Appendix H

H1 Bus Stop Review Methodology

H2 Bus Stop Review Analysis

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Bus Stop Review Methodology (REV 3)

Project name	Date	Prepared by
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1.0 Introduction

The location and design of bus stops will be critical to the success of the operation of BusConnects Dublin. Bus stop catchment areas and safety will need to be maximised, the size of the stop needs to be sufficient to meet the expected passenger and bus demand, and the bus stop itself must not become a bottle neck to the operation of the corridor. This methodology outlines how each corridor shall be assessed so as the location and operation of bus stops can be optimised.

This Note does not relate to the physical layout of the bus stops which is addressed in Chapter 11 of the Preliminary Design Guidance Booklet, although spatial considerations are discussed in section 5.4. Standard details for bus stop layouts are to be included in the next draft of the Design Guidance Booklet.

It is important to note that existing bus stops located along the Core Bus Corridors will have been subject to considerable thought by Bus Operators, An Garda Siochana, and the Local Authority. For this reason, it is imperative that each location is closely examined before it is considered for relocation or removal.

For avoidance of doubt this manual assumes the standard bus is a twin axle double decker bus (10 to 11m in length) with a front and middle doors. Other vehicles, such as 3-axle double decker, are in use by Dublin Bus and should be considered when undertaking the Geometric Design.

Figure 1.2 Standard Bus being used on the CBC's.

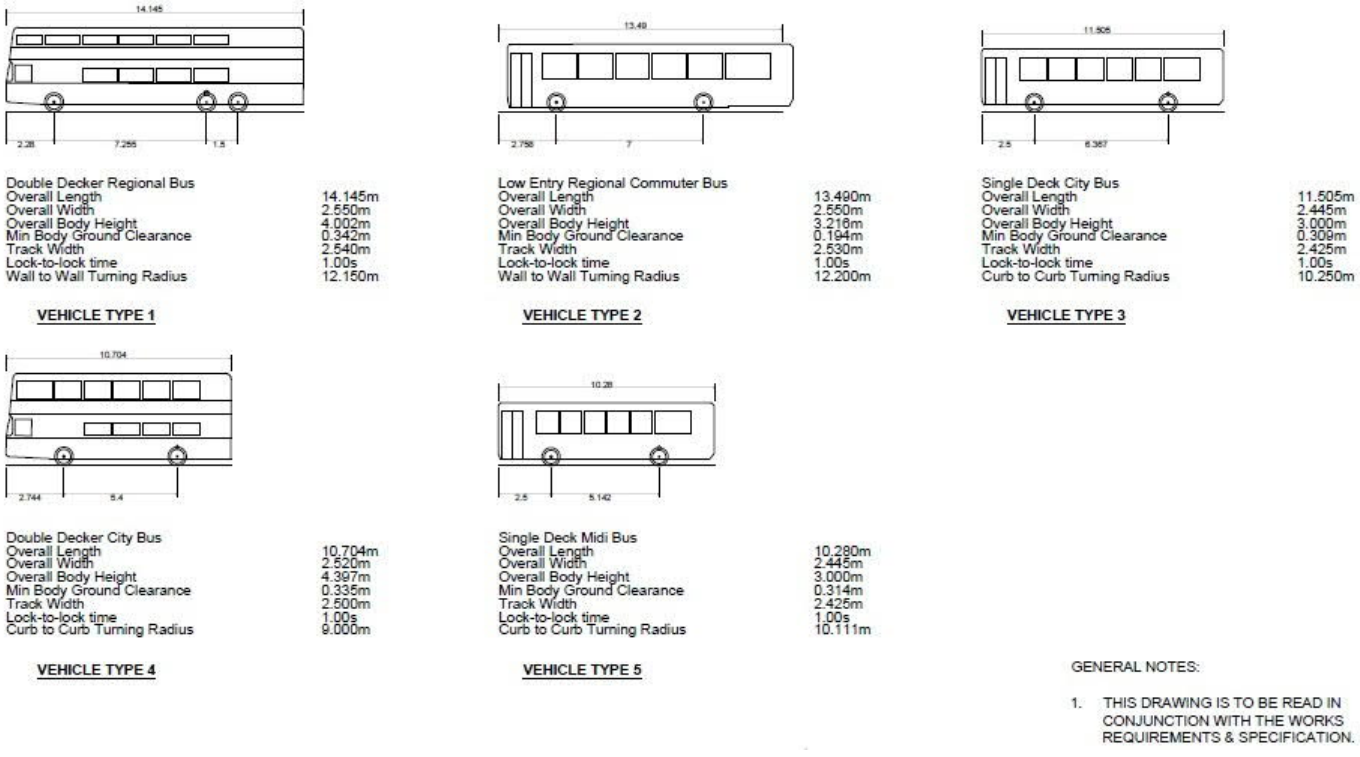


Figure 1.3 Standard Transport for Ireland Bus Specifications.

Considerations for Bus Stop Locations

The basic criteria for consideration when locating a bus stop:

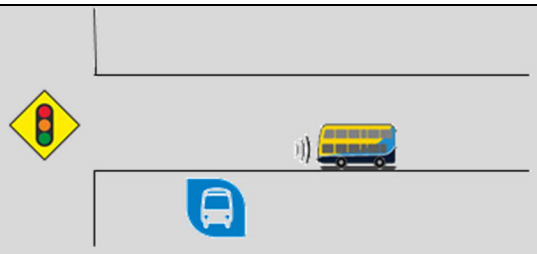
- Driver and waiting passengers are clearly visible to each other;
- Located close to key local facilities;
- Located close to main junctions without affecting road safety or junction operation;
- Located to minimise walking distance between interchange stops;
- Where there is space for a bus shelter;
- Located in pairs, 'Tail to tail' on opposite sides of the road;
- Close to (and on exit side of) pedestrian crossings;
- Away from sites likely to be obstructed; and
- Adequate footway width.

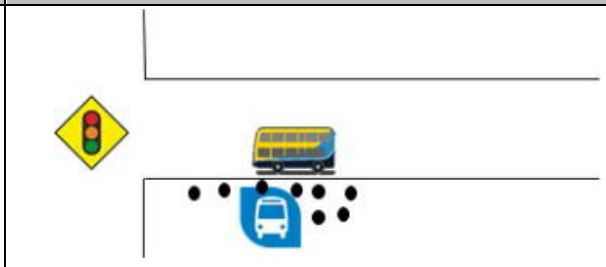
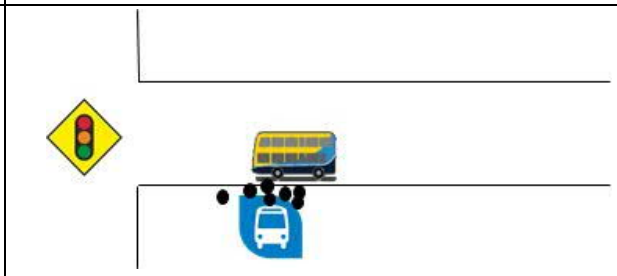
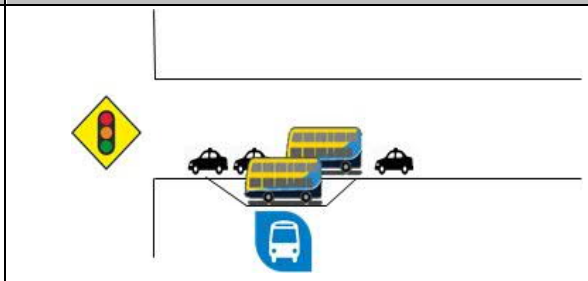
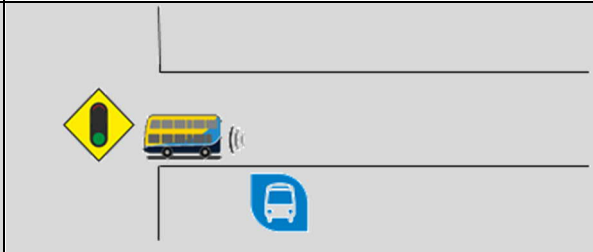
Principals of Bus Stop on high capacity Bus Systems.

The Core Bus Network Report (2015) noted that the distances between bus stops influences the efficiency of the bus network. In general, the lower the distances between stops along a corridor, the higher the delay that is incurred for buses. This delay is caused through acceleration and deceleration and delays associated with pulling in and out of bus stops with some estimates suggesting that stopping at bus stops makes up in excess of 20% of the journey times along the QBC corridors. International literature on bus stop spacing recommends a distance of 300 to 500m (NTA Report on Core Bus Network Infrastructure Network, February 2015) between stops in suburban areas is optimum, whereas in Dublin many routes have bus stops located at far lower spacing. The Core Bus Network Report concluded that increasing spacing between bus stops was part of the solution to reduce delays along the corridors.

The following indicates where delay materialises when accessing bus stops.

Table 1.1 Sources of Bus Delay associated with Bus Stops (TCQoSM, TRB)

1 Deceleration Time spent slowing to serve the stop.	

2 Bus stop failure Waiting for other buses to clear the stop	
3 Boarding lost time Waiting for passengers to reach the bus	
4 Passenger service time (dwell time) Opening the doors, boarding and alighting passengers, and closing the doors	
5 Traffic signal (traffic control) delay Waiting for the signal to turn green, or other traffic control delay	
6 Re-entry delay Waiting for a gap in traffic	
7 Acceleration Time spent getting back up to speed	

Boarding of passengers, layout of stations are not being examined as they are either not relevant in this case or dealt with elsewhere as part of the overall BusConnects Programme.

The acceleration and deceleration will be similar at all stops and clearly the overall impact is dependent on the number of bus stops along a route; this will be dealt with by examining the number of bus stops along a corridor.

Bus Stop failure is linked to the amount of time buses are stopped and the frequency of buses along the route and has a significant impact on the overall corridor capacity and efficiency, particularly where non stopping buses are present (Express or Regional Buses). A situation where a bus arrives at a bus stop to find all loading areas full:

- The bus must wait until space becomes available;
- Slows down the bus and creates schedule reliability issues; and
- Delay can also increase further as bus bunching occurs and bus dwell and traffic control delay times will increase.

The proximity of a bus stop to signalised junctions has an impact on bus speeds with far-side stops having the least negative impact on speed and capacity, and also favored as passengers cross the road behind the bus which increases safety.

