.5	0.5	7.6	-	0.05
	D	8.63	21.30	0.405	-	0.7	0.7	10.2	-	0.08
Segment : 5 - 17:45 to 18:00	A	8.91	27.27	0.327	-	0.7	0.5	7.4	-	0.05
	B	0.09	17.53	0.005	-	0.0	0.0	0.1	-	0.06

	C	7.96	29.24	0.272	-	0.5	0.4	5.7	-	0.05
	D	7.05	22.26	0.316	-	0.7	0.5	7.1	-	0.07
Segment : 6 - 18:00 to 18:15	A	7.46	27.43	0.272	-	0.5	0.4	5.7	-	0.05
	B	0.08	18.51	0.004	-	0.0	0.0	0.1	-	0.05
	C	6.66	29.47	0.226	-	0.4	0.3	4.5	-	0.04
	D	5.90	22.97	0.257	-	0.5	0.3	5.3	-	0.06

Queuing Delay Information Over Whole Period

Arm	Total Demand		Queueing Delay		Inclusive Queueing Delay	
	(Veh)	(Veh/Hr)	(Min)	(Min/Veh)	(Min)	(Min/Veh)
A	818.6	545.7	45.7	0.06	45.7	0.06
B	8.2	5.5	0.5	0.06	0.5	0.06
C	730.9	487.2	35.0	0.05	35.0	0.05
D	647.2	431.5	44.3	0.07	44.3	0.07
ALL	2204.9	1469.9	125.5	0.06	125.5	0.06

Delay is that occuring only within the time period.
Inclusive delay includes delay suffered by vehicles that are still queueing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

Accident Data

No Data, please select the 'Accident Analysis' option in 'Principal Options' and try again.

Accident Results

No Data, please select the 'Accident Analysis' option in 'Principal Options' and try again.

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CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN FOR A PROPOSED DEVELOPMENT

"ART DATACENTRES ENNIS CAMPUS"

Appendix 14.1

Report Prepared For

ART Datacentre Development Ltd.

Report Prepared By

Chonaill Bradley, Senior Environmental Consultant

Our Reference

CB/21/12145WMR01

Date of Issue

07 July 2021

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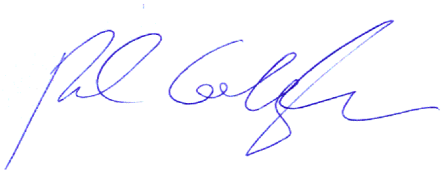
Signature		
Name	Chonaill Bradley	Fergal Callaghan
Title	Senior Environmental Consultant	Director
Date	07 July 2021	07 July 2021

Contents Page

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Construction & Demolition Waste Management Plan (C&D WMP) on behalf of ART Datacentre Development Ltd. The proposed development includes six data storage facilities, an energy centre an Above Ground Installation (AGI) building, vertical farm, a substation compound and associated ancillary development on a greenfield site (previously used for agriculture and hosting power transmission infrastructure) in the townlands of Tooreen and Cahernalough, Co Clare.

This plan will provide information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Acts 1996 - 2011* and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Southern Region (SR) Waste Management Plan 2015 – 2021* [4]. In particular, this Plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This C&D WMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams.

2.0 CONSTRUCTION & DEMOLITION WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998*, Changing Our Ways*[5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020 the government released a new national policy document outlining a new action plan for Ireland and its waste to cover the period of 2020-2025. This plan, 'A Waste Action Plan for a Circular Economy' [7], was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to a new economy, where climate and environmental challenges are turned into opportunities, replacing the previous national waste management plan 'A Resource Opportunity (2012)'

It aims to fulfil the commitment in the Programme for Government to publish and start implementing a new National Waste Action Plan. It is intended that this new national waste

policy will inform and give direction to waste planning and management in Ireland over the coming years. It will be followed later this year by an All of Government Circular Economy Strategy. The policy document shifts focus away from waste disposal and moves it back up the production chain. To support the policy, regulation is already in place (Circular Economy Legislative Package) or in the pipeline (Single Use Plastics Directive). The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken is the development of a high-level, whole of Government Circular Economy Strategy to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity. This stratergy was issued for public consultation in April 2021.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* [8] in July 2006 in conjunction with the then Department of the Environment, Heritage and Local Government (DoEHLG). The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for waste manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Clare County Council, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a C&D Waste Management Plan for developments. This development requires a C&D WMP under the following criterion:

- New developments including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250m^2.

Other guidelines followed in the preparation of this report include 'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers' [9] , published by FÁS and the Construction Industry Federation in 2002 and the Environmental Protection Agency (EPA) 'Best Practice Guidelines for the Preparation of Resource Management Plans for Construction & Demolition Projects' Draft for public consultation [10] (April 2021).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Clare County Council (CCC). The *Southern Region Waste Management Plan 2015 – 2021* is the regional waste management plan for the CCC area published in May 2015.

