

Bray and Environs Transport Study

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National Transport Authority
Wicklow County Council
Dún Laoghaire-Rathdown County Council
Transport Infrastructure Ireland

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1 Introduction

1.1 Background

Following a meeting held in 2017, the National Transport Authority (NTA), Transport Infrastructure Ireland (TII) and Wicklow County Council (WCC) agreed to undertake a transport study for Bray and Environs. The overarching purpose in undertaking this study was to seek to facilitate the land use objectives of Wicklow County Council and Dún Laoghaire-Rathdown County Council as provided for in statutory regional, county and local plans.

The approach taken was to set out the local interpretation of the NTA's Transport Strategy for the Greater Dublin Area and DPHLG's Spatial Planning and National Roads Guidelines for Planning Authorities, and to express, in an integrated manner, the transportation policies and objectives of Wicklow County Council and Dún Laoghaire Rathdown County Council, as contained in their County Development Plans and local area plans. The latter were at various stages in their development as this study was being prepared. The study also incorporates the outcome of the assessment of the recommendations from TII's M11/N11 Corridor Study Needs Assessment Report of 2016 and subsequent related NDP and Part 8 projects.

The statutory processes outlined above are subject to legislative requirements relating to public consultation and environmental assessment. As such, the preferred approach set out in this Study does not define rules that must be complied with when administrative consent of projects is being granted. They are non-binding and advisory and do not comprise public policy.

1.2 Objectives and Key Stages

This study assumes that the NTA Transport Strategy and the TII Corridor Study Needs Assessment Report form the basis for transport investment in the Study Area up to 2035, both of which are provided for and supported by the National Development Plan. The first objective of the study is therefore not to revisit these policy documents, but by way of carrying out further analysis focussed on the Bray and Environs area, to determine how the measures set out in these documents could be applied at the local level. The second objective of the study is to set out the transport implications, in terms of mode share, journey times etc. of the land use patterns envisaged by the two local authorities for the Study Area.

The following outlines the key stages of this exercise:

- Review receiving environment;
- Determine the travel demand associated with the existing and proposed land-uses for the Study Area;
- Apply a local interpretation of the public transport, walking, cycling and road proposals provided for by the NTA Transport Strategy and National Development Plan, with a view to accommodating demand in the Study Area in a sustainable manner;
- Undertake modelling of the emerging option and refine if necessary; and
- Recommend an emerging preferred approach to cater for the Study Area.

1.3 Report Structure

The report sets out the preferred approach for the long-term delivery of land use and transport objectives for Bray and Environs and is intended to inform their implementation, with specific emphasis on the delivery of development at Fassaroe in the short term. The Appendices set out the methodology for the study and the manner in which the preferred approach identified by this Study emerged.

2 Preferred Approach

2.1 Public Transport, Walking and Cycling

Following the assessment of the options undertaken, the following AM Peak Hour public transport, walking and cycling measures are deemed necessary for the future development of the Study Area. These measures are recommended to be subject to on-going monitoring and review, including their phased introduction in line with development occurring within the Study Area. They are shown in Figure 2.1.

1. Luas Extension to Bray Town Centre
 - 7.5 minute AM Peak Hour frequency with interchange with Metro at Sandyford. Luas Stops at Stonebridge Road, Crinken Lane, Allies River Road, Old Connaught Avenue, Dublin Road, former Bray Golf Club and Bray DART Station.
2. Luas / DART / Bus Interchange at Bray Station
3. Bray Core Bus Corridor Dublin Rd / M11 – N11
 - 3-minute AM Peak Hour frequency from DART station to City; and
 - 10-minute frequency express service from South Bray to CBC via Bus / Bus Interchange
OR
 - 6-minute frequency from DART and from Bray South forming 3-minute peak hour spine onto Dublin Road
4. Bray South Feeder Services to DART and CBC
 - 10-minute coordinated frequency bringing 5 minute frequency to Main Street on to DART station
5. Fassaroe to Bray DART Bus Service
 - 5-minute frequency
6. Fassaroe – Old Connaught – Woodbrook DART Station Bus
 - 10-minute frequency using new Busway and Bridge over County Brook at Ballyman Glen, via Old Connaught Avenue and an upgraded Wilford Interchange or via a new Road from Ferndale Road to Dublin Road
7. Feeder Bus from Metro at Sandyford via N11, Cherrywood and Rathmichael to Bray DART Station via new Cherrywood to Rathmichael link road
8. Woodbrook DART Station and Park and Ride
9. DART 10-minute frequency plus 2 AM Peak Hour service inserts
10. Associated infrastructure

- Public Transport, Pedestrian and Cycle Bridge and link from the Golf Club Lands to Bray DART Station
- Cycle and Pedestrian Bridge over the N11 from Fassaroe
- Implementation of the Greater Dublin Area Cycle Network Plan
- Priority for Bus on Dublin Road, Castle Street, Lower Dargle Road
- Busway from Fassaroe to Old Connaught over County Brook at Ballyman Glen
- Improvements to the pedestrian network in the study area

In addition to the above, the potential for a bus-based Park & Ride south of Bray will be examined. This facility would be designed with a view to serving travel demand from South Wicklow and Wexford, beyond the study area, and encouraging transfer from car to bus, thereby reducing demand for travel by private car on the N/M11 in the study area and northwards.

2.2 Road

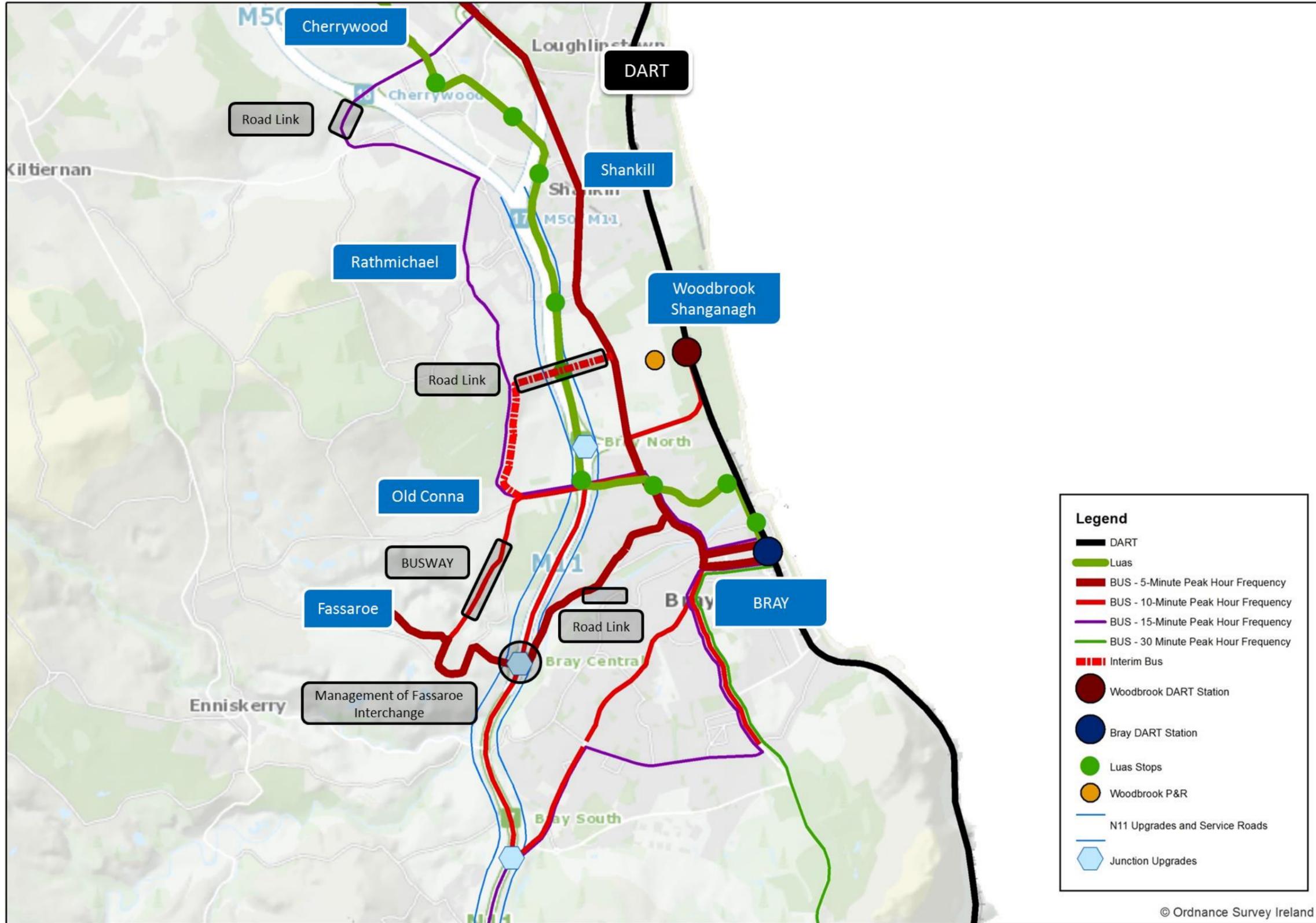
Following the assessment of the options undertaken, the following roads measures are deemed necessary for the future development of the Study Area:

1. N11/M11 Junction 4 to 14 Improvement Scheme;
2. Delivery of Wicklow County Council Part 8 N11 capacity and safety upgrades, as approved;
3. Interim Traffic Management Measures Framework to protect strategic function of the N/M11 arising from the initial phased development of Fassaroe;

The following additional local roads and traffic management measures may be deemed necessary for the future development of the Study Area subject to section 5.8.3 of the *Transport Strategy for the Greater Dublin Area – Principles of Road Development*, feasibility and environmental assessment, and demonstration of their compatibility with the strategic function of the national road network:

- New Road Bridge from Herbert Road to Upper Dargle Road
- New road link from the M50 Cherrywood Interchange to Rathmichael
- Ferndale Road to Dublin Road, Shanganagh link road; and
- Traffic Management in Bray Town Centre

Figure 2.1: Preferred Approach 2035



ADDENDUM – March 2018Metrolink

During the final stages in the development of this study, the NTA launched the Emerging Preferred Route for Metro. Instead of two separate projects as envisaged in the 2016 Transport Strategy – Metro North and Metro South – it is now intended to deliver Metro as one project from Swords to Sandyford. This involves the construction of a new line from Swords to the City Centre, tying in with the existing Luas Green Line at Charlemont, which will be upgraded to deliver Metro levels of service as far south as Sandyford.

This is a departure from the baseline assumptions used in the development of the transport options and the derivation of the Preferred Approach in this study. Bride's Glen was originally intended to act as a terminus for Metro, and consequently as the hub for interchange from the Bray Luas and feeder bus services. It also provided for through-running of Luas trams from Bray to the City Centre, which is not possible under the new proposals. The images and commentary in the Appendix includes the original Transport Strategy proposal for Metro and Luas.

The most significant implication of the Metrolink for this study is that a higher-frequency Luas service than that originally envisaged could be provided from Bray to Sandyford, at which point, however, all passengers would be required to interchange with Metro for onward travel. It also renders the Bus/Metro interchange at Bride's Glen redundant. Instead the northern section of the bus feeder from Bray to Bride's Glen would be extended under the preferred approach to Sandyford with some or all services terminating at the Sandyford Bus/Luas/Metro interchange, and the remainder terminating in Cherrywood, depending on emerging demand patterns.

The NTA have assessed the above scenario and are satisfied that the outputs from the model for the 2035 scenario do not depart significantly from those set out for the original Preferred Approach. Metrolink is scheduled to commence operations during Phase 2 of this study. As such, it has no bearing on servicing immediate growth in Woodbrook / Shanganagh, Fassaroe, Bray Town Centre, and the former Bray Golf Club lands, which is recommended will be undertaken in line with the Preferred Approach. The early phases of the development of Old Connaught would be served by interim bus measures linking to DART and the Dublin Road Bus Corridor, which would be developed by the NTA in due course, as development plans become clear for this area.

2.3 Local Details

2.3.1 Fassaroe

The following is required to serve the full build-out of Fassaroe:

- Fassaroe development roads;
- N11 Cycle and Pedestrian Bridge;
- N11/M11 Junction 4 to 14 Improvement Scheme
- Delivery of Wicklow County Council Part 8 N11 capacity and safety upgrades, as approved;
- Busway from Fassaroe to Old Connaught over County Brook at Ballyman Glen;
- Traffic Management Measures at Fassaroe Interchange to protect strategic function of the N/M11; and
- Commitment to the phased introduction of bus and enhanced rail services in line with increased demand.

At a more detailed level, the development of Fassaroe may commence on a tightly phased basis when certainty on the need for and delivery of the above is fully determined. Please see sections 3.2 and 3.3.