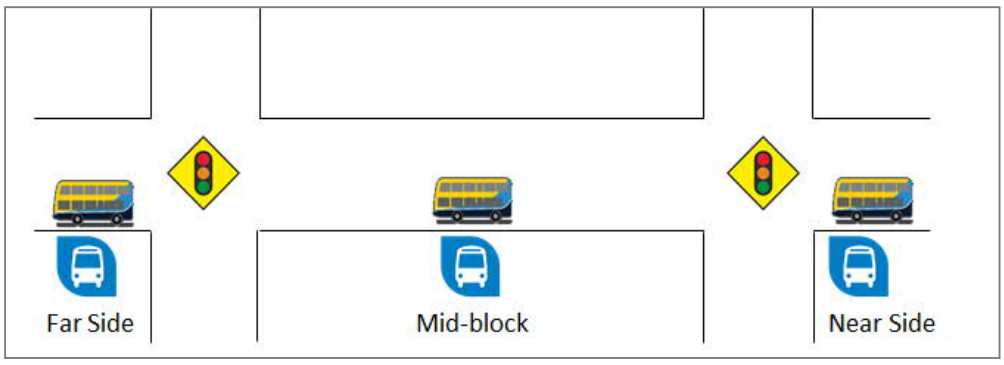


Figure 1.4 Typical Location of Bus Stops.

Ability to overtake slower buses is an important parameter where the route is made up of both express (rarely stopping) and slower (stopping at all stops) buses. For example, on the N11 QBC lay-bys (or passing lanes) were introduced after the original QBC was built to increase the capacity and allow express buses to pass the slower vehicles. On some of the BusConnects schemes this will need to be considered particularly on those routes that include regional and intercity services.

Figure 1.5 Stillorgan QBC with high bus flows and no bus laybys resulted in bus bunching/ platooning; bus lay-by's provided at key locations to allow express buses to pass slower buses. (Source: Google Maps)

Figure 1.6 A typical bus lay-by adjacent to a bus lane; note concrete surface for additional durability.

Consideration should also be given to locations where coaches stop along the Corridors, particularly those serving the airport which could require longer dwell time to allow passengers to load/unload their luggage. In these cases, a layby separate to the CBC Bus Stop maybe desirable (Figure 1.7).

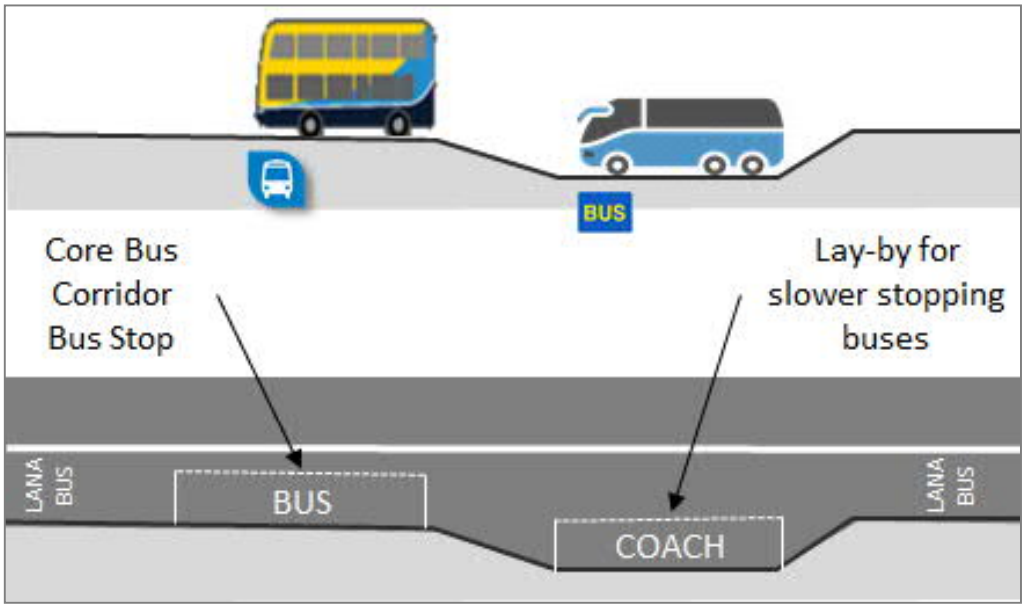


Figure 1.7 Double Bus Stop (in-line for BusConnects routes) concept for locations with buses requiring different dwell times.

Figure 1.8 Multiple bus operators may be using bus stops along the Corridors.

In general, most bus stops along corridors will be in-line (bus stops within the bus lane), as a result re-entry delays will not impact the operation of buses. However, on busier corridors where lay-bys are used re-entry may delay buses. ED's need to consider the flow of buses and taxis passing lay-by's, and where there is increased risk of delay additional measures may be required to generate

gaps in traffic (far-side) or the installation of a yellow box to allow buses to renter the traffic queue (near-side).

Pedestrian accessibility

Another important aspect of bus stop positioning is proximity to pedestrian crossings. Failure to provide high quality pedestrian facilities on the pedestrian desire line may lead to a higher accident risk associated with a bus stop. Therefore, designers need to consider how passengers are going to cross the road to get access to the stop, in general this will require bus stops to be located close to safe crossing points.

2.0 Methodology

This section outlines the process for examining each BusConnects Corridor and assessing and reporting on the bus stops along each route. The flow chart summarises the process and this is followed by a more detailed description of the tasks to be undertaken.

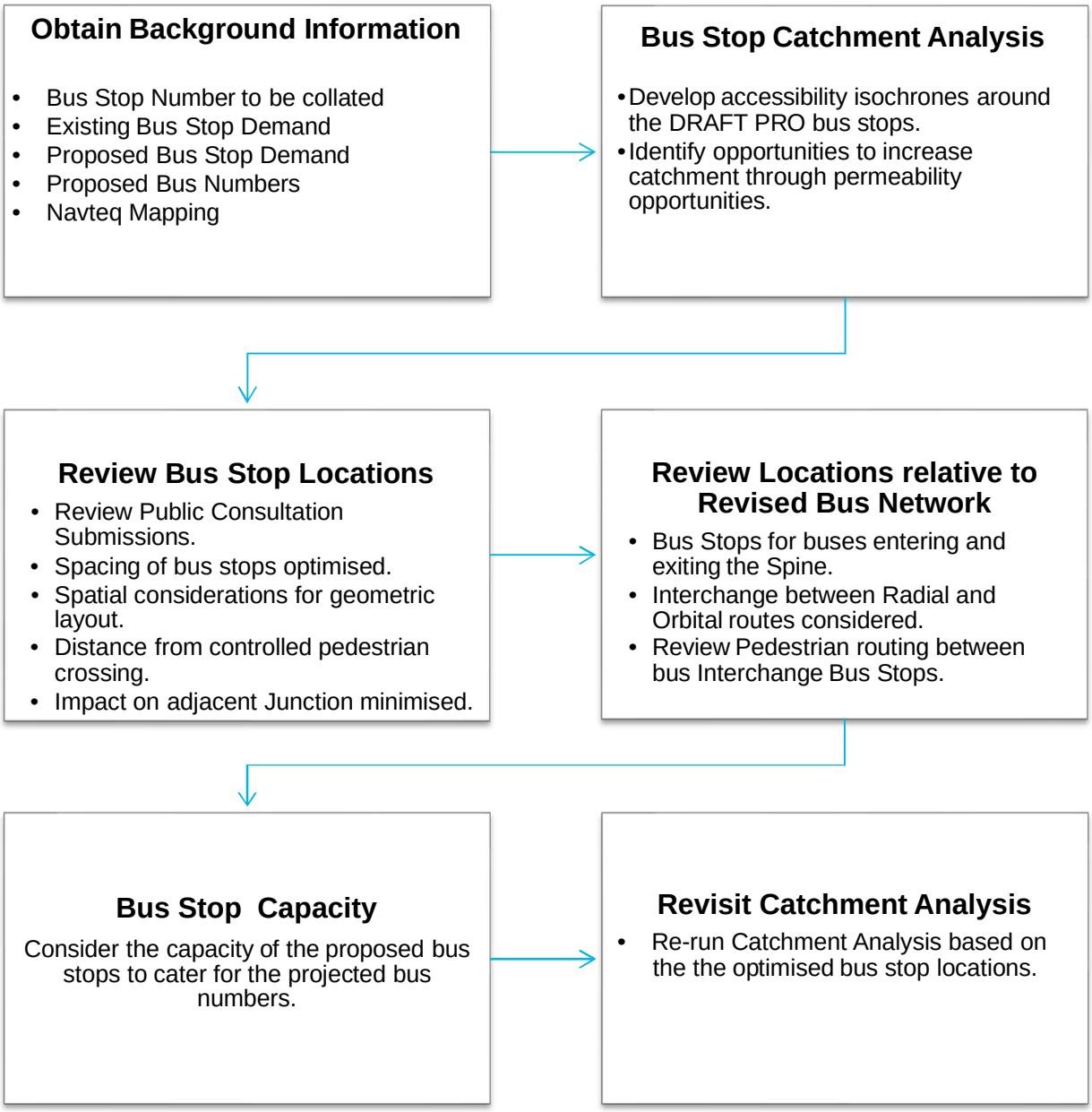
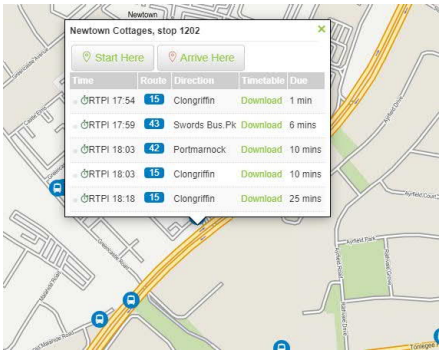


Figure 2.1 Flow Chart for proposed Bus Stop Review.

3.0 Background Information

In order to undertake the review of the bus stops along each corridor background information must be gathered. The following section outlines this information and how to obtain it.

Table 3.1 Information to be gathered to undertake the Bus Stop Review

Item	Description	Location/Contact
Bus Stop Number	Bus Stop Numbers can be obtained from a number of online sources. 	https://www.transportforireland.ie/plan-a-journey/
Existing Bus Stop Demand	Estimated boarding and alighting figures are available from NTA Business Intelligence Unit. Using Leap Card Data and Machine Learning the NTA has recently developed a tool for estimating where passengers are alighting buses along each route. The format that this will be available in is currently under development. This information can include details on use of Free Travel Pass which may help in identifying locations which are a higher priority for the elderly and those with accessibility issues.	**NTA Business Intelligence Unit**
Proposed Bus Stop Demand	Obtain future passenger demand for each corridor, this will come from the ERM. This will not be linked to specific bus stops, but zonal. The bus stop demand will then be linked to bus stops by using the existing bus stop data and factoring up existing boarding and alighting figures.	TIAR Consultant
Proposed Bus Numbers	The number of buses on each corridor is available from the BusConnects Network Redesign Team. This information has already been issued to each ED. It is the ED's responsibility to confirm that these figures are correct at this time.	Confirm that the numbers provided are the revised network data.
Navteq Mapping	The GIS Mapping is required to understand permeability in the area surrounding bus stops. NTA has this information and will provide it to each ED. Note that this base data will need to be reviewed thoroughly as from experience there will be many permeability routes that are missing.	NTA to issue mapping to all teams.