The Regional Plan sets out the strategic targets for waste management in the region but does not set a specific target for C&D waste. However, the *Waste Framework Directive* sets Member States a target of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste"* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

The *Clare County Development Plan 2017 – 2023 (As Varied)* [11] sets out a number of policies for Clare County in line with the objectives of the regional waste management plan. The plan identifies the implementation of the joint waste management plan for the south region as the main objective of the County Council. Other waste management objectives with a particular relevance to the proposed development are:

Objectives:

CDP 8.28: a) To implement the provisions of the Southern Region Waste Management Plan 2015 – 2021;
b) To support the development of higher-value waste pre-treatment processes and indigenous recovery practices

CDP 8.31: a) To require a C&D Waste Management Plan to be prepared by the developer having regard to the DoEHLG's publication 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' for new construction or demolition projects and to require that the maximum amount of waste material generated on site is reused and recycled.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- Waste Management Act 1996 (No. 10 of 1996) as amended.
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended [12.]

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2001* and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the

incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a Waste or Industrial Emissions Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESCRIPTION OF THE DEVELOPMENT

3.1 Location, Size and Scale of the Development

The proposed development will generally comprise:

Demolition of some of the existing buildings and hard standing areas onsite.

Construction of a mixed-use development featuring:

1) 6 data centres buildings,
2) A gas powered energy centre and Above Ground Installation (AGI),
3) A new 110kV substation, two drop down masts and underground grid connection.
4) Fibre connection,
5) Connection and upgrade of foul sewer and mains supply extending along the existing R352.
6) Undergrounding of two of the existing overhead 110kv circuits
7) Associated Infrastructure; roads, attenuation pond etc.

Figure 2.1 presents the site layout for the proposed masterplan. The proposed development occupies c. 48 of the total development site; the site layout reserves c. 10 ha of lands as ecological buffer zones. The indicated buffer zones on Figure 2.1 were delineated by Clare County Council (CCC) to protect ecology are protected during construction and operation of the proposed development.

Two of the 110kV overhead circuits which currently traverse the site will be brought underground to the Ennis substation as they come onto the site on the east side.

3.2 Details of the Non-Hazardous Wastes to be Produced

There will be waste materials generated from the demolition of the existing residential building, multiple farm buildings and some hardstanding areas on site, as well as from the

further excavation of the building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete, etc.

There will also be topsoil, subsoil, stones, clay and rock excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. The development engineers (Clifton Scannell Emerson Associates Consulting Engineers) have estimated that c. 111,424 m^3 of material will need to be excavated to do so. It is currently envisaged that all of the excavated material will be able to be retained and reused onsite for landscaping and fill. If any material is found to be unsuitable for reuse it will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

3.3 Potential Hazardous Wastes Arising

3.3.1 Contaminated Soil

Site investigations were carried out by Ground Investigations Ireland (GII) during April-May 2021.

Two (2) no. samples were analysed and compared against Waste Acceptance Criteria (WAC) set out by the adopted EU Council Decision 2003/33/EC which established criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). There was no fill material noted during trial pit excavations with all samples being recorded as original clay subsoil.

The WAC analysis identifies that the representative samples are suitable for classification as Category A – Inert. Based on the laboratory results and parametric concentrations obtained from the site investigation, material from the sample locations would be acceptable at inert waste facilities (Category A).

If any potentially contaminated material is encountered, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [13] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [14], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify CCC and provide a Hazardous / Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

3.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

3.3.3 Invasive Plant Species

Multiple site surveys were undertaken by Scott Cawley Ecology for the purpose of identifying and managing any Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 as amended invasive species such as Japanese Knotweed (*Fallopia japonica) if located onsite*. No invasive species as listed on the Third Schedule of the European Communities (Birds and Natural Habitats) were found.

3.3.4 Asbestos

Prior to the demolition of any of the existing structures onsite demolition and refurbishment asbestos surveys will be undertaken by a suitably qualified expert. All reports will be presented to CCC prior to any demolition works being undertaken.

Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted / licenced waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All material will be taken to a suitably licensed or permitted facility.

3.3.5 Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.4 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 3.1. The List of Waste (LoW) code (applicable as of 1 June 2015) (also referred to as the European Waste Code (EWC)) for each waste stream is also shown.

Table 3.1 *Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)*

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

** Individual waste type may contain hazardous substances*

4.0 WASTE MANAGEMENT

4.1 Demolition Waste Generation

The demolition stage will involve the demolition of an existing residential building, multiple farm buildings and some hardstanding areas on- site. The demolition areas are identified in the planning drawings provided with this application. The anticipated demolition waste and rates of reuse, recycling / recovery and disposal are shown in Table 4.1, below.