2.3.2 Bray Golf Club Lands

The following is required to serve the full build-out of Bray Golf Club lands:

- Golf Club Lands development roads;
- Pedestrian and cycle links from the Golf Club to Bray Town Centre;
- Dublin Road bus priority (part of Bray Core Bus Corridor);
- Public transport, pedestrian and cycle bridge from the Golf Club Lands to Bray DART station for future use by Luas;
- Development of interchange at Bray DART Station; and
- Commitment to the phased introduction of bus and enhanced rail services in line with increased demand.

2.3.3 Woodbrook

The following is required to serve the full build-out of Woodbrook / Shanganagh:

- Woodbrook DART Station; and
- Commitment to the phased introduction of bus and enhanced rail services in line with increased demand.

2.3.4 Old Connaught

The following is required to serve full build out of current residentially zoned lands at Old Connaught:

- Subject to section 5.8.3 of the *Transport Strategy for the Greater Dublin Area – Principles of Road Development*, feasibility and environmental assessments, and demonstration of their compatibility with the strategic function of the national road network, securing planning consent and funding commitment for upgrades to the road network to facilitate the safe, convenient and reliable movement of public transport, cyclists and pedestrians, including for the following schemes:
 - o Upgrade of Ferndale Road;
 - o Development of new road link from Ferndale Road to Dublin Road at Shanganagh; and
 - o Cherrywood to Rathmichael link road;

- Commitment to the phased introduction of bus services in line with increased demand.

At a more detailed level, the development of the residentially zoned lands at Old Conna is subject to the adoption of a Local Area Plan. As part of the making of this Local Area Plan, it is recommended that DLRCC, with input from the NTA and TII, will prepare an implementation plan for these lands. This implementation plan is recommended to include a phasing programme which would set out the transport infrastructural and service requirements for each successive phase of development. It is recommended that this implementation plan would be incorporated into the Local Area Plan.

Any potential longer-term future development at Old Connaught – beyond that envisaged by the Dun Laoghaire-Rathdown County Development Plan 2016-2022 – would require unambiguous commitment to the delivery of the Luas Green Line from Bride’s Glen to Bray - a project already provided for in both the NTA GDA Transport Strategy 2016-2035 and the National Development Plan 2018-2027.

2.3.5 Rathmichael

The following is required to serve Rathmichael:

- Subject to section 5.8.3 of the *Transport Strategy for the Greater Dublin Area – Principles of Road Development*, feasibility and environmental assessments, and demonstration of their compatibility with the strategic function of the national road network, securing planning consent and funding commitment for upgrades to the road network to facilitate the safe, convenient and reliable movement of public transport, cyclists pedestrians, including for the following schemes:
 - o Upgrade of Ferndale Road;
 - o Development of new road link from Ferndale Road to Dublin Road at Shanganagh;
 - o Cherrywood to Rathmichael link road;
- Commitment to the phased introduction of bus services in line with increased demand.

The delivery of all transport infrastructure and services for the current residentially zoned lands at Rathmichael is recommended to be undertaken according to a phasing programme for development to be prepared by DLRCC in collaboration with NTA and TII and are recommended to be subject to monitoring and review as investment in transport infrastructure in the Study Area is realised, in particular Woodbrook DART Station and the Luas Green Line extension to Bray . It is recognised that any significant development at Rathmichael will be dependent on the implementation of Irish Water’s Old Connaught/Woodbrook Drainage Scheme, which is unlikely to be delivered in the short-term.

3 Implementation

3.1 Introduction

This section sets out the timelines for the implementation of the preferred approach identified by this Study within the period of the Transport Strategy up to 2035 taking account of requirements established in Section 2 of this study. A more detailed phasing and implementation plan – linked formally to the growth of each development area – is recommended to be developed subsequent to this plan, with the exception of the initial development phase for Fassaroe, measures for which are recommended below.

A key assumption in this regard is that any significant development of Rathmichael, and the growth of Old Connaught and Woodbrook beyond the residential zonings set out in the current Dún Laoghaire-Rathdown Development Plan, will only occur after 2027. This section is based on the current work being undertaken by the NTA on the on-going capital investment programme; TII National Roads Schemes in the National Development Plan; *BusConnects*; work being undertaken in conjunction with the local authorities as part of the Sustainable Transport Measures Programme; and the work previously undertaken for the Transport Strategy.

In considering the implementation of the preferred approach, it must be borne in mind that Bray and its Environs – despite being identified in the Draft Regional Spatial and Economic Strategy as a Key Town which “... has the capacity and future growth potential to accommodate above average growth” - comprises but only one of a number of such development areas throughout the Greater Dublin Area which require investment in transport infrastructure and services. The development areas within the study area to the west of the N11/M11 have very limited existing assets in this regard. As such, their development would also require corresponding planning and design work to be undertaken on each of the relevant transport measures. Timelines for their full delivery would also need to be confirmed.

For all schemes, regardless of where responsibility for delivery ultimately lies, each one would require agreement and cooperation between the agencies. In the case of some local authority schemes, these are likely to be managed with the NTA under the Sustainable Transport Measures Grants programme and TII under government funding allocations with regard to national road schemes. All of the schemes below would be also be funded in part by contributions levied against development in the study area.

3.2 First Growth Area – Phase 1 (a) Fassaroe

Phase 1 (a) of the development of Fassaroe would comprise c.650 residential units and appropriate residential support facilities. The measures required to deliver this development are set out in Table 3.1 below. These would be agreed between the applicant, Wicklow County Council, the NTA and TII and are recommended to be subject to monitoring and review with a view to their improvement and alteration as investment in future phases is realised, in particular Woodbrook DART station and the extension to Bray of the Luas.

Due to the need to address the impact of any proposal on the existing congested national road network in advance of NDP N11/M11 Junction 4 to Kilmacanogue – Junction 14 Improvement Scheme, it would be necessary for Wicklow County Council, in agreement with TII, to prepare a framework for a Traffic Management System to facilitate phase 1(a) development of the Fassaroe lands. It is recommended that the agreed framework includes in its scope the identification of traffic management measures and infrastructure to minimise the impact of the Fassaroe proposal on the mainline the N/M11 and to enhance Wicklow and TII's ability to manage traffic flow on the N11 corridor pending future national road schemes. This Framework is recommended to be undertaken within two months of the date of the agreement of this Study.

Recommended framework measures will include appropriate agreed controls for merging traffic on to the N11 mainline, public transport priority and additional monitoring equipment.

Table 3.1 – Transport Requirements for Phase 1 of Fassaroe

Infrastructure or Service	Delivery Process	Work Commenced	Completed to a Standard to be Taken in Charge
Fassaroe Development Roads	Part of Planning Application	Prior to Occupation of any dwellings	Prior to Occupation of any dwellings
N11 Cycle and Pedestrian Bridge	Part of Planning Application	Prior to Occupation of any dwellings	Prior to Occupation of any dwellings
Traffic Management Measures at Fassaroe Interchange arising from the development	Wicklow County Council Traffic Management System Framework to be agreed with TII within 2 months of the agreement of the Bray Study .	Prior to Occupation of any dwellings	Prior to Occupation of any dwellings
New bus services in line with demand	Part of Planning Application with agreement of NTA	Phased introduction as dwellings are completed	n/a
Bus Priority on Upper Dargle Road including the approach to Sunnybank Junction	In conjunction with Phase 1(a) development	Prior to occupation of any dwellings	n/a – WCC Scheme
Bus priority on Dublin Road – Castle Street	Prior to occupation of 50% of Development	Prior to occupation of 100% of Development	n/a – WCC / NTA Scheme

In addition to above, it is recommended that any application for the development of the Fassaroe lands demonstrate the following:

- a) That the proposed development provides fully for walking and cycling trips to all local services within Fassaroe;
- b) That the applicant will provide a bus service to Bray DART station in advance of demand justifying public investment as part of the expansion of the bus network under BusConnects;
- c) That the applicant has fully assessed a requirement for a bus service to Bride’s Glen or Cherrywood Luas and provides same if demand is deemed sufficient in advance of demand justifying public investment as part of the expansion of the bus network under BusConnects;
- d) That the applicant demonstrates how demand for travel to schools from Fassaroe can be accommodated without undue recourse to the private car;

If the above elements are delivered and demonstrated, the development of Phase 1 of Fassaroe would be regarded by TII and the NTA as a development which:

- (i) Is sufficiently served by public transport, walking and cycling;
- (ii) Would not be excessively car-dependent;
- (iii) Would not adversely impact on the safe and efficient operation of the national road network;
- (iv) Would not adversely impact on the carrying capacity and strategic function of the national road network; and
- (v) Demonstrates close integration between transport planning and land use planning.

As such, the development of c.650 residential units and appropriate residential support facilities on the lands at Fassaroe on this basis could be considered to be consistent with the *Transport Strategy for the Greater Dublin Area* and DHPLG's *Spatial Planning and National Roads Guidelines for Planning Authorities*.

3.3 Further Phases of Fassaroe

Table 3.1 sets out an approach that would help to facilitate the immediate development of Fassaroe to provide for c.650 residential units. Further phases of the build out of these lands are recommended to be governed by a separate implementation and monitoring plan to be developed by Wicklow County Council with input from the NTA and TII. Whereby such a plan has been agreed with all agencies, the full build-out of Fassaroe could proceed on that basis.

3.4 Bray and Environs Development Phase A – 2019-2027

In Phase A, the agencies (NTA, TII, WCC, DLRCC), subject to the considerations set out in Chapter 2, would seek to deliver the following:

- Woodbrook DART Station and Park & Ride;
- Increased DART frequencies;
- Metrolink;
- Introduction of bus services linking Fassaroe to Woodbrook;
- Framework for interim Traffic Management System for the N11;
- N11 capacity and safety upgrades;
- Progression of N11/M11 Junction 4 to 14 Improvement Scheme
- Bray (Dublin Road) Core Bus Corridor incl. Castle Street Bridge and junction improvements;
- Bus Connects Network Review;
- Bus Service from Bride's Glen to Bray via Rathmichael and Old Connaught;
- Golf Club Development Roads including Dargle bridge for use by buses, pedestrians and cyclists;
- Busway from Fassaroe to Old Connaught over County Brook at Ballyman Glen;
- Development of new road link from Ferndale Road to Dublin Road;
- New road link from the M50 Cherrywood Interchange to Rathmichael;
- Upgrades to local roads serving Old Connaught to facilitate bus, pedestrian and cycle movements, as required by development;
- A Feasibility Assessment of the Bridge from Upper Dargle Road to Herbert Road; and
- Bus Priority on Killarney Road.

3.5 Bray and Environs Development Phase B – 2028-2035

In Phase B, the agencies, subject to the considerations set out in Chapter 2, would seek to deliver the following:

- Increased service frequency on bus services in line with demand;

- Luas to Bray;
- N11/M11 Junction 4 to 14 Improvement Scheme
- Demand Management on the M50 and M/N11;
- Bridge from Upper Dargle Road to Herbert Road; and
- Upgrades to local roads serving Rathmichael to facilitate bus, pedestrian and cycle movements, as required by development.

3.6 Current Public Transport Programme

As of 2018, the investment programme of the NTA includes the following elements of the preferred approach, as identified by this study:

- Increased DART Frequencies (implemented);
- Planning and Design for Metro;
- Bray Core Bus Network; and
- Bus Connects Network Review.

All of the other schemes and measures are recommended to be subject to the direct provision by developers; further investment programmes over the period of the Transport Strategy; further collection of development contributions; planning and design work; cost benefit analysis; environmental assessment; and the planning consent process where applicable. Potential for fast-tracking certain elements of the programme exists, as does the potential for some elements to be delivered at a later date.

3.7 Bray Municipal District Local Area Plan 2018

The Bray Municipal District Local Area Plan was adopted in May 2018. The following measures / objectives of the plan would facilitate and promote the implementation of all of the transportation interventions and actions recommended in this study which apply to the Bray Municipal District:

3.7.1 Public Transport

BUS: This study identifies the requirement to enhance and improve bus services from and into Bray town centre from all directions, but particularly along the Dublin-Bray Core Bus Corridor (Dublin Road – Castle Street), Killarney Road and Dargle Road, connecting to Bray Station, in order that high frequency services can be provided. Objectives PT1, PT2, PT3, PT7 and R07 would support and facilitate the delivery of the necessary public transport facilities and road and traffic management interventions, required to deliver these enhanced bus services. These include, but are not limited to the provision of bus lanes and the management of on-street parking. In this manner, the LAP would help to facilitate the implementation of the suggestions included in this study and the delivery of the NTA’s public transport programme.

RAIL / BRAY STATION INTERCHANGE: This study identifies the need to develop a high quality rail / Luas / bus interchange at Bray Station; objectives PT1, PT2, PT3, PT4, R05 and Zoning Objective GTH support and facilitate this objective.