4.0 Bus Stop Catchment Analysis

Bus stop passenger catchment areas are critically important to the success of a high-quality bus corridor. The catchment at each bus stop needs to be maximised so as each stopping movement collects sufficient passengers to justify the loss in journey speed; a bus stopping at each bus stop to pick up one passenger will result in a very slow journey time, the ideal scenario is to stop less often and collect more passengers at each stop. Clearly too few bus stops could also be detrimental to the success of the scheme. To assess if bus stops are optimally spaced to maximise the passenger catchment area it is recommended that a catchment analysis using the NTA Navteq data(or similar process) is undertaken.

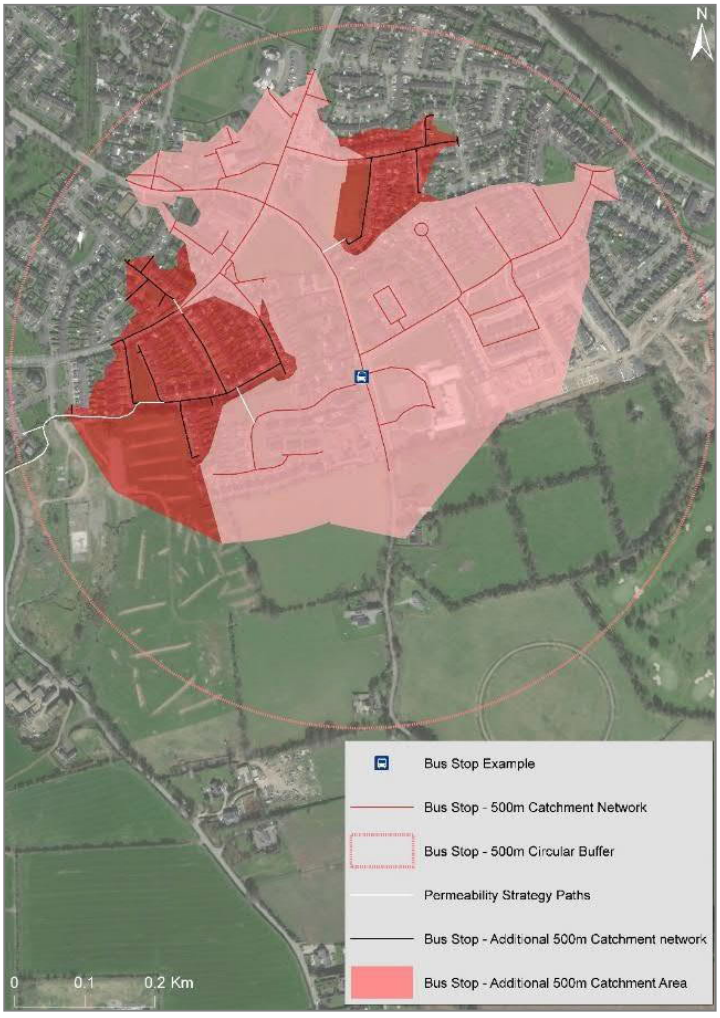


Figure 4.1 Passenger catchment analysis for a bus stop indicating the existing and possible catchment areas assuming permeability improvements can be undertaken.

Figure 4.1 indicates the area that is within a standard walking distance of a bus stop (400m for BusConnects CBC's) based on the actual walking distance rather than "as crow flies" analysis which can be misleading particularly where there are long sections of blank, inaccessible, wall along

corridors. The number of people living within this area can be obtained from GeoDirectory data. In addition, permeability solutions can be identified and the impact of making these changes can be quickly assessed in terms of increased catchment area. The process of undertaking this analysis is outlined below:

Task 1: Enhancing the Navteq network using OpenStreetMap to add footpaths, greenways, cut throughs which are accessible to most people, paths over greens or parks, etc., this is required as the network supplied by the NTA is a primarily a driving network not a pedestrian network.

To do this you will add walk links extracted from OpenStreetMap's data clearly coding these into the Navteq supplied by the NTA. Google Streetview should be used as a check to ensure any link added to the Navteq exist on the ground and are accessible to all. Informal walk links should not be added at this stage.

Figure 4.2 Example of permeability link missing from Navteq mapping on Tallaght/Clondalkin Cor Bus Corridor.

Task 2: Once the Navteq has been enhanced to the required level to capture all major pedestrian movement within bus stop catchment areas, catchment analysis shall be run for the proposed and existing bus stops. Using the Network Analyst Extension in ArcGIS generating 400m and 800m walking bands to reflect 5 and 10-minute walking catchments of bus stops.

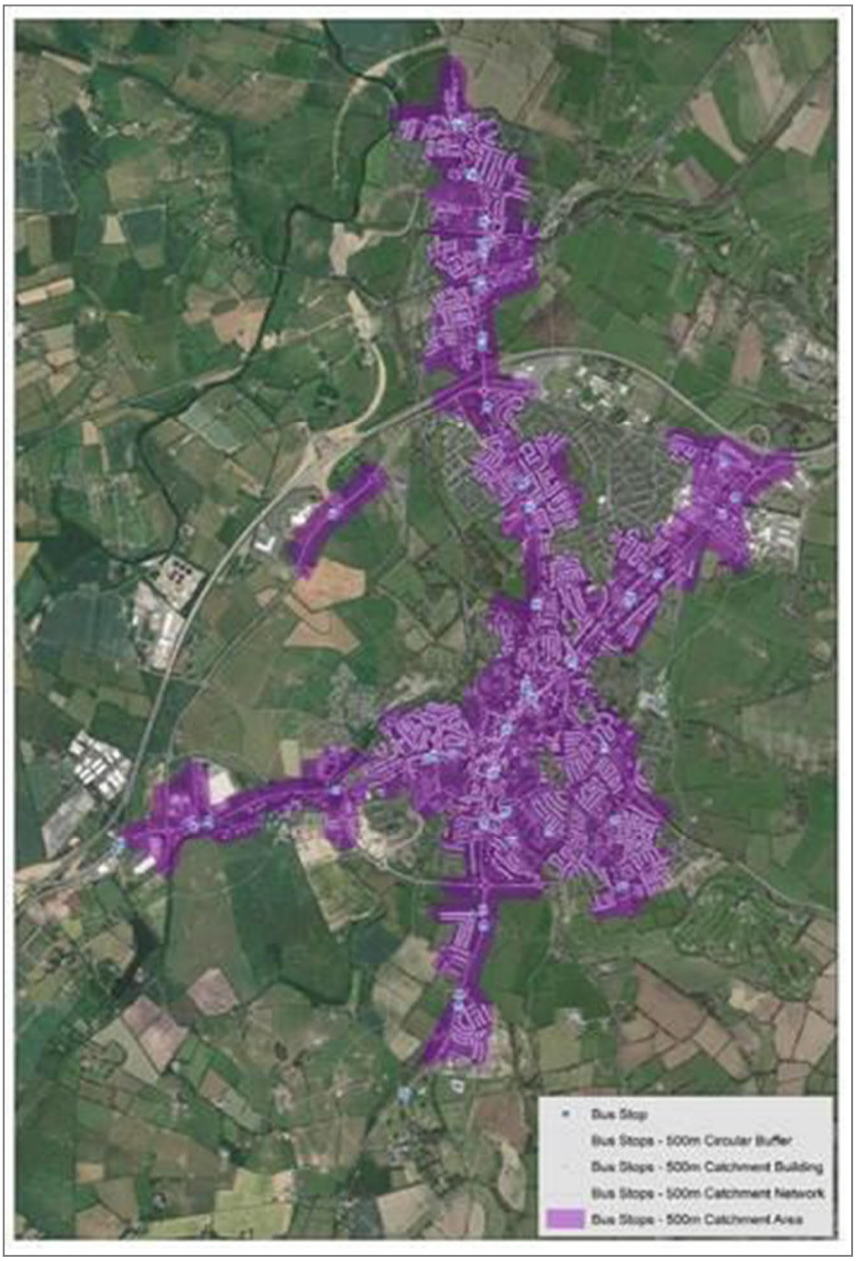


Figure 4.3 Example of catchment analysis run for all bus stops in Naas

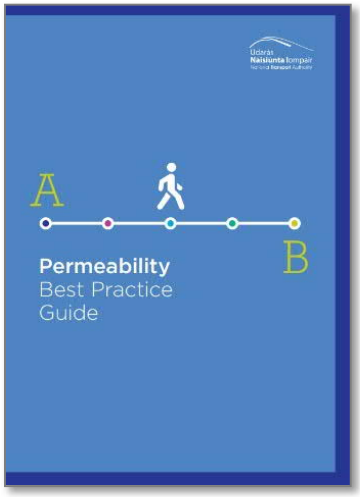
Task 3: Production of catchment tables identifying number of households using Geo Directory or population estimate using census 2016 and Geo Directory to apportion sections of Census Small Area within 400m and 800m catchments of each bus stop. Catchments will be non-overlapping to avoid double counting between stops along the same alignment.

Task 4: Maps will be generated for each stop along each of the alignment, or stops can be grouped together to reflect particular study areas. Maps can be generated in any particular format to match the theme of previous reports (EPR Reports).

Task 5: Quality Assurance and Checking of catchments is critical as missing, or additional, links will be easily identified by the public and could discredit the analysis if there are errors.

Having developed a detailed understanding of the catchment areas consideration should then be given to how the catchments can be widened through identification of permeability opportunities along the corridors. Permeability describes the extent to which an urban area permits the movement of people by walking or cycling. Such an approach is known as “filtered permeability”. Barriers to filtered permeability can include:

- Boundary walls around estates and within residential areas that prevent movement along natural desire lines, being usually the shortest and most direct route connecting two points;
- Cul-de-sacs which prohibit through movement;
- Poorly designed linkages that are difficult or unattractive to use; and
- Connections which require much longer travel distances than direct linkages.



The NTA Permeability Best Practise Guide should be followed for the identification and assessment of these opportunities. Careful consideration should be given to whether or not these proposals should form part of the Bus Connects scheme or if they should be identified to the Local Authority for actioning. Only those linkages that are directly linked to the corridor should be considered as part of this application.