Table 4.1 *Estimated off-site reuse, recycle and disposal rates for demolition waste*

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	32.6	0	0.0	85	27.7	15	4.9
Concrete, Bricks, Tiles, Ceramics	184.7	30	55.4	65	120.0	5	9.2
Plasterboard	14.5	30	4.3	60	8.7	10	1.4
Asphalts	3.6	0	0.0	25	0.9	75	2.7
Metals	79.7	5	4.0	80	63.7	15	11.9
Slate	3.6	0	0.0	85	3.1	15	0.5
Timber	43.5	10	4.3	60	26.1	30	13.0
Asbestos	0.1	0	0.0	0	0.0	100	0.1
Total	**362.2**		**68.1**		**250.2**		**43.9**

4.2 Construction Waste Generation

Table 4.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [15] *and the joint EPA & GMIT study* [16].

Table 4.2: *Waste materials generated on a typical Irish construction site*

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 4.3, below, shows the estimated construction waste generation for the proposed Project based on the gross floor area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on an average large-scale development waste generation rate per m^2, using the waste breakdown rates shown in Table 4.2. These have been calculated from the schedule of development areas provided by the architect.

***Table 4.3**: Predicted on and off-site reuse, recycle and disposal rates for construction waste*

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	310.1	10	31.0	80	248.1	10	31.0
Timber	263.2	40	105.3	55	144.7	5	13.2
Plasterboard	94.0	30	28.2	60	56.4	10	9.4
Metals	75.2	5	3.8	90	67.7	5	3.8
Concrete	56.4	30	16.9	65	36.7	5	2.8
Other	141.0	20	28.2	60	84.6	20	28.2
Total	**939.8**		**213.3**		**638.1**		**88.3**

In addition to the waste streams in Table 4.3, there will be c. 111,424 m^3 topsoil, subsoil, stones, clay and rock excavated excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. Any suitable excavated material will be temporarily stockpiled for reuse as fill, where possible it is expected that no material will be required to be removed offsite. If any material is found to be unsuitable for reuse it will be removed off- site for appropriate reuse, recovery and / or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

4.3 Proposed Waste Management Options

Waste materials generated will be segregated on- site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off- site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source, where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Clare region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off- site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off- site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off- site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Topsoil, Subsoil, Stones, Clay and Rock

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

If material is removed off- site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*, which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

If bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off- site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on- site, the appropriate mobile waste facility permit will be obtained from CCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off- site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on- site, the appropriate waste facility permit will be obtained from CCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off- site.

Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard

There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phases will be stored in a separate skip, pending collection for recycling. The site Manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

Other Recyclables

Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off- site.

Non-Recyclable Waste

C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip / receptacle will be examined by a member of the waste team (see Section 7.0) to determine if recyclable materials have

been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

Any asbestos or ACM found on- site will be removed by a suitably competent contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and / or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on- site. However, if the crushing of material is to be undertaken, a waste facility permit will first be obtained from CCC and the destination of the accepting waste facility will be supplied to the CCC waste unit.

4.4 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project Waste Manager (see Section 7.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 - 2011*, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project Waste Manager (see Section 7.0) will maintain a copy of all waste collection permits on-Site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste / Industrial Emissions Licence for that site will be provided to the nominated project Waste Manager (see Section 7.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-Site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-Site waste management records.

All information will be entered in a waste management recording system to be maintained on-Site.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

5.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material off-Site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-Site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

5.2 Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips. Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste. Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

5.3 Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

6.0 DEMOLITION PROCEDURES

There will be waste materials generated from the demolition of the existing residential building, multiple farm buildings and some hardstanding areas on site. The demolition areas are identified in the planning drawings and demolition report submitted as part of this application. A formal demolition plan including safety procedures will be prepared by the demolition contractor. However, in general, the following sequence of works should be followed during the demolition stage:

<u>Check for Hazards</u>

Prior to commencing works, buildings and structures to be demolished will be checked for any likely hazards including asbestos, ACMs, electrical power lines or cables, gas

reticulation systems, telecommunications, unsafe structures and fire / explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

Removal of Components

All hazardous materials will be removed first. All components from within the buildings that can be salvaged will be removed next. This will primarily be comprised of metal; however, may also include timbers, doors, windows, wiring and metal ducting, etc.

Removal of Roofing

Steel roof supports, beams, etc., will be dismantled and taken away for recycling / salvage.

Excavation of Services, Demolition of Walls and Concrete

Services will be removed from the ground and the breakdown of walls will be carried out once all salvageable or reusable materials have been taken from the buildings. Finally, any existing foundations and hard standing areas will be excavated.

7.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the Waste Manager to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

7.1 Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The Waste Manager will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The Waste Manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The Waste Manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this C&D WMP.