LUAS: This study identifies the need to facilitate the extension of the Luas Green Line to Bray town centre via the golf club lands, including a new public transport bridge over the River Dargle. This is provided for in the LAP through objectives PT1, PT2, PT3, PT5 and ‘Specific Local Objective 3 – Bray Golf Course’

3.7.2 N/M11

This study identifies the need for N/M11 capacity and safety upgrades, and junction improvements from J4 to J14. It also identifies an interim requirement to manage traffic at the Fassaroe Interchange in order to protect the strategic function of the N/M11. The LAP supports and

facilitates said improvements through Objective R01 which provides for capacity and operational improvements, removal or reconfiguring of existing direct accesses and left on / left off junctions, upgrades to the regional / local road network to provide improved access between existing M11/N11 mainline junctions and regional / road network and through Objective R02.

3.7.3 Walking & Cycling

This study identifies the need for enhancement of walking and cycling infrastructure, and in particular connections to bus corridors and transport interchange points. Such improvements are supported in the LAP via Objectives CW1, CW2, CW3, CW4 and R09, R10.

3.7.4 Fassaroe

This study sets out the roads and transportation requirements to facilitate the development of Fassaroe, west of the N11; in particular the delivery of mass public transit to the area with connections to Bray town centre, Bray station, Old Connaught and Woodbrook DART. The LAP makes provision for all of the interventions required to deliver such a services, in particular through delivery of Objectives PT1, PT2, PT3, PT5, PT7, R01, R02, R04, R07, R10.

The development of Phase 1 (a) of Fassaroe is recommended to be undertaken in a manner consistent with section 3.2 of this study. Further development is recommended to be subject to the development of an implementation plan by WCC in collaboration with NTA and TII.

3.8 Recommendations for Dún Laoghaire-Rathdown County Council

For the same reason as provided in section 3.7, it is recommended that any statutory land use plan in Dún Laoghaire-Rathdown reflects the following objectives:

- To develop Woodbrook DART station and Park & Ride;
- To upgrade the road system in Rathmichael and Old Connaught in order to facilitate safe, convenient and reliable movement of public transport vehicles, cyclists and pedestrians including;
 - o Upgrade of Ferndale Road;
 - o Development of new road link from Ferndale Road to Dublin Road;
 - o Cherrywood to Rathmichael link road;
- To provide for a busway from Fassaroe to Old Connaught over County Brook at Ballyman Glen which facilitates walking and cycling;
- To support the delivery of a bus service from Sandyford to Bray DART station via Old Connaught and Rathmichael until such time as the Luas Green Line extension to Bray is suitably advanced;
- To facilitate the implementation of demand management measures on the N/M11 and M50;
- To facilitate the delivery of Metro to Sandyford and Luas to Bray; and
- To facilitate a new road link from the M50 Cherrywood Interchange to Rathmichael.

3.9 Next Steps

The NTA recommend that the statutory plans of Wicklow County Council and Dún Laoghaire-Rathdown County Council are amended, where necessary, in order to reflect this study fully. As an input into this process, the NTA will publish a budgetary programme of investment for the Bray and Environs area that includes transport projects, such as the *BusConnects* network review and bus infrastructure schemes, that are already established as public policy by other plans, programmes, and strategies.. It is recommended that similar programmes are set out by TII for the N/M11 upgrades and the local authorities for their schemes. In relation to the development of

further phases of Fassaroe, it is recommended that Wicklow County Council produce an implementation and phasing plan with inputs from TII and NTA.

Appendices

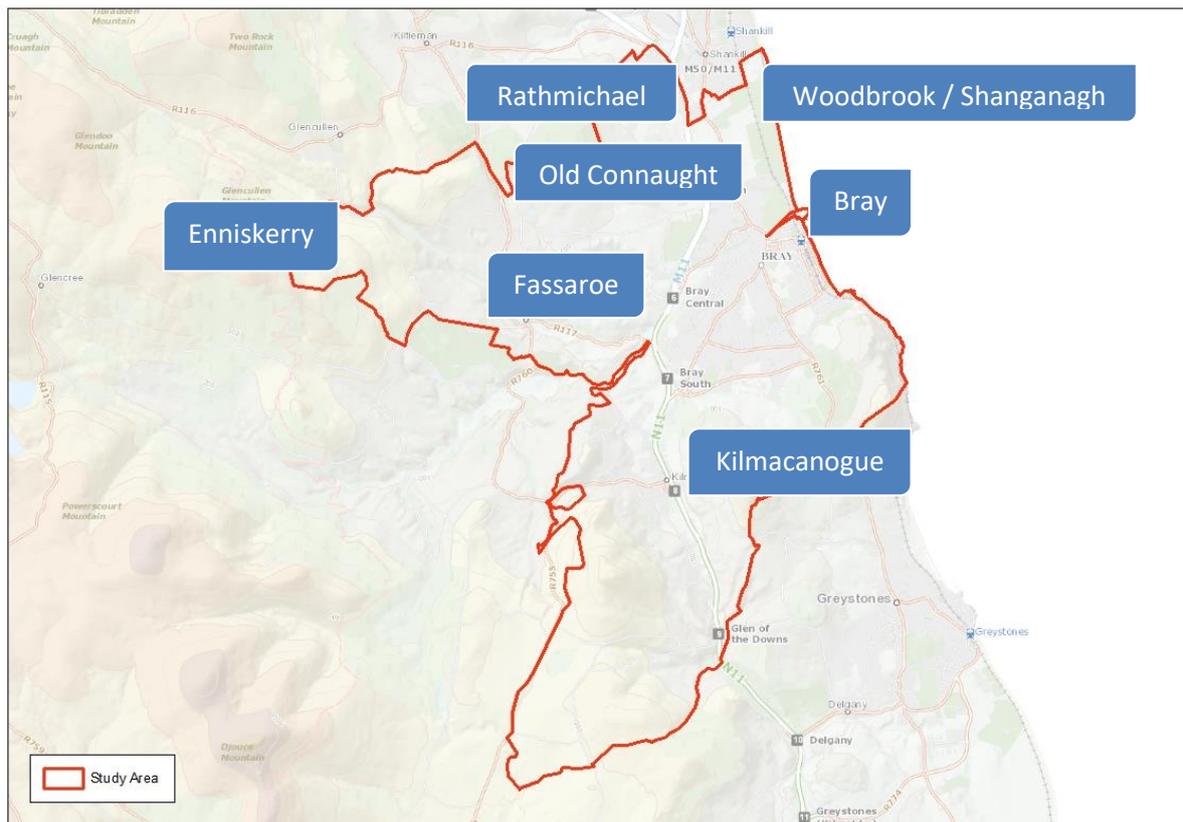
Study Development

A. Baseline

(i) Study Area

The Study Area covers an area of c. 5,409 hectares straddling the Wicklow and Dublin border. It includes the development areas of Woodbrook / Shanganagh, Old Connaught and Rathmichael in Dún Laoghaire-Rathdown, and Fassaroe in Wicklow. It also includes the entire settlements of Bray, Enniskerry and Kilmacanogue. In the case of the latter, their large rural hinterlands are also included in the area calculation. The major transport features of the study area are the N/M11 national road and the East Coast Rail line. The former acts as the current western boundary to the built-up area, with the latter defining the eastern coastal boundary. A number of regional roads make up the distributor road network within Bray, with the rest of the area defined by regional, local and rural roads. The study area is shown in Figure A1 below:

Figure A1: Study Area



(ii) Existing Public Transport

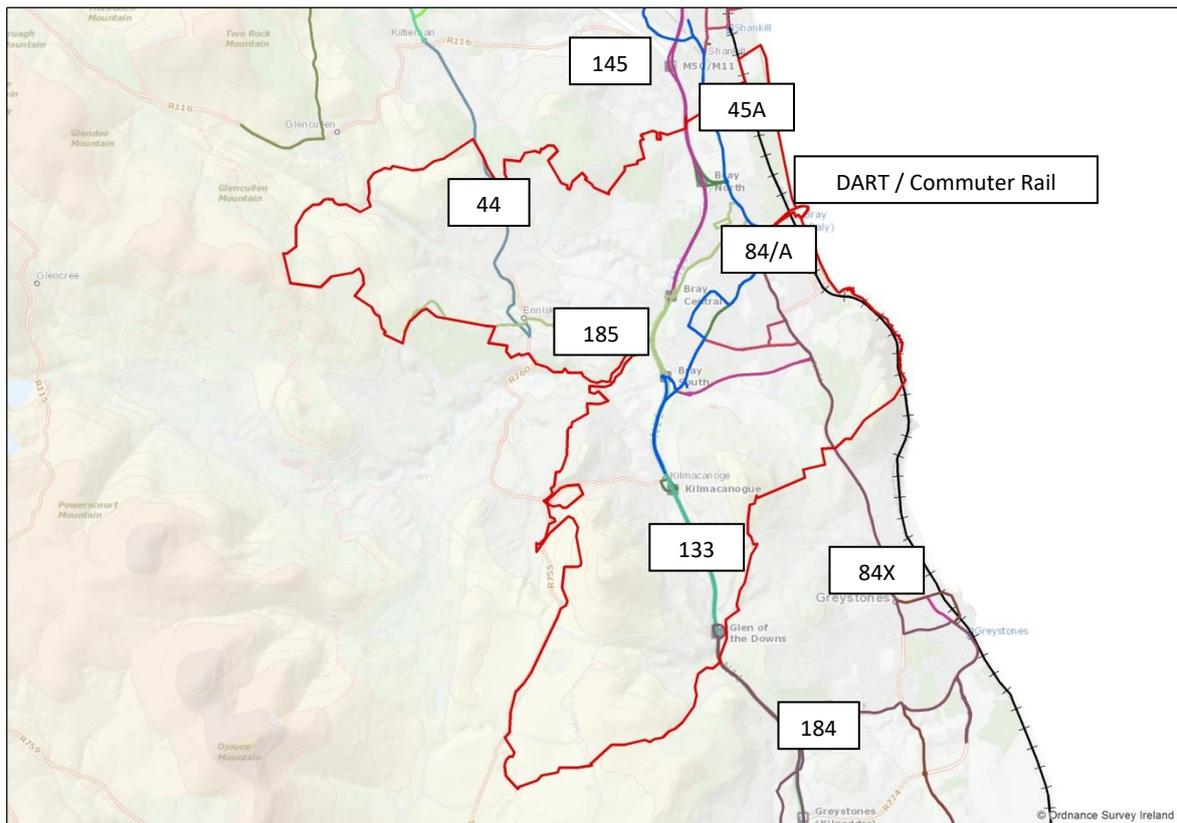
Existing Public Transport Network and Services

The eastern flank of the study area is well served by public transport. Bray Station is served by DART and Commuter rail with 17 peak period services daily towards the City Centre, including DART services to Malahide / Howth.

The Dublin Road / N11 corridor is a key bus route. It is served by the 145, 84/A and 45A services. The 84X uses the M11 to reach Greystones without serving Bray. The 185 links Enniskerry to Bray Station and the 184 links Newtownmountkennedy. Enniskerry is linked to the City Centre by the 44. Of these, only the 145 is a high frequency service linking the study area to Dublin City Centre.

Bus Éireann route 133 links Wicklow to Dublin Airport via the M/N11, with off-peak services running via Bray Main Street.

Figure A2: Existing Public Transport Network and Services



(iii) Existing Road Network

The study area is defined by the N/M11 national road which runs through its centre in a north-south direction. This route links Dublin to Wexford via Wicklow and acts as the spine for the south-east of Ireland.