An example from the Clongriffin to City Centre CBC can be seen in Figure 4.4 where a very large housing estate which is located immediately adjacent to the proposed bus corridor has a continuous boundary wall that runs for over 800m preventing easy access to the bus routes and requiring a walk of almost 1km to access the bus routes. Opening a pedestrian access on the boundary wall could create a much shorter route to the buses and substantially increase the bus passenger catchment area.

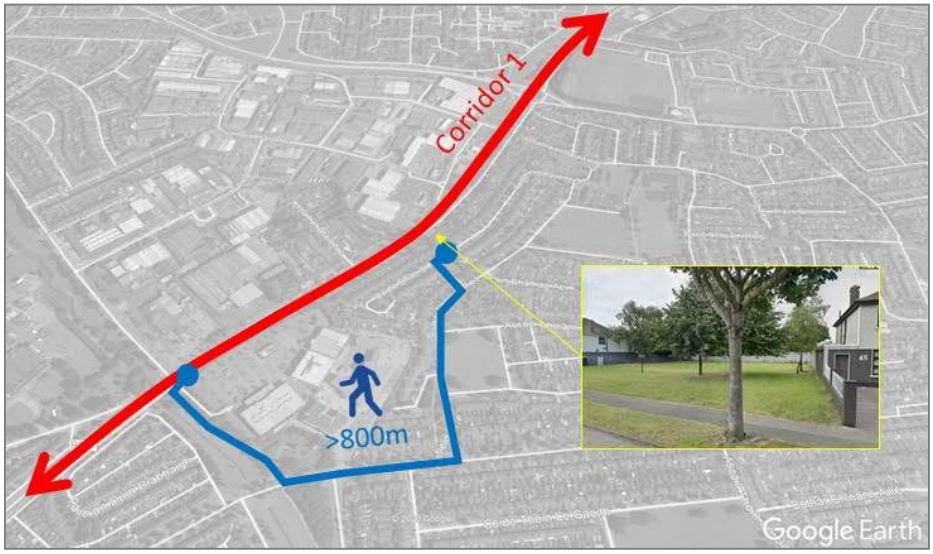


Figure 4.4 Permeability option on the Malahide Road (Source: Google Maps).

Figure 4.5 Boundary wall along Malahide Road (Corridor 1) where local residents have opened up individual doors to access the existing QBC route.

5.0 Review Bus Stop Locations

5.1 Public Consultation Feedback.

An important aspect of the bus stop review is to review feedback received from the general public in relation to the position of an existing, or proposed, bus stop along the corridor. This may identify a specific issue that the reviewer should be aware of before beginning the review. For example, the relocation of a bus stop away from a destination for people with mobility impairments may not have been identified during the preliminary design process and should now be considered. It is also important to review these comments against commitments that may have been given during the "one to one" meetings held during the initial, and subsequent, consultation stages.

Please note that some bus stops were relocated after the EPR public consultation as a result of public consultation comments, if a bus stop is being considered for relocation please also check whether it had been relocated previously by checking the EPR drawings and discussing with the NTA IPO.

5.2 Usage of Bus Stops.

In order to help the reviewer, understand the passenger movements at a bus stop it is recommended that the existing Boarding and Alighting Data is reviewed at this early stage and is used as an approxi for future passenger movements. This will provide an indication of the numbers using a bus stop in an area and would indicate the number of pedestrians movements having to be catered for. It will also indicate those bus stop locations that are relatively lightly used and could be considered for amalgamation with a nearby bus stop, relocation to a more convenient location, or removal completely.

5.3 Spacing of Bus Stops.

The spacing of bus stops has a significant impact on the average speed of a bus corridor, clearly the more times a bus stops the slower the overall journey time will be. A bus incurs a minimum of 15 seconds delay with each stop on an urban street just to decelerate, open and close the bus doors, and accelerate back to speed (25 seconds on a busway). Table 5.1 uses information extracted from the Transit Capacity and Quality of Service Manual (TRB) and indicates the estimated average speed on an 80kph busway. This clearly indicates that bus stop spacing, and dwell time have a large impact on average speed on bus corridors.

Table 5.1 Average Bus Speed (km/h) in Bus Priority Corridors, 80km/h running speed.

Average Stop Spacing (km)	Average Dwell Time (s)				
	0	15	30	45	60
0.8	50	37	32	27	24
1.6	61	51	45	40	37
2.4	68	58	53	48	45

For BusConnects it is proposed that bus stops should be spaced approximately **400m** apart on typical suburban sections of the route, dropping to approximately **250m** in urban centres (CIHT Buses in Urban Developments, January 2018). This spacing should be seen as a recommended spacing rather than an absolute minimum spacing.

The ability to increase stop spacing depends in part on the quality of the pedestrian connectivity in the area and also the availability of safe crossing points in the vicinity of the proposed bus stop. It may also depend on the characteristics of the passengers using the stop, e.g. persons with limited mobility may find it difficult to walk to the next stop. It is therefore recommended that for locations that may generate high number of elderly or mobility impaired bus passengers (health facilities, local businesses) consideration should be given to locating the bus stop within **100m** of the location if spatial considerations permit.

5.4 Spatial considerations for geometric layout.

The provision of high-quality bus stop infrastructure that is customer orientated is considered an essential part of the BusConnects offering, including:

- Being fully accessible for all bus passengers;
- Having a bus shelter for waiting passengers;
- Having both timetable and real time passenger information (RTPI) available to passengers;
- Having sufficient footpath space to allow the free movement of pedestrians passed the bus stop;
- Continuous cycle lane past the bus stop; and
- Provision of Cycle Parking at, or close to, the bus stop.

All of which requires significant space along the already congested radial routes that the Core Bus Corridors run along. Therefore, an important aspect of locating bus stops is identifying locations that have sufficient space to accommodate all, or most, of these elements.

The BusConnects Design Guide suggests that an Island Bus Stop (Figure 34) is the preferred bus stop option to be used as standard on the CBC project where space constraints allow. The **minimum footpath width within which an island bus stop can be implemented is 5.4m** (1.8m footpath + 1.2m cycle track + 2.4m island with shelter). This option assumes a shelter with half bay end panels. Should full panels (as seen on Figure 5.2) be required the width requirement will increase to approximately 6.3m.

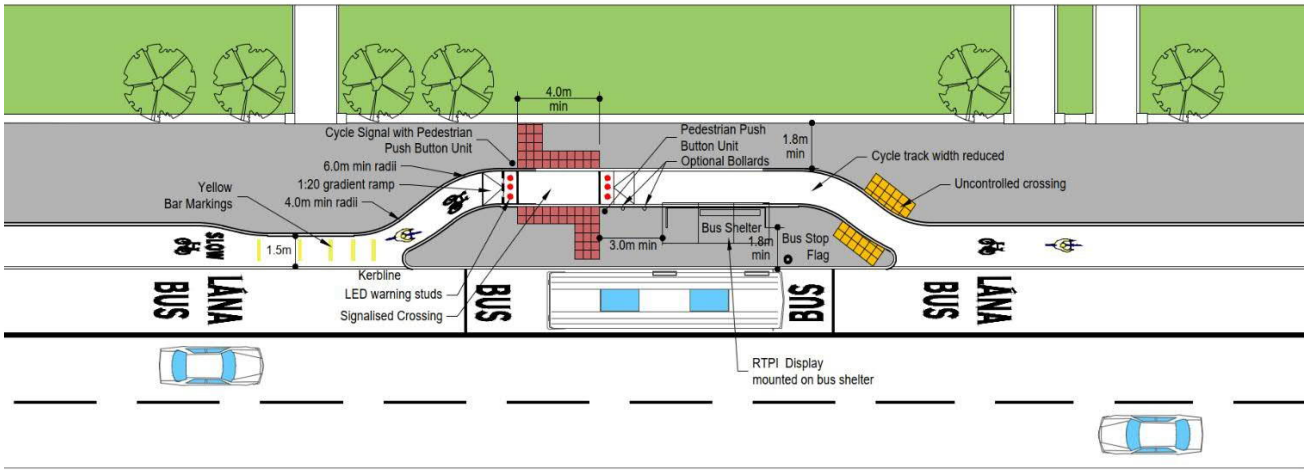


Figure 5.1 Typical Island Bus Stop Arrangement (Bus Connects Design Guideline).

Figure 5.2 Standard 3 Bay Reliance Mark Shelter with full width advertising panel.

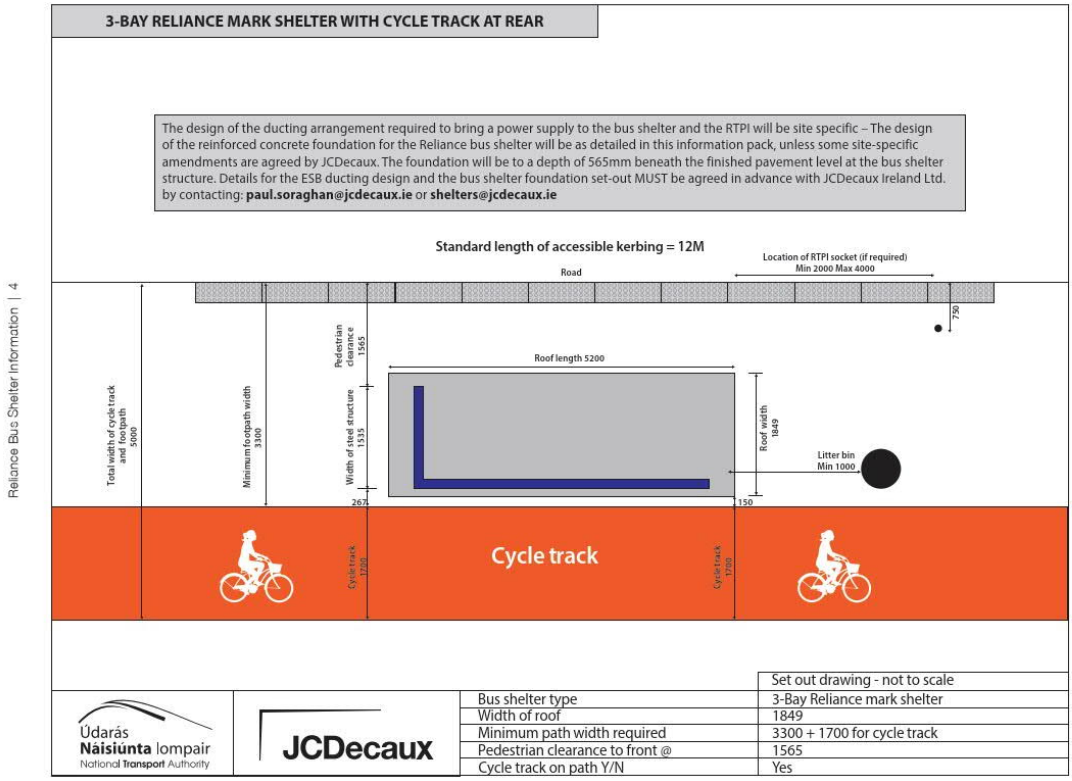


Figure 5.3 Standard layout for a 3 Bay Reliance Mark Shelter with full width advertising panel and cycle lane to the rear (note cycle lane width is to be determined by designers).