7.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the Waste Manager and, as such, a waste training program will be organised. A basic awareness course will be held for all site crew to outline the C&D WMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

8.0 RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisingon Site.

A waste tracking log will be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver will stop at the site office and sign out as a visitor and provide the security personnel or Waste Manager with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel will complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC / LoW

The waste vehicle will be checked by security personal or the Waste Manager to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the Waste Manager on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the CCC Waste Regulation Unit when requested.

Alternatively, each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times. Subcontractors who have engaged their own waste contractors, will provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

9.0 OUTLINE WASTE AUDIT PROCEDURE

9.1 Responsibility for Waste Audit

The appointed Waste Manager will be responsible for conducting a waste audit at the site during the C&D phase of the proposed Project. Contact details for the nominated Waste Manager will be provided to the CCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

9.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site should be undertaken mid-way through the demolition and construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

10.0 CONSULTATION WITH RELEVANT BODIES

10.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the CCC Waste Regulation Unit.

CCC will also be consulted, as required, throughout the demolition, excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

10.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the demolition and construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off- site, and the recycling / reclamation process each material will undergo off- site.

10.2.1 Current C&D Waste Disposal / Recovery Routes

During the planning phase and prior to the appointment of waste contractors, waste destinations for C&D Waste cannot be supplied. These details are to be finally determined prior to demolition and construction beginning. Waste facilities have capacity and life span limitations that may not be available at the of construction & demolition phases of the development.

As well as EPA licensed facilities, there are currently a number of facilities in Clare and the counties surrounding the proposed Project in possession of a Waste Facility Permit or Certificate of Registration from the applicable County Councils which accept soils and inert waste from construction and demolition works. These facilities are all permitted or certified to operate Class 5, Class 6, and/or Class 7 waste activities as described in the Third Schedule of the Waste Management (Facility Permit and Registration) Regulations 2007 (S.I. No. 821/2007).

The currently licensed or permitted facilities which can operate under these classes of activity and are closest to the proposed development are listed in Table 14.1. There are also registered sites that can receive waste from the development that are not included in the table due to their lower capacity limits, however they can still potentially be used by the yet to be selected waste contractor. All details were collected from the National Waste Collection Permit Office and Environmental Protection Agency websites (July 2021) and a full list of licensed, permitted and register sites can be found on the registers contained on these sites.

***Table 10.1**: Potential destinations for Construction & Demolition Waste*

Facility / Applicant Name	Licence Number & Facility Type	Location
Potential Soil Recovery Facilities		
Tulligmore Quarry Solutions Limited	W0255-02	Tulligmore Quarry Solutions Limited, Tulligmore, Dripsey, Cork.
Lennon Quarries Limited	W0272-02	Lennon Quarries Limited, Tallagh, Belmullet, Mayo.
Mallow Contracts Limited	W0266-01	Mallow Contracts Limited, Lissard & Ballyhilloge, Mourneabbey, Co. Cork, Cork.
Potential Permitted Waste Facilities for Soil		
Cloonaughter Parteen Co Clare	WFP-CE-17-0001-01	Cloonaughter Parteen Co Clare
Clare Waste & Recycling Co. Ltd	WFP-CE-08-0002-03	Raheen Tuamgraney Co. Clare V94 WY67
Jim Bolton Sand and Gravel Ltd	WFP-CE-19-0001-01	Faheymore O'Briens Bridge Co Clare V94 F635
Kieran Kelly Haulage Ltd	WFP-CE-19-0002-01	Ballynacragga Newmarket-on-Fergus Co Clare
Lymar Contracts Ltd.	WFP-CE-20-0002-01	Caherea Lissycasey Ennis Co Clare
Potential Permitted Waste Facilities for Demolition and Construction Waste		
Clare Waste & Recycling Co. Ltd	WFP-CE-08-0002-03	Raheen Tuamgraney Co. Clare V94 WY67
Clean (Irl) Refuse & Recycling Company	WFP-CE-08-0003-03	Smithstown Industrial Estate Shannon Co Clare V14 HP89
Potential Waste Facilities Hazardous Waste		

Facility / Applicant Name	Licence Number & Facility Type	Location
Enva Ireland Limited	W0145-02	Enva Ireland Limited (Cork), Unit 9, Raffeen Industrial Estate, Raffeen, Monkstown, Cork.

11.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate
2. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Southern Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
8. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
9. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and* site *Managers* (2002).
10. Environmental Protection Agency (EPA) *'Best Practice Guidelines for the Preparation of Resource Management Plans for Construction & Demolition Projects'* Draft *(April 2021).*
11. Clare County Council (CCC), Clare County Development Plan 2017-2023 (As Caried) (2017)
12. Planning and Development Act 2000 (No. 30 of 2000) as amended
13. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
14. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
15. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
16. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).