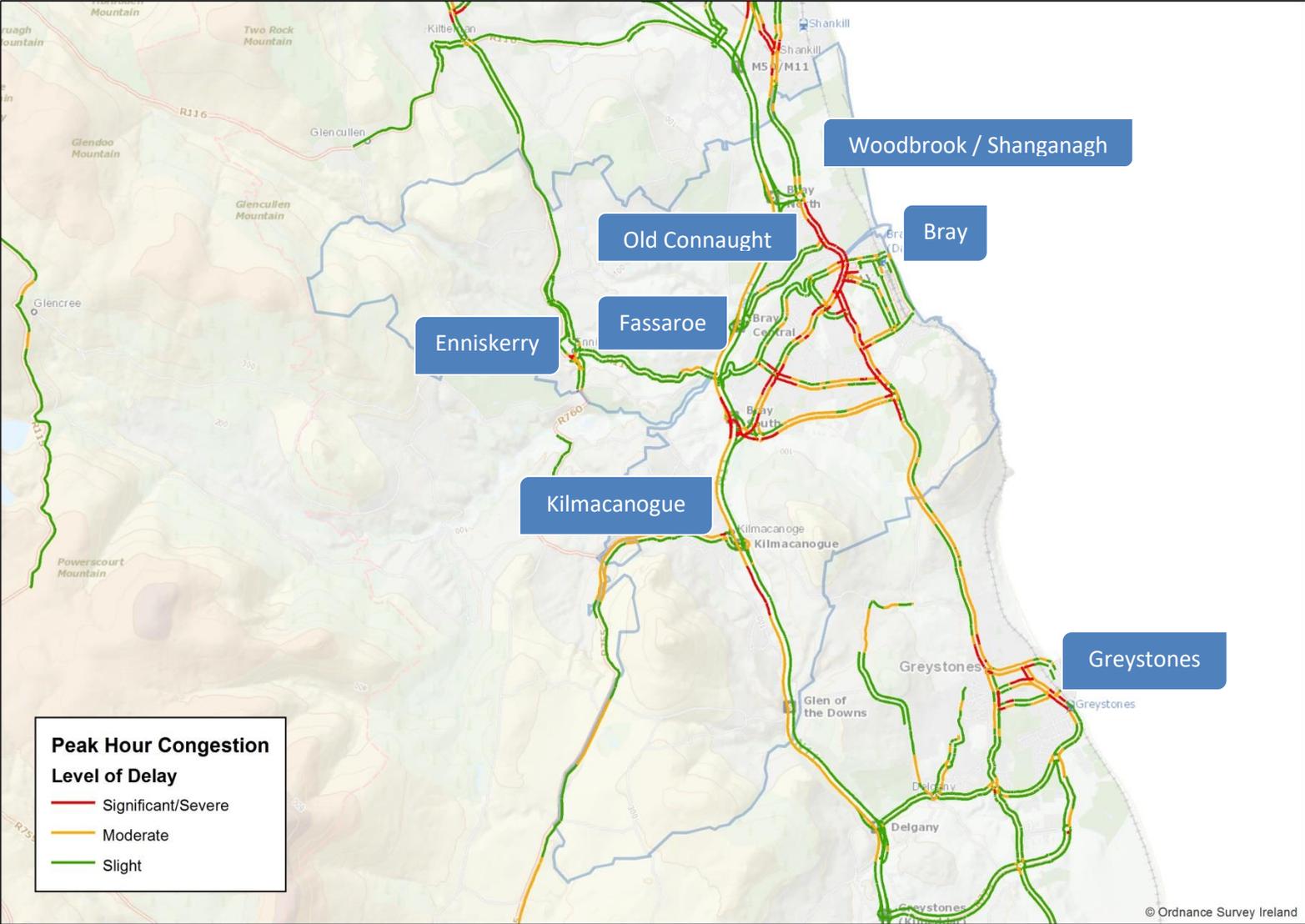
Bray is defined by a number of regional routes which form a triangle with the town hall at its northern apex. These are the Southern Cross R768, Vevay Road R761 and the Killarney Road R767. From the town hall northward the R761 Dublin Road connects the town to Shankill and Dublin via the R119 and N11.

In the western side of the study area, the road network is primarily rural in nature, but can be defined loosely by the north-south R760 Enniskerry Road and in terms of a number of east-west routes as follows. To the north, the Old Connaught Avenue – Ballyman Road comprises a spine upon which the development area of Old Connaught hangs. The Upper Dargle Road – Fassaroe link via what is currently Berryfield Lane provides the connection between Bray and the Fassaroe Masterplan lands. Through the centre of the Study Area, the R117 links the N11 and Bray to Enniskerry, while the R755 which links Kilmacanogue with Roundwood defines the southern portion of the Study Area.

(iv) Existing Road Network Operation

The following image shows the level of peak hour congestion on a typical morning in the study area, based on traffic speeds experienced in the AM peak hour relative to that experienced at night time. This data has been extracted from Tom-Tom sat-nav outputs. It shows that Bray experiences moderate to severe congestion on several links, most notably Dublin Road and the southern M11 junction.

Figure A3: Existing levels of Congestion



(v) Land Use and Transport Planning Context

Land Use Planning

Land use planning policy in the Study Area is determined by the following documents:

- Project 2040 National Planning Framework ;
- Draft Regional Spatial and Economic Strategy for the Eastern and Midland Region;
- Dún Laoghaire-Rathdown Development Plan 2016-2022;
- Wicklow County Development Plan 2016-2022;
- Bray Municipal District Local Area Plan (2018-2024); and
- Woodbrook / Shanganagh Local Area Plan 2017-2023

Together these plans envisage significant growth in the Study Area. Between the Old Connaught and Fassaroe development areas, an additional population of c.16,000 is catered for either by land use zonings or by stated long-term aims of the local authorities, with the latter also potentially yielding 3,000 jobs according to the Draft Bray Municipal District Local Area Plan. The lands of the former Bray Golf Club, close to the town centre, comprise another key residential and commercial development site, while Woodbrook / Shanganagh and Rathmichael could cater for a combined population of c.11,000 by 2035.

Transport Planning

Apart from the land use planning documents highlighted above transport planning in the Study Area is informed by the following:

Government of Ireland, Project 2040 National Development Plan (NDP) 2018

The purpose of the National Development Plan is to set out the new configuration for public capital investment over ten years to secure the realisation of each of the National Planning Framework (NPF) National Strategic Outcomes (NSOs). The NDP includes major transportation projects to enable NSO's including BusConnects, Metrolink, Luas extension to Bray, and the progression through pre-appraisal and early planning of a national roads scheme for M11 from Junction 4 to Kilmacanogue – Junction 14.

NTA Transport Strategy for the Greater Dublin Area 2016-2035

The Transport Strategy for the Greater Dublin Area 2016 – 2035 (the “Strategy”) sets out the strategic infrastructure and services proposed to be delivered over the next 20 years. The following outlines some of the transport proposals included in the Strategy, some of which have since been developed further and which will affect the study area:

- Heavy Rail:
 - DART expansion programme; and
 - Higher frequency services.
- Light Rail:
 - Metro South; and
 - Luas to Bray.
- Bus:
 - Core Radial Network from Bray to UCD.

- Cycling:
 - Greater Dublin Area Cycle Network.
- Walking:
 - Improvements to provide safer, more comfortable and convenient.
- Road:
 - National Road Scheme Improvements; and
 - Regional and Local Road Improvements, including roads to cater for local traffic.
- Demand Management; and
- Park and Ride at Woodbrook.

NTA BusConnects

The most significant progress which has been made since the Transport Strategy's approval, and which is of direct relevance to the Study Area, has been the launch and development of the *BusConnects* programme. This programme has several strands, but the most significant two in terms of this study are as follows:

- Core Bus Network – the NTA is preparing preliminary designs for a number of Core Bus Corridors (CBC) with a view to seeking full bus priority in both directions. The Bray CBC runs from Castle Street to Dublin City Centre. Greater clarity on this element of *BusConnects* will emerge through 2018; and
- Dublin Metropolitan Bus Network Review – the NTA is currently undertaking a major and fundamental review of the Dublin Public Service Obligation (PSO) network with a view to making it more efficient and in order to increase patronage. This will have an impact on the services in the Bray environs, and will be rolled out from 2019. It should be noted that the network which emerges from this exercise will not constrain this study's proposals for 2027 or 2035, as the travel demand environment will have changed significantly by these study's horizon years.

Transport Infrastructure Ireland – M11 / N11 Corridor Study Needs Assessment Report

This non statutory TII study was published in November 2016. The function of this study was to outline possible measures which could address the needs recognised by TII and the NTA associated with the M11/N11 road corridor; and present a potential overall strategy in terms of delivery and implementation; while aligning with the objectives set out in DTTa's Strategic Investment Framework for Land Transport (SIFLT) .

The document sought to set out a number of national roads proposals but also considered the needs of the regional and local road network and public transport to address both the existing transport issues on the N/M11 corridor, and those which are forecast to emerge up to 2030 and 2050. While the study indicated a significant investment in roads within the study area, this study also sought to exploit this investment for use by public transport to the maximum extent possible, both by using the additional capacity but also by prioritising public transport where capacity emerges elsewhere on the network as a result of this investment.

Department of Environment Heritage and Local Government Spatial Planning and National Roads Guidelines for Planning Authorities

In relation to development planning and national roads, the above Section 28 guidelines contain the following key messages of relevance to this study:

- Development plans must include measurable objectives for securing more compact development that reduces overall demand for transport and encourages modal shift towards sustainable travel modes;
- Development plans must include policies which seek to maintain and protect the safety, capacity and efficiency of national roads and associated junctions, avoiding the creation of new accesses and the intensification of existing accesses to national roads where a speed limit greater than 50 kph applies;
- Planning authorities and the NRA must work together during the early stages of plan preparation to identify any areas where a less restrictive approach may apply;
- Development plans must include clear policies and objectives with regard to planning and reservation of new routes and/or upgrades; and
- Planning authorities should consult at a very early stage with transport infrastructure providers (including TII) and, in the Greater Dublin area, with the National Transport Authority.

B. Travel Demand

This chapter sets out the travel demand for the Study Area that will be used for deriving a preferred approach for the study. This process is an interim high-level step in advance of the use of the full ERM to determine the full demand level, trip distribution and mode share. It takes into account the GDA Transport Strategy travel demand levels, revised development proposals, and AM peak hour demand only. It is based on a number of broad assumptions related to future mode splits, which are detailed in section 3.2.3.

(vi) Establishing Demand

The assignment model demand matrices from a previous 2035 Do Strategy ERM run were used as the basis upon which the demand analysis was undertaken. The demand for the Study Area in the previous 2035 Do Strategy ERM run includes previously assumed development for the Study Area. The demand associated with the Study Area has been factored and adjusted to take into account revisions to the land-use scenario, based on more precise planning data which has emerged since the making of the Strategy. These revisions were undertaken with the agreement of Wicklow County Council and Dún Laoghaire-Rathdown County Council.

(vii) Developing Demand Expansion Factors

In order to factor the demand matrices to align with the more precise land use proposals, a comparison was undertaken to determine the land use changes and their implications for the AM Peak period trip ends. Table B1 outlines a comparison of the population, job numbers and education places for the Study Area for the previous 2035 Do Strategy and the revised Land Use scenarios. The table also includes a comparison of the total production and attraction trips ends for each land use scenario.

It can be seen that for the Study Area the revised land use scenario results in a significant uplift to the trip ends. The trip end production and attraction percentage increases were applied to the origins and destinations for the trip matrices for the AM peak hour for the Study Area.

This uplift is primarily due to significant additional growth being forecast in the Dún Laoghaire-Rathdown sectors of the study area. Between Old Connaught, Rathmichael and Woodbrook, the 2035 population forecast is now approximately 20,000. The original Strategy forecasts equated to approximately half that number.

Table B1: Comparison of Land-Use Scenarios and Trip Ends

	Study Area 2035 Do Strategy	Study Area 2035 Revised
Population	59,999	69,972
Jobs	14,223	20,615
Education	12,024	13,845
TE Production	38,589	46,180
TE Attraction	34,872	36,713

(viii) Demand Analysis

Sectors

In order to analyse the demand for travel to and from the Study Area, sectors external to the study area have been identified. In this manner, we can determine the demand for travel to and from Dublin City Centre, other sectors within the region, and detailed sub-sectors which we would anticipate to have a close relationship with the study area. Figure B1 and B2 outline the sectors and those sub-sectors closer to the study area.