For locations where space is constrained an option consisting of a shared bus stop landing zone can be considered. This option is indicated in Figure 5.4 and should only be considered on a case-by-case basis to ensure suitability with particular attention paid to the volume of cyclists and volumes of boarding and alighting passengers. **Using the narrowest non-standard bus shelter this would require a minimum width of approximately 4.0m** (1.9m footpath with shelter + 1.2m cycle track + 0.75m island).

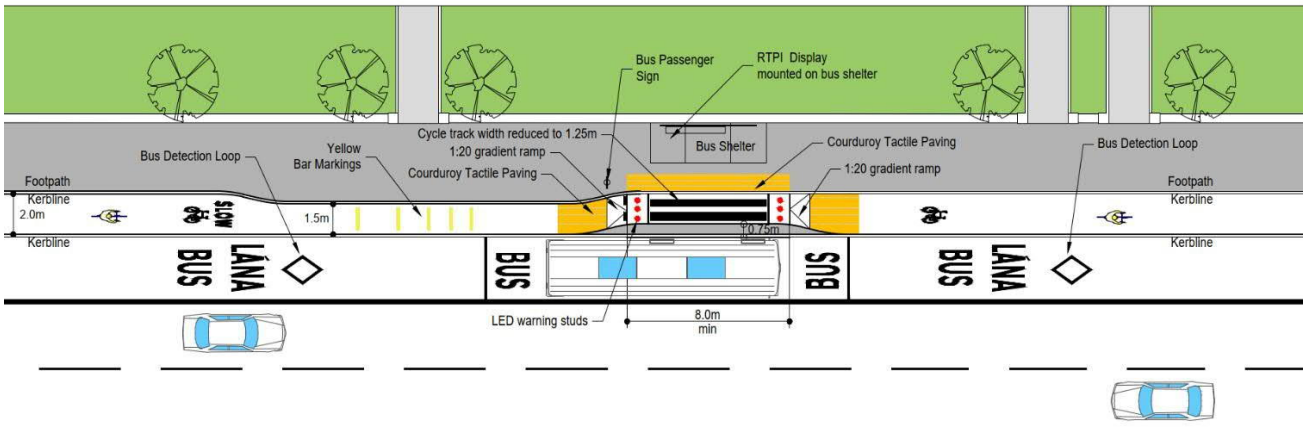


Figure 5.4 Shared Bus Stop Landing Zone Arrangement (Bus Connects Design Guideline).

Figure 5.5 Cantilever narrow roof Bus Shelter

It is important that ED's do not immediately choose the minimum sized shelter as this will impact on the weather protection provided to bus passengers and potentially advertising revenue share received by the NTA. Where there are a substantial number of bus stops using the nonstandard bus shelter it is recommended that the NTA IPO are consulted prior to finalising the proposals.

Providing cycle parking at bus stops has the potential to increase the catchment area of a bus corridor by providing a safe place for cyclists to secure their bike for the duration of their trip. ED's should look to provide cycle parking at all bus stops along the BusConnects Corridors where space permits. The **minimum provision is 3 Sheffield Stands** (accommodating 6 bicycles) in the vicinity of a bus stop. Where larger numbers of cyclists can be expected consideration should be given to providing a larger covered area of approximately 10 Sheffield Stands (accommodating 20 bicycles).

Figure 5.6 Sheffield Bicycle Stands provided at a Bus Stop on the N11.

Figure 5.7 Covered Sheffield Bicycle Stands provided at a Bus Stop on the N11.

5.4 Distance from controlled pedestrian crossing.

Pedestrians by their nature often take the quickest route to their destination rather than the safest route, particularly if they feel the safety risk is low. This results in bus passengers leaving buses stepping out in front of, or behind, buses and crossing the road in a hazardous manner. The placement of bus stops near safe pedestrian crossing points is therefore a critical aspect of bus stop design. Providing a bus stop where there is no, or an indirect, pedestrian crossing will lead to “jaywalking” and pedestrians making higher risk movements.

There are many examples of bus stop located immediately outside a pedestrian opening into a housing estate which makes it easy for passengers to access the bus stop in the morning, however on the return journey the passenger can often be isolated on the other side of the road with no safe crossing point available. While this may be satisfactory on some roads, it may not be on others, and how is a person with a mobility impairment to cross a busy radial route? **All bus stops along the CBC’s should be located within a short distance of a controlled crossing point.**

The optimum location to locate a bus stop is adjacent to junctions which have signalised pedestrian crossings provided on all desire lines. Much research has been undertaken in relation to the optimum location for a bus stop adjacent to a junction, either before (near-side) or after a junction (far-side), while there are advantages and disadvantages of both, all guidance recommends that locating the bus stop on the **far-side of a junction is the optimum solution**. While this may be theoptimum location in terms of the operation of a corridor a near-side bus stop may still be appropriatewhen spatial constraints, routing, or distance from junction are considered.

Figure 5.8 indicates various locations for bus stops at junctions with particular consideration for interchange between Spine and Orbital Core Bus Corridors. This indicates that all options which require passengers to interchange will require passengers to cross at least one arm of a junction (on average over both legs of their journey), emphasizing the importance of locating bus stops at junctions and providing controlled crossings on all desire lines between interchanging bus stops.

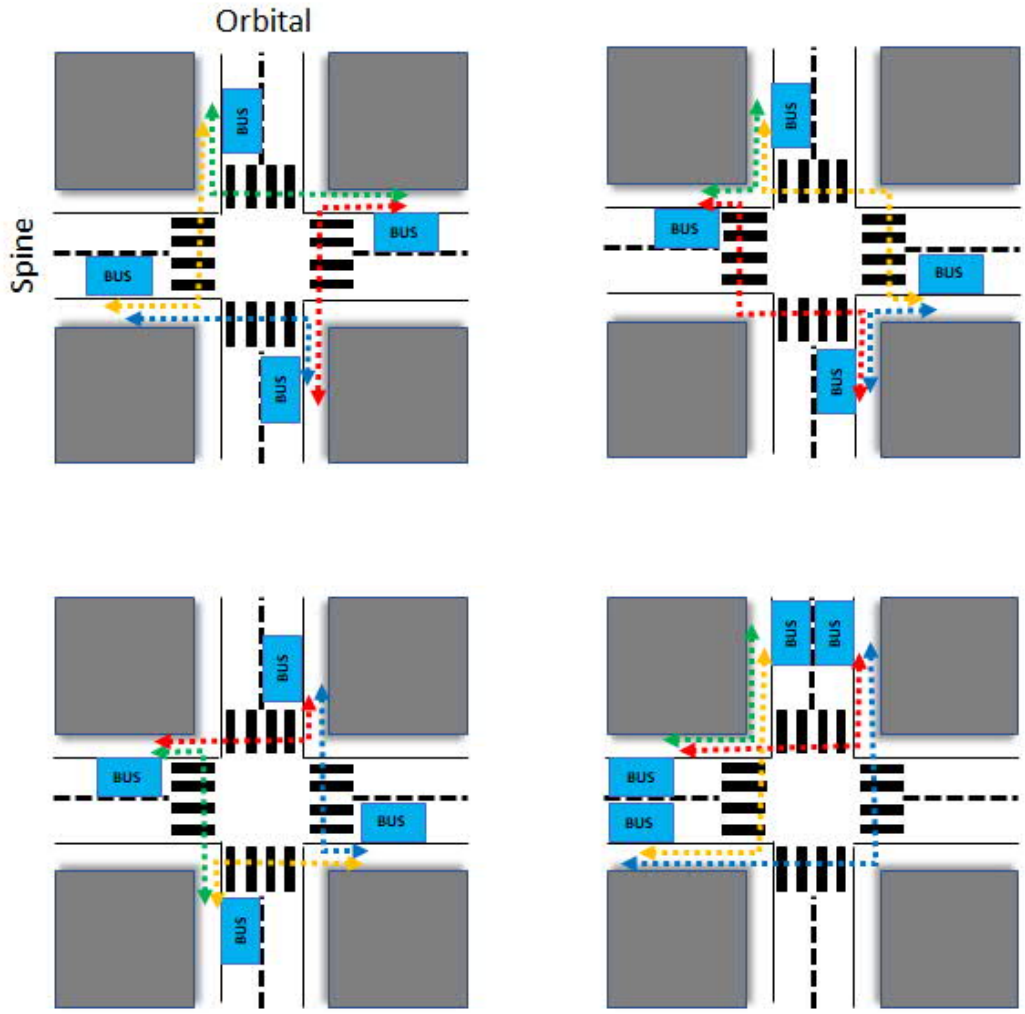


Figure 5.8 Bus stop locations and passenger interchange routes between them.

The DfT document Inclusive Mobility (2005) suggests recommended distance limits without rest for various Mobility Impaired Groups that ranges from 50 to 150m, which limits the distance between interchanging bus stops significantly. It is therefore recommended that the distance between the key interchange bus stops is limited to approximately **100m walking distance** where possible to enable all impaired groups to be able to interchange, consideration must be given to providing a rest spots at approximately 50m between the bus stops to cater for those that will not make this distance without a rest.