Figure B1: Greater Dublin Area Sectors

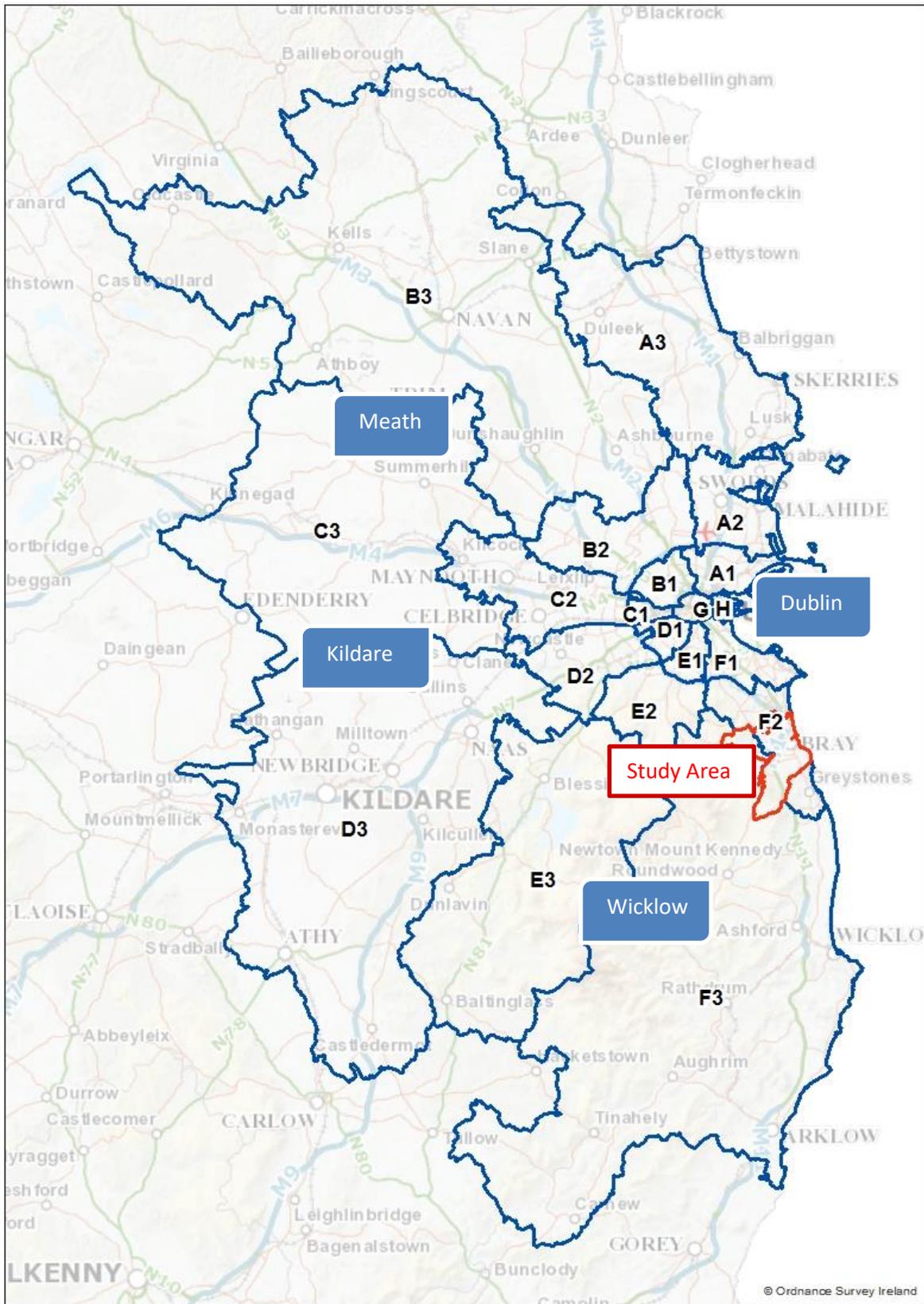
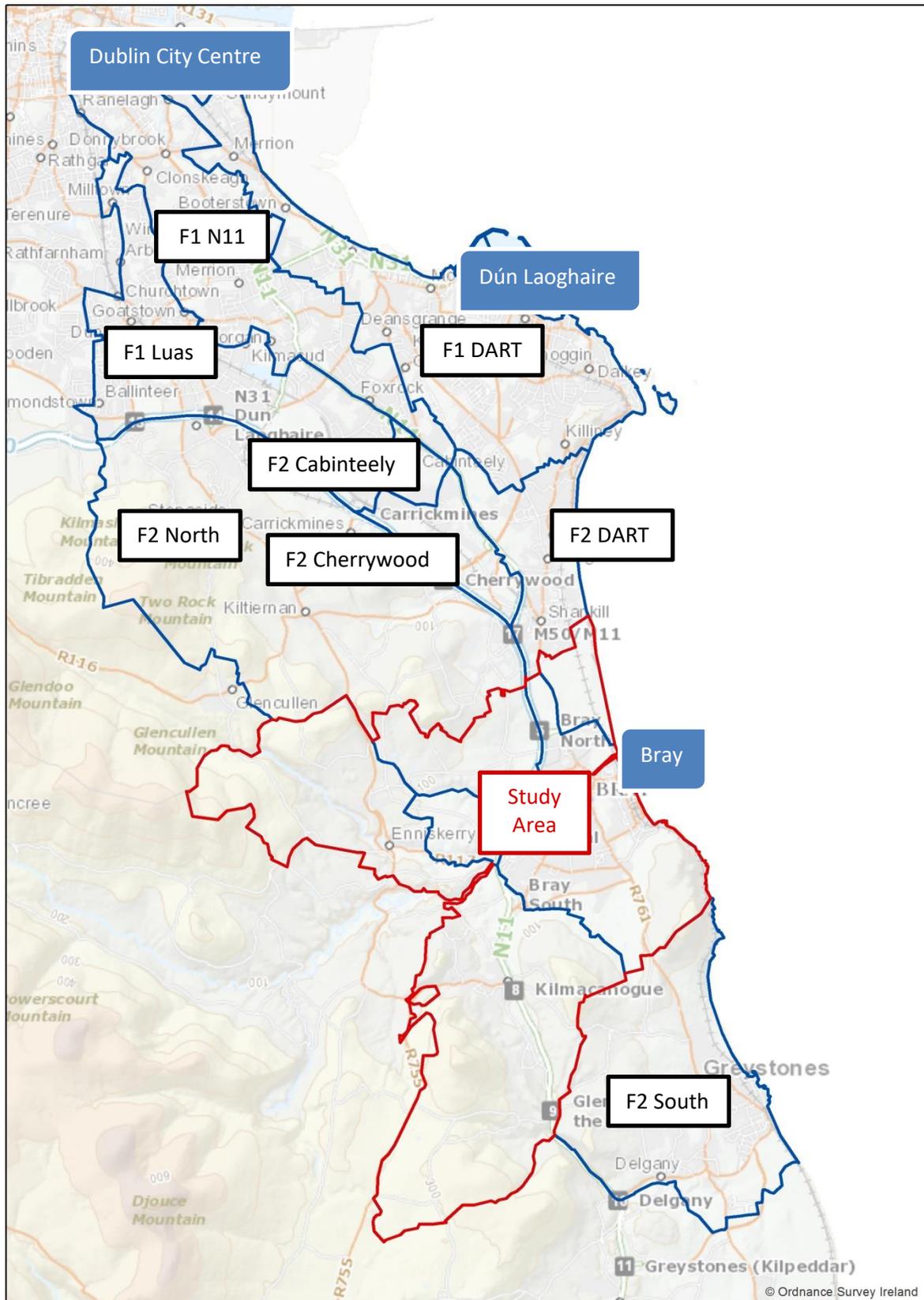


Figure B2: Sub-Sectors



AM Peak Hour Demand Sector Distribution

Table B2 outlines the person trip totals to and from the Study Area as distributed based on the origin or destination sectors. The distribution of these trips to and from the sectors through the GDA is set out, as is the percentage of the total demand associated with trips to or from the sectors.

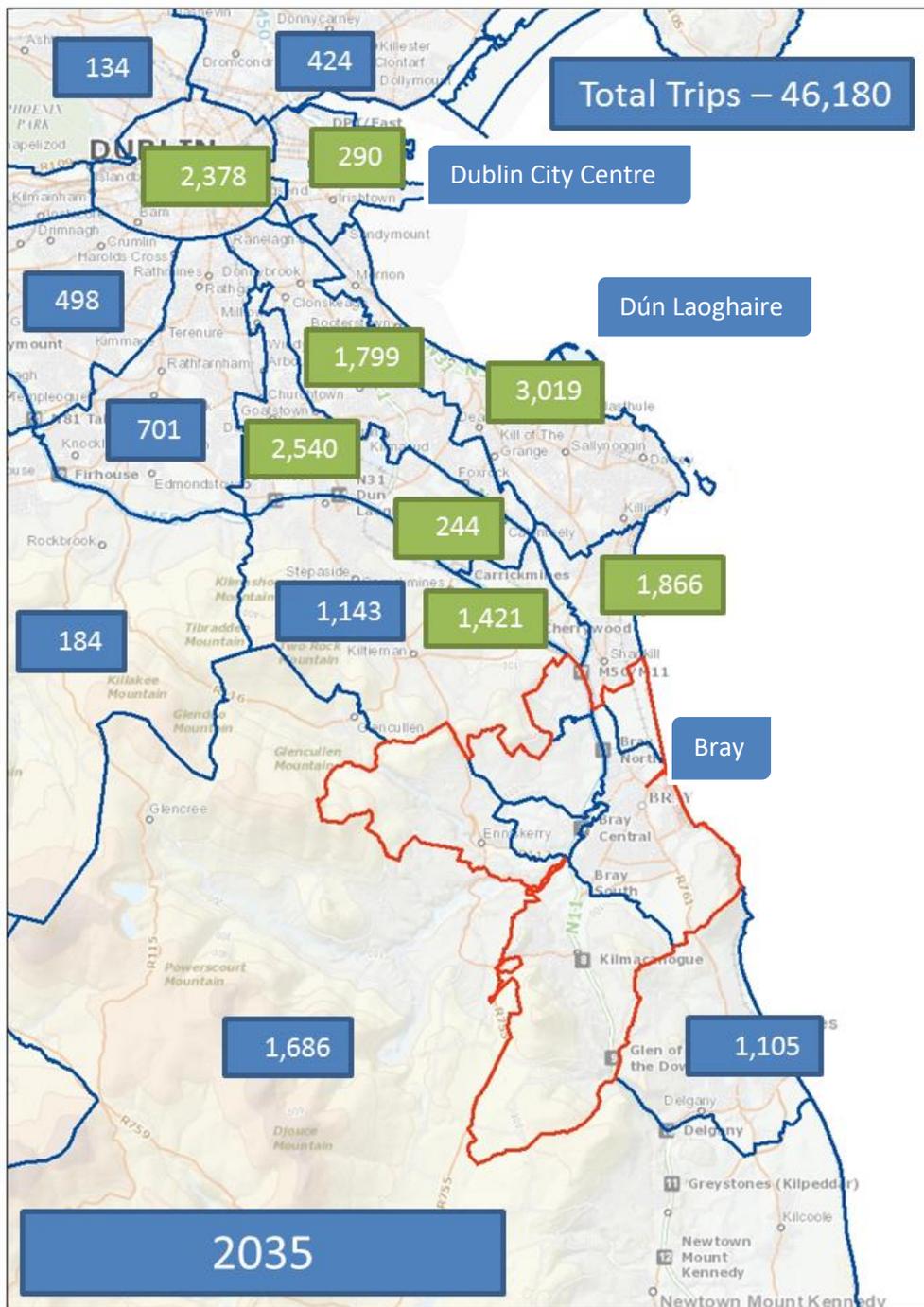
Table B2: AM Peak Hour Person Trips Demand Distribution

Sector	Trips From Study Area	Percentage From Study Area	Trips To Study Area	Percentage To Study Area
A1	424	1%	132	0%
A2	276	1%	79	0%
A3	9	0%	21	0%
B1	134	0%	60	0%
B2	84	0%	64	0%
B3	8	0%	16	0%
C1	152	0%	36	0%
C2	128	0%	85	0%
C3	1	0%	7	0%
D1	498	1%	110	0%
D2	372	1%	149	0%
D3	7	0%	39	0%
E1	701	2%	326	1%
E2	184	0%	174	0%
E3	8	0%	62	0%
F1	7357	16%	2,021	6%
F2	31,473	68%	28,782	78%
F3	1,686	4%	4,053	11%
G	2,378	5%	196	1%
H	290	1%	50	0%
External	8	0%	252	1%
Total	46,180	100%	36,713	100%

Figure B3 shows a more detailed breakdown of the above data for trips FROM the Study Area to Dublin City Centre and to the subsectors of sectors F1 and F2, as identified in Figure 3.2. These trips are shown in the green boxes. This trip pattern was chosen as it equates to the highest level of demand, and therefore any public transport solution derived to serve trips originating in the Study Area could be therefore assumed to serve trips with their destinations in the Study Area.

This analysis is aimed at devising public transport options for serving the demand from the Study Area.

Figure B3: 2035 Am Peak Hour Demand to Subsectors



Mode Split Assumptions

The sections below illustrate how the above demand relates to the main corridors to the north of the study area, i.e. Luas, N11 and DART, and its transport implications. The methodology for deriving these figures is based on the following assumptions:

- That all growth in demand from 2011 to 2035 is catered for by public transport; and
- An assumed mode split between each public transport option which reflects the geographic relationships between each subsector and public transport options.

The tables below and Figure B4 show how these assumptions were applied:

Table B3: Assumed Mode Split between Public Transport Modes – 2035

Trip Pattern by Mode Split - 2035	Assumed PT Split		
	Bus	Luas	DART
Study Area to Subsector / Mode Split			
G City Centre	25%	38%	38%
H Docklands	38%	0%	63%
F1 Luas	0%	100%	0%
F2 Cabinteely	50%	50%	0%
F2 Cherrywood	43%	57%	0%
F1 N11	100%	0%	0%
F1 DART	0%	0%	100%
F2 DART	14%	0%	86%

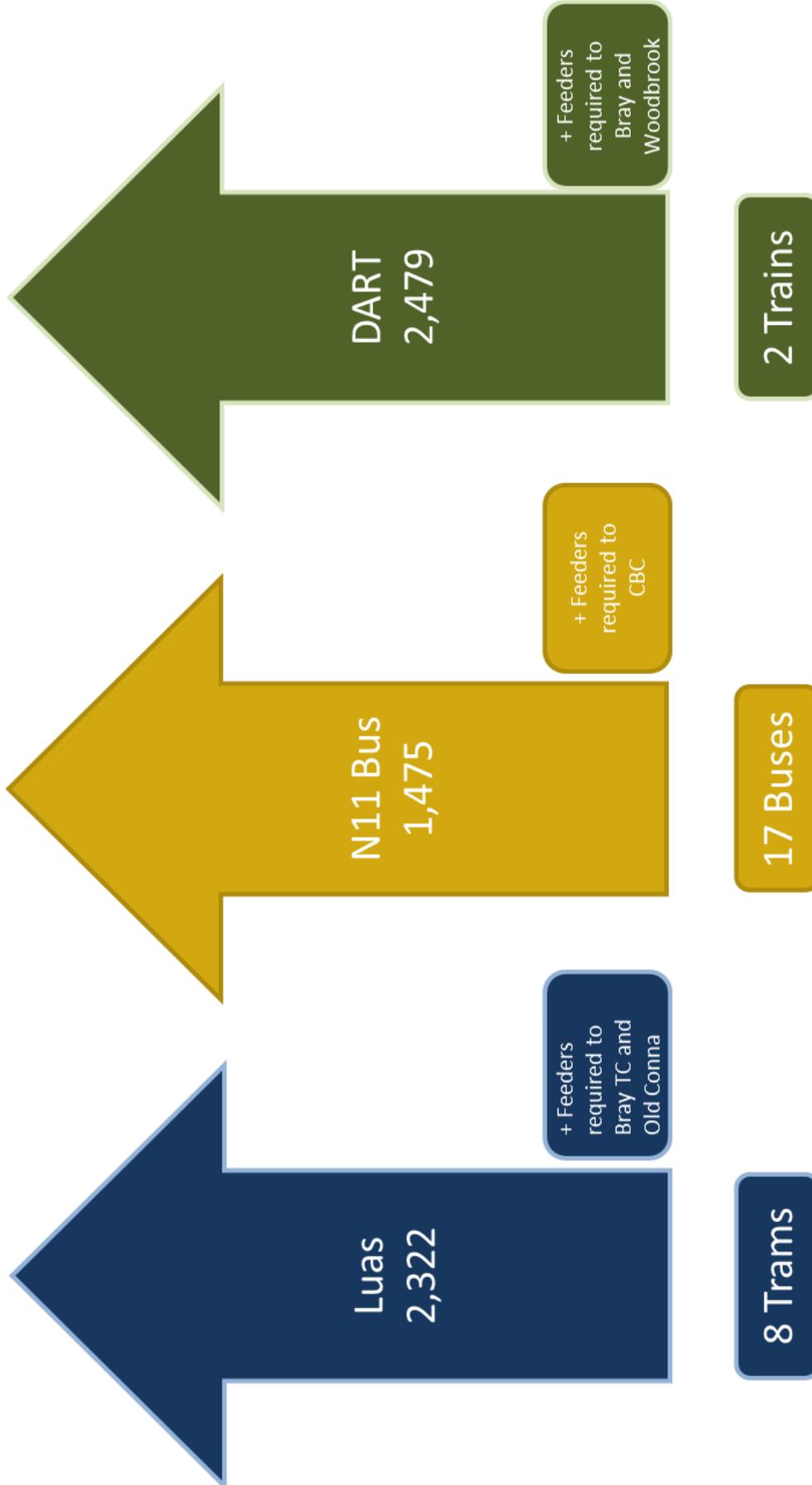
Table B4: Additional Demand by Mode

Study Area to Subsector	2011	2035	Growth	Bus	Luas	DART
G City Centre	1163	2338	1175	294	441	441
H Docklands	137	283	146	55	0	91
F1 Luas	1189	2415	1226	0	1226	0
F2 Cabinteely	144	235	91	45	45	0
F2 Cherrywood	307	1375	1068	458	610	0
F1 N11	1244	1721	477	477	0	0
F1 DART	1838	2911	1073	0	0	1073
F2 DART	787	1808	1021	146	0	875
TOTAL	6809	13085	6276	1475	2322	2479

These figures, when added to the 2011 demand, lead to an assumed 2035 car mode share of 52% from the Study Area to these selected locations and a public transport mode share of 48%. The mode split for car for work trips – which make up the majority of AM Peak external trips – from Bray in 2011 was 61%. As such, the mode split figures emerging from this analysis are deemed reasonable in the context of the delivery of significantly enhanced alternatives to the private car for travel in 2035.

This approach can then be applied to essentially set out a framework methodology for examining public transport options. This is set out in Figure 3.4, which shows the number of trams required in the AM peak hour to serve the additional demand to the Luas corridor; the number of buses required to serve additional demand to the N11; and the number of trains required for the DART corridor. Critically, the need to connect the Luas, Core Bus Corridor and DART stations to the residential areas of the Study Area by means of feeder buses, must also be considered.

Figure B4: Demand to the Subsectors north of Study Area and Transport Implications



Distribution within the Study Area

In order to get a more detailed picture of travel demand within the study area, 2035 demand was examined further. This included the isolation of the demand crossing the Bray Western Screen, i.e. all demand travelling from Old Connaught, Enniskerry and Fassaroe into Bray. This Western Screen represents the relationship between Old Connaught and Fassaroe, and Bray. The latter is the key service centre for the former two major development areas and Enniskerry, with potential transport interchange for onward travel also a consideration. The quantum of trips travelling from Bray to Fassaroe and Old Connaught also emerges as a key consideration, as do the trips internal within Bray, Old Connaught and Fassaroe. Travel from Woodbrook to Bray as well as internal trips within Woodbrook also emerges as a factor for consideration.

Table B5: 2035 AM Peak Hour Demand within the Study Area

Study Area	Bray	Enniskerry	Fassaroe	Kilmac	Old Connaught	R'michael	Woodbrook
Bray	12,938	151	870	282	635	50	165
Enniskerry	209	198	35	13	245	3	6
Fassaroe	1,728	65	1,780	83	498	8	23
Kilmacanogue	492	14	55	122	74	2	5
Old Connaught	1,167	254	358	57	1,978	42	37
Rathmichael	351	17	33	10	146	27	18
Woodbrook	661	11	36	11	48	7	550

C. Public Transport Option Development

(ix) Overview

With the high-level demand analysis of Chapter 3 in mind, this chapter outlines the public transport options for the Study Area. For the purposes of this report, it is assumed that all pedestrian and cyclist movement will be catered for on the road network and that measures to address issues on the N/M11 in line with the recommendations of TII will be developed in the long-term. It should be borne in mind that due to the physical constraints of the study area, and the operational constraints of the 2035 transport network in terms of serving the requirements of the entire Metropolitan Area, the range of options available which are both feasible and which meet the additional demand, are extremely limited.

Options

The following lists the public transport options that could be considered to meet the additional target demand for the Study Area:

Option 1 - Light Rail

- a. Luas spur to Fassaroe as per previous Line B2 proposal;
or Luas Alternative Routeing via Ferndale Road
- b. Feeder Bus from Fassaroe to Bray DART; and
- c. Feeder Bus from Bride's Glen to Bray DART via Rathmichael (subject to Luas routeing).

Option 2 - DART

- a. Enhanced DART services to Bray;
- b. New Station and Park and Ride at Woodbrook;
- c. Feeder Bus from Bride's Glen to Woodbrook DART via Rathmichael;
- d. Feeder Bus from Fassaroe to Woodbrook DART via Old Connaught; and
- e. Feeder Bus from Fassaroe to Bray DART.

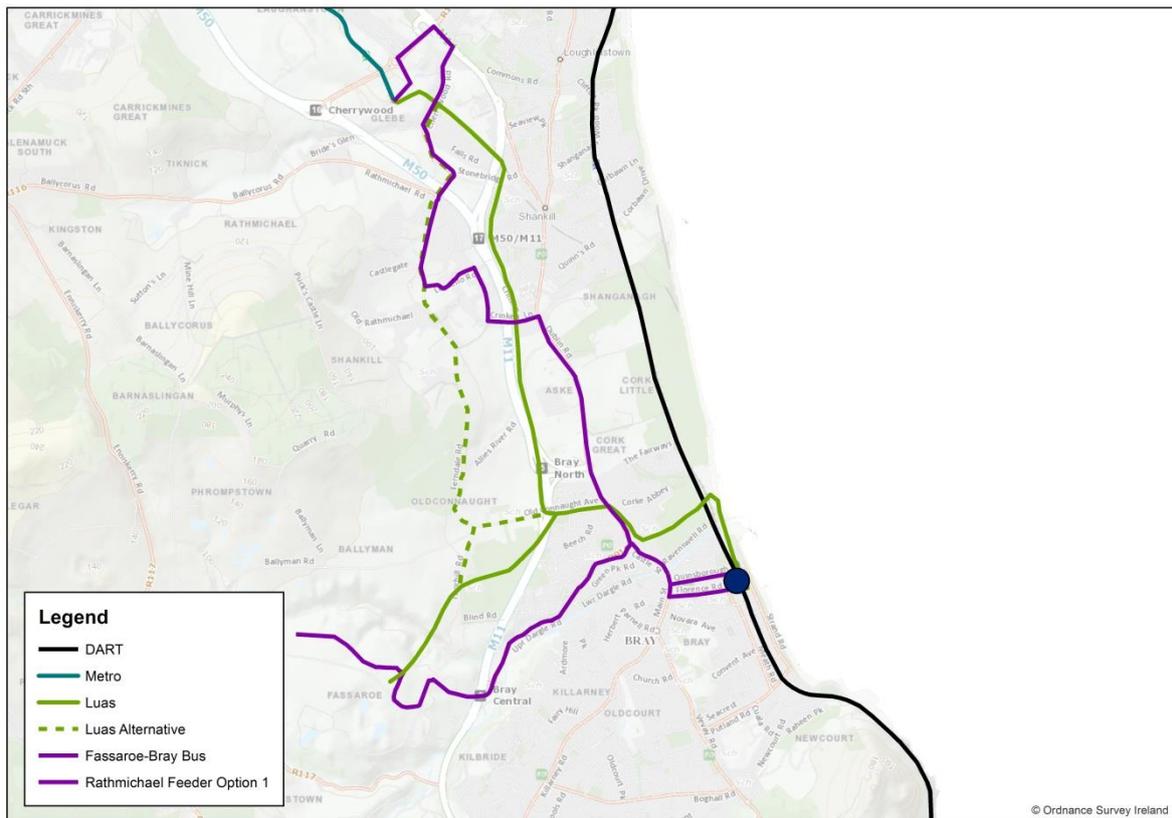
Option 3 - Bus

- a. Core Bus Corridor from Bray DART Station to City Centre;
- b. High-Frequency Bus Services from Fassaroe to Bray DART; and
- c. High-Frequency Bus Services from Fassaroe to Bride's Glen via Old Connaught and Rathmichael

(x) Option 1: Light Rail

Option 1 is based on the extension of the Luas Green Line to Bray and Fassaroe via Old Connaught along the B2 alignment, supplemented by a bus service from Fassaroe to Bray and from Bride’s Glen to Bray to link the Rathmichael development area to Metro and DART. An alternative Luas alignment could run through Rathmichael via Ferndale Road. As such, it includes the development of bus priority along Upper Dargle Road. Luas would run at 10 minute frequencies during the peak hour from both Bray and Fassaroe, combining to give a 5 minute frequency to Bride’s Glen Metro, where interchange with the higher capacity service would happen. Fassaroe and Bride’s Glen / Rathmichael would be linked to Bray via a 10-minute frequency bus service.