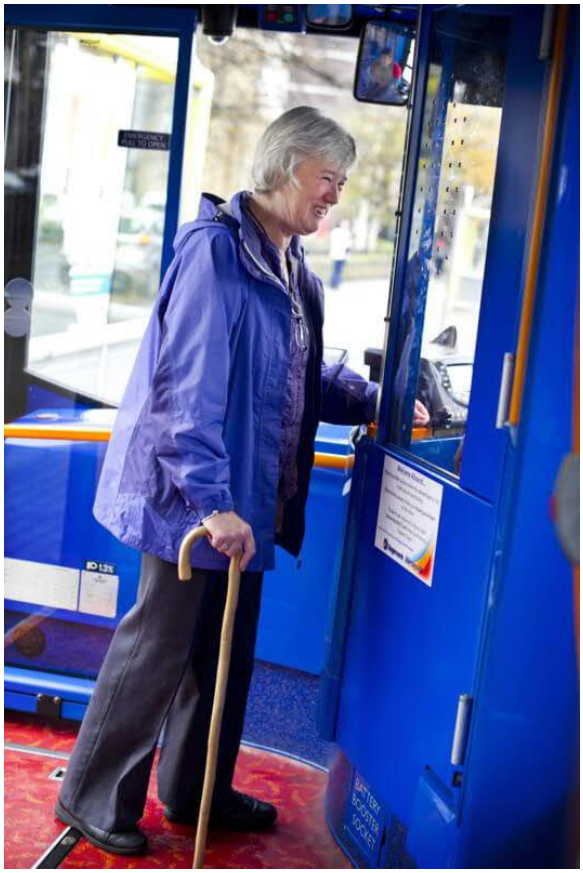


Figure 5.9 Pedestrians using sticks have a limited range of 50m before needing a rest.

For mid-block (between junctions) bus stops it is important that consideration is given to the location of a safe crossing point. It is recommended that a signalised crossing is located in close proximity to these stops to allow all passengers to cross the road safely. It is also recommended that bus stops are positioned upstream of this crossing to avoid buses blocking visibility to the crossing and that passengers walk to the back of the bus where they are more visible to oncoming traffic.

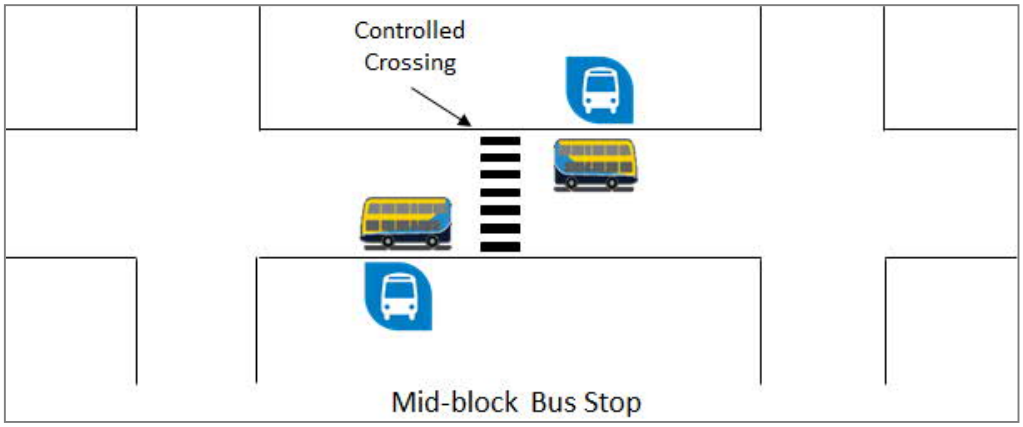


Figure 5.10 Mid-block bus stop optimum layout.

5.5 Impact on Adjacent Junction.

Locating bus stops close to junctions is optimum for pedestrian connectivity and safety, however it clearly can impact on the capacity of a junction and may result in increased congestion. Designers will need to review the location of the bus stops in order to minimise the impact on the operation and capacity of the junctions; things to consider include:

- Distance from the far-side bus stop to the junction. Buses will be running at headways of approximately 2 minutes at peaks on some corridors, while every effort will be made to avoid bunching it is likely that buses will end up meeting each other as they wait for a green signal. As a result, it is important that sufficient space for a bus to wait behind a stopped bus is provided at all junctions. Importantly this offset should start beyond the pedestrian crossing point in order to avoid blocking the crossing. Table 2.2 provides guidance on offset distance from key features.
- For near-side bus stops it is important that the location is reviewed in the context of visibility to the traffic signals for general traffic (bus, or the bus stop infrastructure, impacting on visibility to primary traffic signals) and also interaction with left turning traffic. Reference DMRB DN-GEO-03044 and DTTaS Traffic Signs Manual Chapter 9.
- Where a bus is joining a Spine from a side road it is important that the bus stops are fully accessible by the turning vehicle and sufficient space is provided to allow the bus to pull in flush with the bus stop so as the gap between the kerb and the bus is minimised (both doors). It is also important to ensure that the manoeuvring bus does not require the bus to sweep over the kerb line.

Figure 5.11 Tracking of a turning bus entering a bus stop.

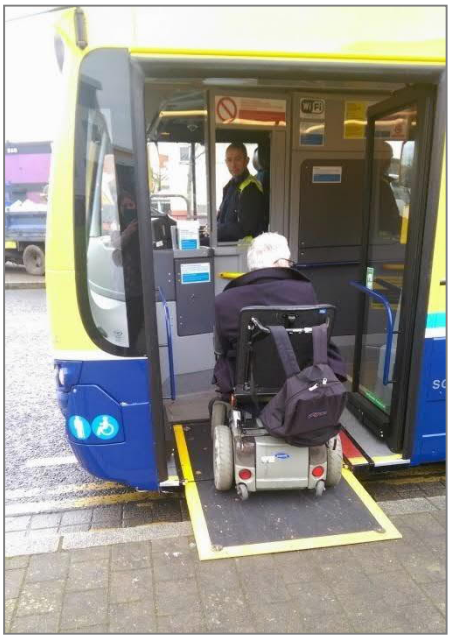


Figure 5.12 Having buses flush with the bus stop is important to allow the ramp to lower correctly, but also to speed up the boarding and alighting of all passengers as gaps slow this down.

Table 5.2 Indicative Distances of Features from Bus Stops

(DRAFT NTA Bus Stop Design Guidance)

Feature	**Distance (m) to bus stop sign**
Prior to isolated pedestrian crossing signals or Zebra	18m
After pedestrian crossing signals or Zebra	10m + bus length*
Prior to signalised junction	20-30m
After signalised junction	20m + bus length*
Prior to or after a side road	20m
After a side road	10m + bus length*
Prior to a roundabout (no diverge)	20-30m
After a roundabout (no merge)	20m + bus length*

***the bus length should be the longest bus using the stop**

6.0 Review Locations relative to Revised Bus Network

The revised BusConnects Network is based on the Connective Network Principle which will rely on some interchange between routes to reduce journey times across the City. This Interchange will primarily occur in the City Centre where the spines overlap rather than along the Spines. However, some interchange will occur between the High Frequency Spines and the Frequent Orbital routes and also between the routes before Branches peel off the spine. Seamless interchange between these bus routes will be critical for the successful operation of this system.

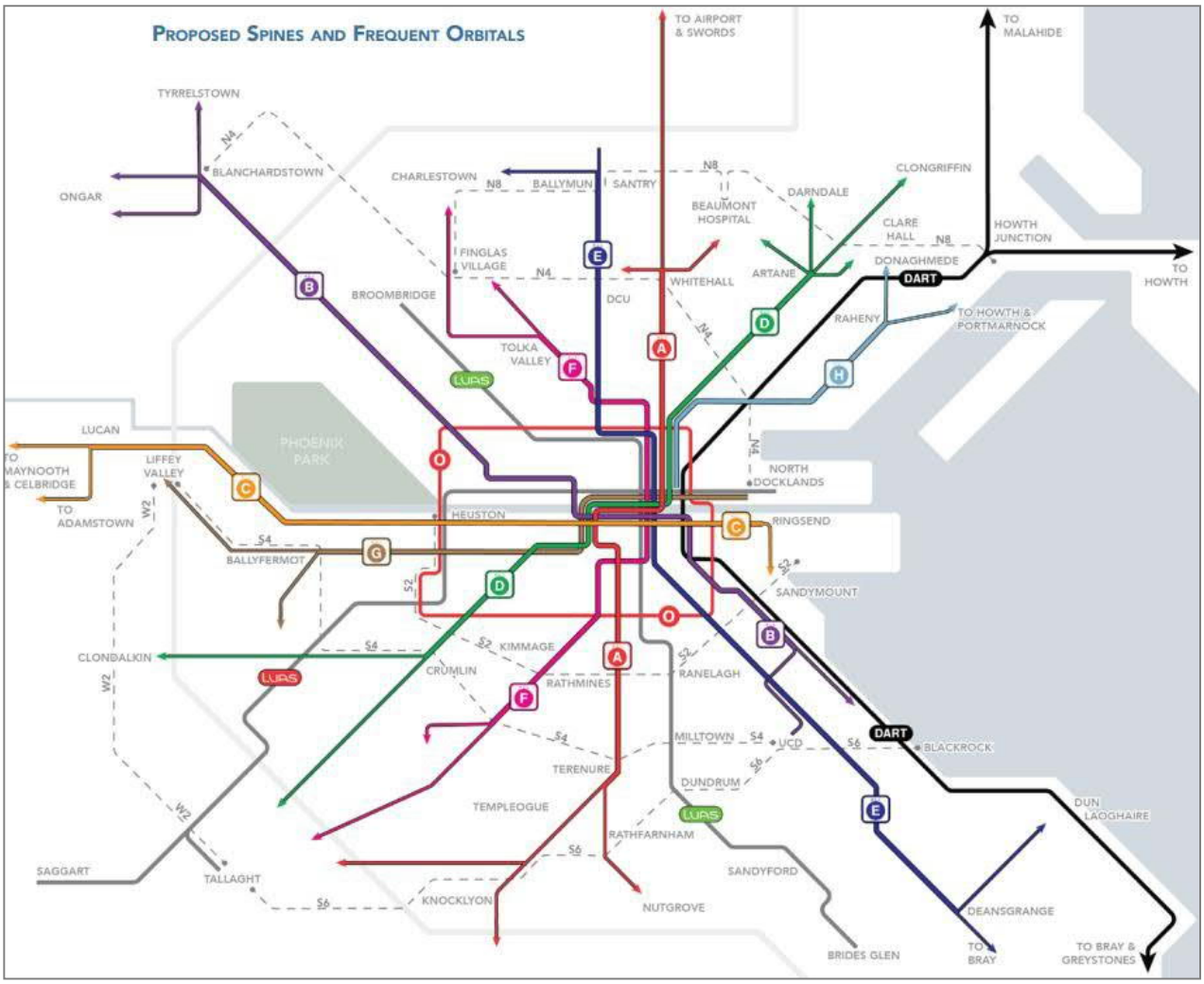


Figure 6.1 Simplified diagram of spines and frequent orbitals in the proposed network

The latest maps need to be obtained by each ED from the NTA IPO. In addition, the ED's can make use of the NTA's Remix system, which is an on-line route and stop information system for the proposed bus network.