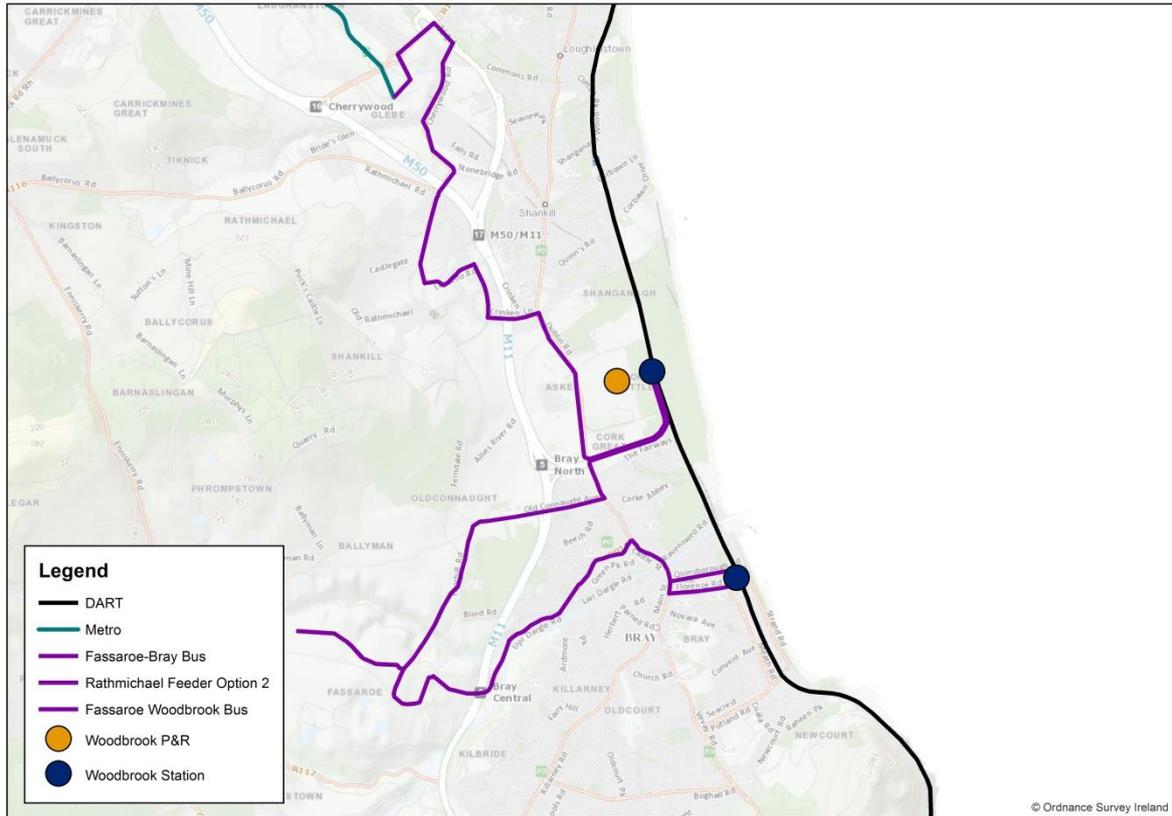
Figure C1: Option 1 – Light Rail



(xi) Option 2: DART

Option 2 is based on the enhancement of the existing DART services to Bray and the development of a new DART station and Park and Ride at Woodbrook station. Fassaroe would be served by bus, with one service linking to Woodbrook via Old Connaught on a new Busway incorporating a bridge over the County Brook, and another to Bray. Rathmichael would be linked to both Bride's Glen Metro and Bray DART via a feeder bus. DART frequencies would be increased to 5-minutes during the peak hour. Feeder buses would also operate at 5 minute frequency.

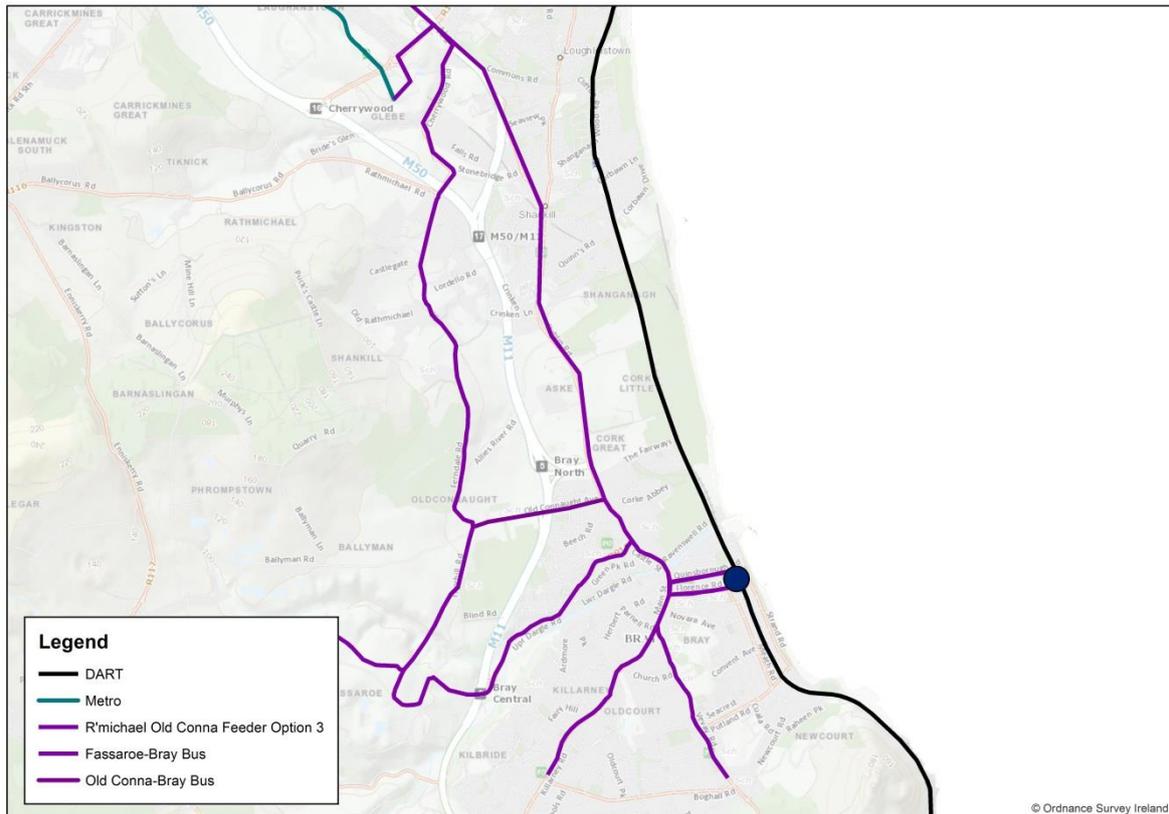
Figure C2: Option 2 – DART



(xii) Option 3: Bus

Option 3 is based on the provision of new bus services connecting to the City Centre and to DART and Luas, with demand from Fassaroe, Rathmichael and Old Connaught to be met by interchange with the rail system. A bus would depart from Fassaroe and Old Connaught to Bray every 5 minutes. Rathmichael would be served by a feeder bus from Bride’s Glen Metro to Bray DART every 5 minutes, also interchanging with the Bray CBC on the N11 and Dublin Road. The Bray CBC would operate at 5-minute frequencies in the peak hour and would be supplemented by 2 feeder services at similar frequencies from south Bray.

Figure C3: Option 3 – Bus



(xiii) Assessment

It is not the intention to rule out any of the above options or services entirely. Instead this section will highlight and explain the main considerations which apply in each case, providing some direction as to why this study arrived at a preferred approach.

Option 1 – Light Rail – the extension of Luas to Bray, either via Rathmichael or via the B2 alignment would be a relatively expensive scheme. The development of a spur line to Fassaroe would also be expensive and would compromise the service quality and levels to Bray. The Luas B2 alignment would also leave a significant section of Old Connaught / Rathmichael without services. The reliance of this option on interchange for travel by high-quality public transport – by excluding a Core Bus Corridor – would also be considered a drawback.

Option 2 – DART – this option also leaves a considerable section of Old Connaught / Rathmichael without services. It also means all of the development areas to the west of the N/M11 would require interchange with Metro or DART to access all locations outside the study area. There is also a risk that the capacity of DART and Metro services will be would up by demand from Bray

and environs. The reliance of this option on interchange for travel by high-quality public transport – by excluding a Core Bus Corridor – would also be considered a drawback.

Option 3 – Bus – these measures, while combining to provide a spatially comprehensive network, would be susceptible to risks related to reliability and capacity. In terms of reliability, the confluence of a number of high-frequency services in the constrained network between Bray Main Street and DART station may cause delays to services. Additionally, the need for passengers from South Bray to interchange in Bray centre to get to Dublin City Centre is a weakness. The main advantage of Option 3 is its comprehensive nature in that all locations are covered.

(xiv) Outcome

From the above considerations, the following principles emerge for this Study:

1. The need for full coverage; and
2. The requirement to protect capacity on DART and Metro;

It is also reasonable to assume certain elements of the above options will be developed even in the absence of this study, as they form part of the Transport Strategy or have emerged during its detailed implementation throughout 2016 and 2017, namely:

1. A Luas line to the Bray Environs;
2. Woodbrook DART Station and Park & Ride; and
3. An enhanced bus network as part of *BusConnects*.

As such, the preferred approach for the development of Bray identified by this Study takes a number of elements from each of the three options; applies the principles above; and assumes the development and roll-out of the strategy measures. The preferred approach is set out at the beginning of this report.

D. Transport Modelling Assessment

(xv) Overview

This chapter outlines the transport modelling assessment undertaken using the NTA Eastern Regional Model (ERM). The transport model is a variable demand model that has destination choice and mode choice operations, as well as detailed road and public transport network assignment elements. This allows for detailed forecasting of travel patterns, travel modes, public transport network analysis and road network analysis. For this study, **the AM Peak Hour from 8am to 9am** was used as the basis for the analysis, as this period relates to the highest demand for travel and proposals to meet this level of demand are deemed to be generally robust for the other periods.

There are a number of caveats that apply to the modelling of areas such as Bray and Environs. The most important relates to the manner in which the model is configured. Large greenfield development areas such as Fassaroe, Old Connaught and Rathmichael have little road network detail in the model. They also comprise large zones – this also has an impact on the level of refinement of the output which emerges. While the NTA is satisfied that the output below represents a rational basis from which all agencies involved can inform their land use and transport planning objectives and priorities for Bray and Environs, more detailed assessment would be required at the site and masterplan level in order to derive more detailed proposals.

(xvi) Modelling Methodology

Modelled Scenarios

The transport modelling assessment involved undertaking four runs of the ERM, as follows:

- Do Strategy 2027;
- Do Strategy plus Bray Environs 2027;
- Do Strategy 2035; and
- Do Strategy plus Bray Environs Proposals 2035;

Do Strategy 2027

The “Do Strategy 2027” scenario is a mid-point run derived in order to assess the impacts of those proposals which are to be delivered in the medium term of the GDA Transport Strategy’s implementation. For the purposes of this study, they are as follows:

- Metro North;
- Bray Core Bus Corridor; and
- Bus Connects Network proposals

Do Strategy 2027 plus Bray Environs

The “Do Strategy 2027 plus Bray Environs” run incorporates the above, but also includes the following:

- Feeder Bus Services from Bray South and Fassaroe;
- Woodbrook DART Station and Park & Ride;
- Capacity & Safety Upgrades as per TII Study;
- Cycle & Pedestrian Bridge over the N11 from Fassaroe; and
- Local Traffic Management and Roads Measures

Do Strategy 2035

The “Do Strategy 2035” Scenario represents the full implementation of all of the transport proposals identified in the Transport Strategy for the Greater Dublin Area 2016 – 2035. The following lists the Do Strategy infrastructure proposals:

- Core Bus Network;
- Swords/Airport-City Centre, Blanchardstown-UCD and Clongriffin-Tallaght Swiftway BRT lines;
- DART Expansion Programme;
- New Metro North and Metro South;
- Luas to Finglas, Lucan and Bray;
- Park and Ride Facilities; and
- Road / Traffic Management Infrastructure Upgrades.

This model run has recently been developed to include greater levels of detail on the Core Bus Network and BRT in terms of infrastructure and service levels.

3.9.1 Do Strategy 2035 plus Bray Environs

The “Do Strategy 2035 plus Bray Environs” run incorporates the above, but also includes the following:

- Feeder Bus Services from Bray South, Rathmichael and Fassaroe;
- Busway link from Fassaroe to Old Connaught;
- Capacity & Safety Updates as per TII Study;
- Cycle & Pedestrian Bridge over the N11 from Fassaroe; and
- Local Traffic Management and Roads Measures

(xvii) Study Area Modelling Results

The mode share model output is presented for the Study Area as a whole; for the Fassaroe development area; and for Bray.

Origin Mode Share

The tables below relate to trips originating in the Study Area as a whole. In both the 2027 and 2035 model runs, the schemes proposed as part of this study have a very minor positive impact on travel patterns, increasing the mode share for public transport by approximately 1% and decreasing the proportion of people travelling by car. It should be noted that the mode split for work trips remains high in 2035 at 72.6%.

Table D1: AM Peak Period Mode Share for ALL Trips Originating in Study Area

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	64.3%	15.0%	19.0%	1.8%
Do Strategy plus Bray Environs 2027	63.2%	16.0%	19.1%	1.8%
Do Strategy 2035	61.9%	15.1%	20.9%	2.4%
Do Strategy plus Bray Environs Proposals 2035	61.8%	16.0%	20.2%	1.9%

Table D2: AM Peak Period Mode Share for WORK Trips Originating in Study Area

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	72.3%	19.2%	7.6%	0.9%
Do Strategy plus Bray Environs 2027	72.1%	19.6%	7.5%	0.9%
Do Strategy 2035	73.7%	17.7%	7.7%	0.9%
Do Strategy plus Bray Environs Proposals 2035	72.6%	19.0%	7.5%	0.8%

Destination Mode Share

The tables below relate to trips with a destination in the Study Area as a whole. In both the 2027 and 2035 model runs for ALL trips, the schemes proposed as part of this study have a negligible impact on travel to the study area, with a shift from car of less than 1% in 2027 and to car of 0.2% in 2035. In relation to WORK trips to the study area, the model is showing that public transport improvements to the extent proposed do not impact on the propensity for people to drive. This is likely due to the corresponding improvements to the local and strategic road network proposed.