6.1 Buses entering and exiting the Spine.

For buses entering and exiting the Spine, consideration should be given to how passengers may switch from one branch to another branch route. While this can happen anywhere along the Spine it will most regularly occur at the last stop before the branch route peels off the Spine. An existing example of this can be seen at Foxrock Church where two high frequency routes (46A/145) deviate at this point. At the last stop before the 46A deviates to Kill Avenue significant numbers switch from one route to the other.

Figure 6.2 Foxrock Church Bus Stop on the N11 QBC

For the Core Bus Corridors consideration should be given to the size and location of the stops before branch routes leave the main Spine. The optimum location of stops at this location will allow all routes to overlap prior to the junction thus removing the necessity for passengers to walk to anotherbus stop.

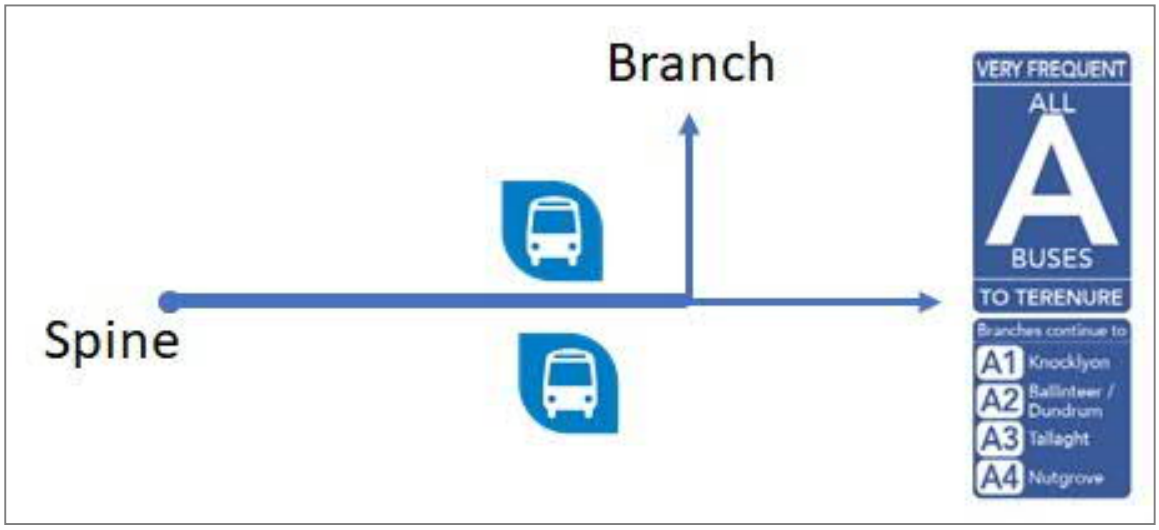


Figure 6.3 Location of Bus Stops Immediately before Branch Route Peels Off Spine

6.2 Interchange between Radial and Orbital routes.

The movement of passengers from one corridor to another is critically important to make Dublin more accessible by public transport. Making this interchange as easy as possible is thus critical to the successful delivery of the BusConnects Programme. Figure 3.4 indicates two typical scenarios that will arise on this project; the crossing movement (D/N4) and the overlapping movement (D/N2).

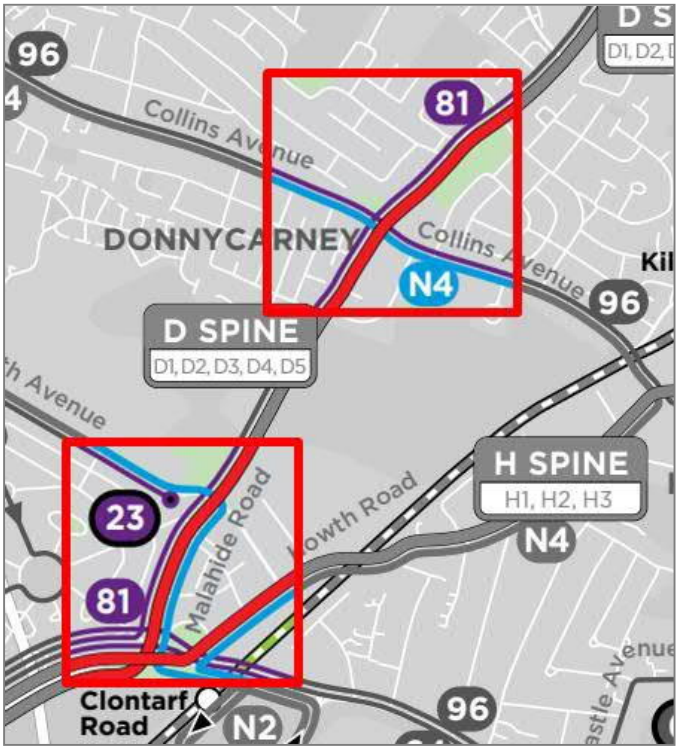


Figure 6.4 Two Different Scenarios for Interchange between orbital and radial corridors.

The optimum solution, but the less likely one, is the overlapping of routes which will allow passengers to leave one route and access another one via the same bus stop (or the opposite pair) making it a very easy interchange. For this option it is important that the designer considers the location of bus stops in a similar manner to the previous section on peeling off of branch lines.

For the more common crossing of routes the location of the bus stops needs to be carefully considered to minimise the distance passengers have to walk and to ensure there is a safe crossing location to facilitate this movements. This was outlined in section 5.4. **For locations where interchange is expected it is recommended that the desirable maximum distance between the interchanging bus stops is 100m,** with rest stops provided at 50m for those with impairments that restrict the maximum walking distance to below 100m.

7.0 Bus Stop Capacity

The capacity of bus stops is a complex and dependent on many variables which may constantly vary throughout a typical peak hour. For this reason it is proposed to undertake a high level assessment of bus stop capacity at this time and a more detailed assessment at a later stage when the Microsimulation Models are available for each corridor which can include the interaction between junctions and bus stops (potential bunching of buses), taxi numbers on the corridor, and the number of express or stopping coaches. Information on the calculation of capacities is available in the TRB, Transit Capacity and Quality of Service Manual, 3rd Edition and for complex locations it is recommended that the designer review applicable sections of this document to gain an understanding of the critical parameters.

7.1 Number of Bus Bays

The TFL Bus Stop Design Guidance states that bus stop capacity is a function of bus length, service frequency, the number of serving routes and their average dwell time. The BusConnects Dublin Corridors will generally carry between 15 to 20 buses per hour at peak times, which equates to a bus every 3 minutes. Assuming a maximum dwell time of 1 minute it could be assumed that one bus stop will be sufficient in most cases. However, the spine corridors will have multiple branches joining at different points with buses running at different frequencies resulting in buses not running at a constant headway. Figure 7.1 below indicates a bus arrival scenario from the TFL Bus Stop Design Guideline which shows how buses may arrive at a stop. This shows the estimated volume of buses at a single bus stop, depending on the frequency of the respective services. For example, Scenario C shows that although there is a frequency of 26 buses per hour, the stop, would theoretically operate well below capacity, however the arrival pattern of buses means that at times more than one bus will be on the stop. For this reason, it would be recommended that this bus stopshould have sufficient space to board and alight two buses at once.

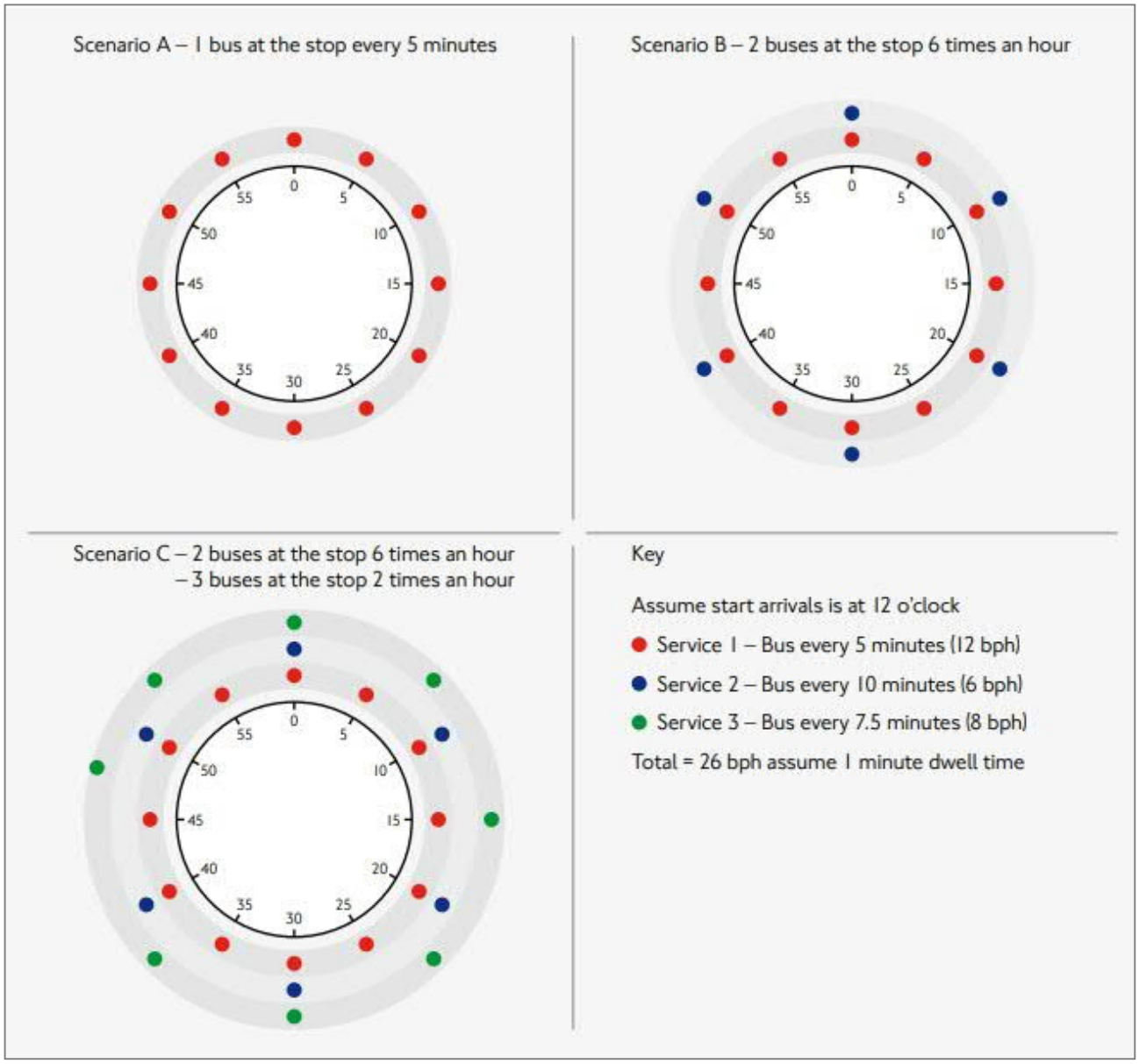


Figure 7.1 Bus Arrival Pattern at a Bus Stop (Source: TFL Bus Stop Design Guidance)

Detail on the buses using each corridor can be obtained from the NTA Remix site (obtain access from NTA IPO), or the frequency information from the BusConnects website. This can be used to make an estimate of the number of bays required at a bus stop by generating scenarios for the stops based on the headways for each route similar to Figure 7.1 above. These assessments will be superseded on completion of the micro-simulation analysis of each route, for this reason it is proposed to undertake this initial assessment based on the assumption that 2 bus bays will likely be required where there are between 25 and 30 buses on the route. This would require a longer bus cage that will accommodate two buses stopped simultaneously, approximately 24m in length (end to end bus), with Kassel Kerbs provided over its length to assist passengers, particularly those with a mobility impairment, to board and alight with ease from both buses.