Table D3: AM Peak Period Mode Share for ALL Trips with a Destination in Study Area

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	72.8%	5.4%	20.0%	1.8%
Do Strategy plus Bray Environs 2027	71.9%	6.1%	20.1%	1.8%
Do Strategy 2035	70.2%	6.0%	21.7%	2.2%
Do Strategy plus Bray Environs Proposals 2035	70.4%	6.7%	20.9%	2.0%

Table D4: AM Peak Period Mode Share for WORK Trips with a Destination in Study Area

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	87.4%	3.1%	8.5%	1.0%
Do Strategy plus Bray Environs 2027	87.4%	3.2%	8.4%	0.9%
Do Strategy 2035	87.1%	3.4%	8.5%	1.0%
Do Strategy plus Bray Environs Proposals 2035	87.1%	3.5%	8.4%	0.9%

(xviii) Detailed Modelling Results

Fassaroe Mode Share

The tables below show the mode share for trips to and from the development area of Fassaroe. As an origin for ALL trips, it shows that the public transport provision proposed would positively impact on travel patterns, with a high proportion of people walking – presumably to local services such as schools and retail, and a high proportion using public transport. For work trips originating in Fassaroe, the mode share is significantly higher for car than for ALL trips, due to the distances involved, but the share using public transport is at a reasonable level. Very few are forecast to walk or cycle.

As a destination for ALL trips, the walking mode share is 18.6% with car at 74.2%. For work trips to Fassaroe, however, the forecast shows very little use of public transport, walking or cycling, with the car dominating with an 89.7% mode share for 2035.

Origin

Table D5: AM Peak Period Mode Share for ALL Trips Originating in Fassaroe

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	74.9%	6.9%	16.7%	1.6%
Do Strategy plus Bray Environs 2027	64.7%	18.3%	15.6%	1.5%
Do Strategy 2035	70.8%	9.4%	18.2%	1.6%
Do Strategy plus Bray Environs Proposals 2035	69.4%	14.1%	15.4%	1.1%

Table D6: AM Peak Period Mode Share for WORK Trips Originating in Fassaroe

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	83.3%	7.1%	8.7%	0.9%
Do Strategy plus Bray Environs 2027	77.5%	14.7%	7.2%	0.7%
Do Strategy 2035	83.8%	7.7%	8.3%	0.7%
Do Strategy plus Bray Environs Proposals 2035	79.8%	11.7%	7.8%	0.7%

Destination

Table D7: AM Peak Period Mode Share for ALL Trips with a Destination in Fassaroe

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	77.5%	1.4%	19.6%	1.5%
Do Strategy plus Bray Environs 2027	69.9%	6.1%	21.9%	2.1%
Do Strategy 2035	74.2%	2.3%	21.7%	1.8%
Do Strategy plus Bray Environs Proposals 2035	74.2%	5.8%	18.6%	1.3%

Table D8: AM Peak Period Mode Share for WORK Trips with a Destination in Fassaroe

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	89.8%	1.0%	8.3%	0.8%
Do Strategy plus Bray Environs 2027	89.8%	1.7%	7.6%	0.8%
Do Strategy 2035	89.7%	1.1%	8.3%	0.8%
Do Strategy plus Bray Environs Proposals 2035	89.7%	1.6%	8.0%	0.7%

Bray Mode Share

The tables below show the same data for Bray. As expected the proportion of people walking is significantly higher than in Fassaroe, with almost 22.7% of people whose trip originates in Bray using this mode in 2035 for ALL trips. For work trips, the share is lower with both Car and Public Transport being more important.

In terms of trips with destinations in Bray, when ALL trips are examined, the proportion using public transport is lower than for those originating in Bray, with the private car making up the difference. As a workplace destination, the model is showing Bray to be extremely car-dependent with 86.5% of work trips arriving by car to the area in all future scenarios.

Origin**Table D9: AM Peak Period Mode Share for ALL Trips Originating in Bray**

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	61.1%	16.6%	20.4%	1.9%
Do Strategy plus Bray Environs 2027	61.0%	16.1%	20.9%	1.9%
Do Strategy 2035	57.6%	16.9%	23.0%	2.4%
Do Strategy plus Bray Environs Proposals 2035	57.7%	17.2%	22.7%	2.3%

Table D10: AM Peak Period Mode Share for WORK Trips Originating in Bray

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	68.5%	22.2%	8.6%	0.7%
Do Strategy plus Bray Environs 2027	69.1%	21.5%	8.6%	0.7%
Do Strategy 2035	69.4%	20.8%	9.0%	0.7%
Do Strategy plus Bray Environs Proposals 2035	69.0%	21.4%	8.9%	0.7%

Destination**Table D11: AM Peak Period Mode Share for ALL Trips with a Destination in Bray**

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	71.9%	6.1%	20.1%	1.9%
Do Strategy plus Bray Environs 2027	71.6%	6.3%	20.2%	1.9%
Do Strategy 2035	69.0%	7.0%	21.7%	2.3%
Do Strategy plus Bray Environs Proposals 2035	69.3%	7.2%	21.3%	2.2%

Table D12: AM Peak Period Mode Share for WORK Trips with a Destination in Bray

	Car	Public Transport	Walking	Cycling
Do Strategy 2027	86.9%	3.4%	8.7%	1.0%
Do Strategy plus Bray Environs 2027	86.9%	3.4%	8.7%	1.0%
Do Strategy 2035	86.4%	3.9%	8.7%	1.0%
Do Strategy plus Bray Environs Proposals 2035	86.5%	3.9%	8.6%	1.0%

Mode Share Conclusions

The conclusions that can be drawn from the above analysis are as follows:

- For the study area as a whole, the significant investment in additional public transport infrastructure and services, and in road infrastructure, included in this study would have a minor positive impact on mode share;
- As a destination for work trips, the Study Area is forecast to be car dependent;
- For all trips originating in Fassaroe, from the perspective of mode split, the assessment shows that this development area could perform in a reasonable manner;
- For work trips to Fassaroe, the model output shows that the area would be car-dependent as a workplace destination; and
- The town of Bray would perform reasonably as an origin for all trips, but as a workplace destination, is forecast to be almost wholly car-dependent. This dependency could be reduced by limiting the number of car-parking spaces available to those working in the town and by managing existing spaces.

(xix) Public Transport Network

Proposed Services Performance

Table D13 shows the number of passengers forecast to use the additional public transport services which were added to the 2035 Strategy measures as part of this study, between 8am and 9am. It clearly shows that the Luas extension, as expected, would be the most effective new service for the study area, carrying over 50% of the total passengers on all new services.

It should be borne in mind that a proportion of the passengers would be transferring from previous Strategy services, such as the enhanced bus services to the City Centre along the Dublin Road, and the higher-frequency services from Bray and Woodbrook DART station. In addition to this, the caveats outlined in 6.1 affect the propensity to use bus over Luas etc. due to the manner in which the model zones are configured. As such, while the total figure below represents a robust forecast of the use of new public transport based on a full regional transport model, one would anticipate, with more detailed local area modelling, that the level of services proposed would be refined in an iterative manner to more accurately reflect detailed patterns of demand. This may result in a different preferred service pattern than that set out in Section 5.1 and different patronage numbers than those set out in Table 6.13 below.

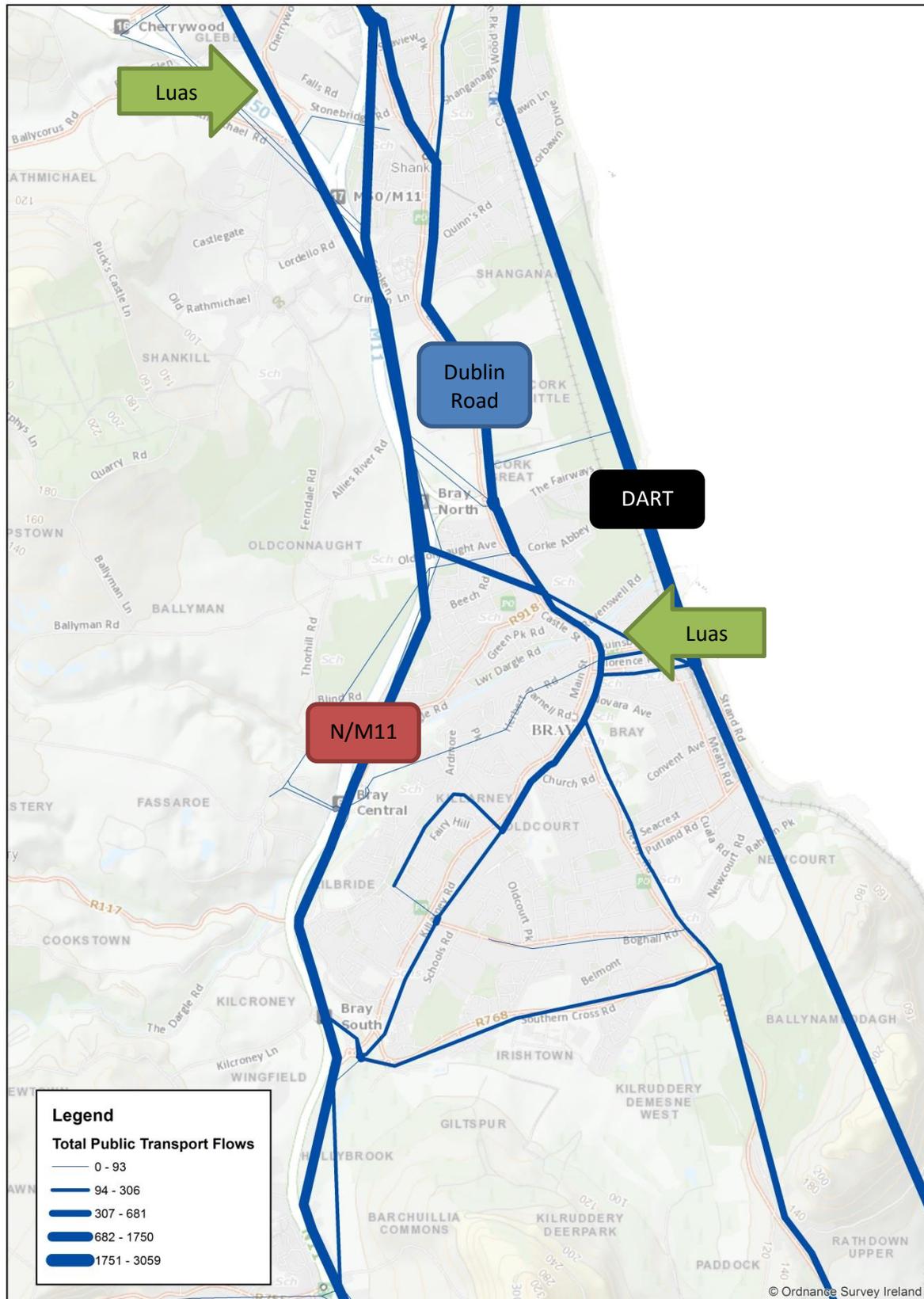
Table D13: AM Peak Period Public Transport Boardings for Additional Bus Services and Strategy Rail Services in the Study Area

New Services	AM Peak 1 Hour Boardings
Buses	
Fassaroe to Bray	181
Fassaroe to Woodbrook	131
Bray South Feeder	85
Rathmichael to Woodbrook	17
Bride's Glen - Bray	40
Strategy Rail	
Woodbrook Rail Station	324
Luas - Total Study Area Stations	830
Total on all New Services	1608

Public Transport Assignment

The map overleaf shows the assignment of public transport trips in 2035 in the Strategy Plus Bray Environs model run. It clearly shows the importance of the Dublin Road, DART and Luas line for trips from the Bray area, as well as the M11 which performs a role in relation to regional and commuter bus.

Figure D1 – Public Transport Passenger Flows – Do Strategy PLUS Bray Environs 2035



(xx) Road Network

Road Network Operations

Figure D2 shows the volume / capacity (V/C) for the junctions in the Study Area from the *Do Strategy plus Bray Environs Proposals 2035* AM Peak Hour model run. It shows that a number of junctions are forecast to perform above capacity, i.e. above 85% V/C at some point in the AM Peak Hour. These junctions are primarily located on the N/M11 and on the Dublin Road, both of which perform critical functions other than carrying general and local traffic, the former being a national route linking Dublin and the South-East including Rosslare Europort, the latter carrying a significant amount of public transport passengers.

In order to assess the performance of the network in more detail, a local area model would be required. The NTA would prioritise such an exercise centred around Bray Town Centre, which would fully incorporate the new bridges and Golf Club development roads and would determine detailed solutions for each link and each junction with a view to managing the level of traffic on the network.

A similar examination of the N/M11 corridor could also be undertaken as part of the development of the upgrade scheme.

As part of this current study, the NTA recommends that traffic from the west of the N/M11 is carefully managed so as to minimise its impact on the mainline through traffic signalling, ramp-metering etc. It is inevitable that development in the Bray Environs will add to the level of traffic on this corridor, and as such, it is recommended to be managed.

Figure D2 – Volume / Capacity for Junctions – Do Strategy plus Bray Environs Proposals 2035