Number of Bays at a Bus Stop	Where a Corridor is carrying approximately **25 to 30 buses** or more per hour, consideration be given to lengthened the bus stop cage and kerbing to provide space for 2 buses stopping simultaneously. Independent arrival and departure is not required.

Figure 7.2 Where space permits double bus bay should be provided where more than one bus is expected to arrive at a bus stop simultaneously (source: Google)

7.2 Passing Lanes

For corridors with large number of buses, particularly express buses that are not stopping at bus stops it may be necessary to provide a passing lane, or to indent the bus stop in a lay-by, to allow these faster moving buses to overtake the slower ones. This is likely to be particularly important on high capacity corridors where Regional Buses are accessing the City Centre. The TIAR Consultant has undertaken an initial assessment of this and have concluded that where the **hourly bus numbers exceed 40 the addition of a bus stop layby** will help maintain bus capacity and reliability along the corridor. The specific number for each corridor will be obtained from detailed microsimulation analysis at a later date.

Requirements for passing Lanes	Where a section of corridor is carrying approximately **40 to 50 buses** or more an hour**,** consideration should be given to providing passing lanes at bus stops.

Figure 7.3 In-line bus stops on a heavily used bus corridor can lead to express, or non-stopping buses, being delayed or making overtaking manoeuvres. (source: Dublin Bus Stuff).

8.0 Revisit Catchment Analysis

On completion of the review of bus stops along each corridor the catchment analysis for each corridor should be undertaken. The process was detailed in Section 4.0. The analysis should be undertaken and presented on a corridor basis with both Residential and Employment/Education population within 5 and 10 minutes presented.

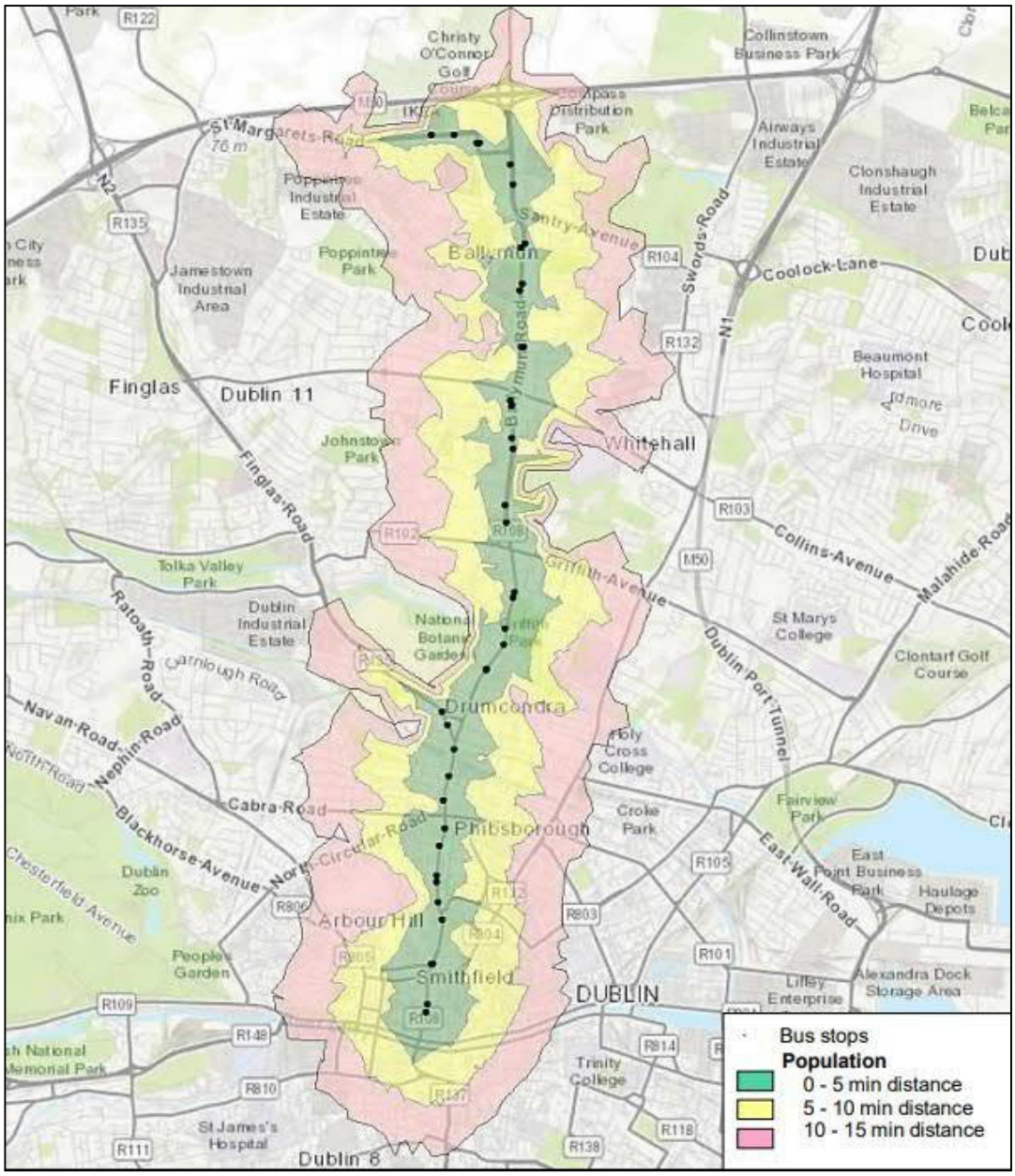


Figure 8.1 Typical map of bus corridor catchment areas

8.1 Presentation of Review

For consistency it is recommended that this review is undertaken, and presented, on the PRO drawings. High-level comments can be listed against each stop with distance between stops also noted (Document 1).

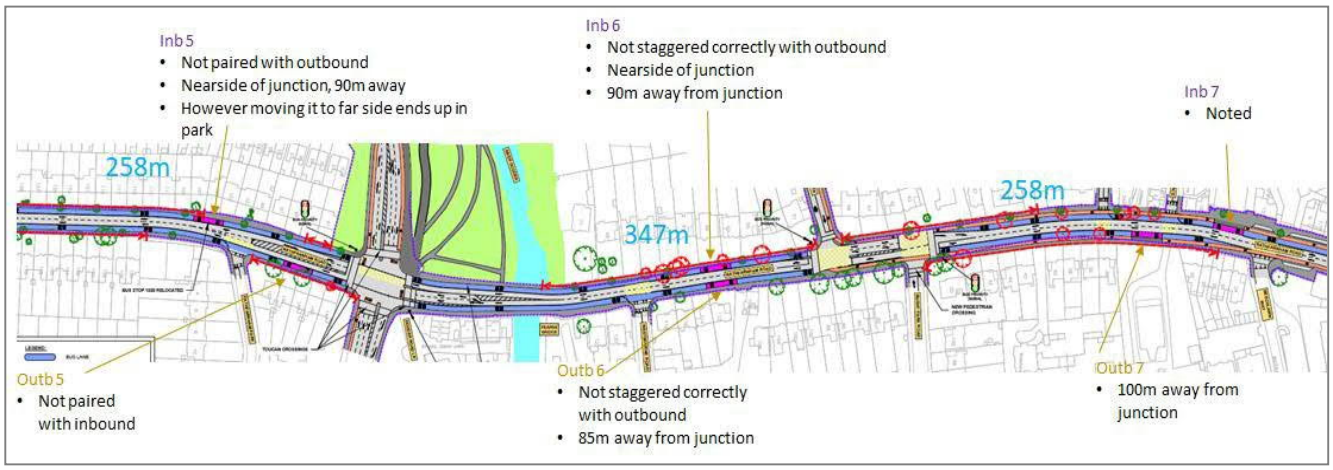


Figure 8.2 Example Review of Bus Stop Locations (Source: ARUP, Rathfarnham CBC).

This document should then be followed by a recommended bus stop strategy (Document 2) for each corridor indicating where bus stop are to be located and that all variables have been considered for each stop. This should be in a similar drawing to the review drawing in Figure 8.2, but focused on those stops that have been altered from the original PRO drawings. A summary table for each corridor should be placed on the front drawing of the recommendations summarising the existing and proposed bus stop strategy:

Corridor Name			
Number of Existing Bus Stops		**Length (KM)**	
	Existing	**Proposed**	**Comment**
Average Spacing of Bus Stops (m)			
All stops located adjacent to a controlled crossing?	Y/N	Y/N	
Have all accessibility / spatial requirements and consultation suggestion been accommodated?	-	Y/N	

Document 2 shall include a report providing specific details of each bus stop along a corridor and detailing the results of the catchment analysis for the optimised bus stops.

Appendix H2
Bus Stop Review Report

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Contents

List of Acronyms

Acronym	Definition
CBC	Core Bus Corridor
CBC's	Core Bus Corridors
GIS	Geographical Information System

1. Introduction

This report presents a summary of the Bus Stop Review process which was conducted for the Proposed Scheme.

The purpose of the process was to review the location of the existing Bus Stops to determine whether a stop should be removed, relocated, or remain where it is. This exercise was carried out to optimize the performance of the bus services travelling along the route by reducing the journey time of the bus service, to increase the walking catchment of the bus stops and to ensure key trip attractors located along the route is sufficiently covered within the catchment of bus stops.

Existing bus stops were therefore rationalised based on best practice principles related to bus stop placement. The outcome of this study was to develop a more efficient route which would attract more passengers by creating a wider population catchment and offer a shorter journey time to destinations.

2. Bus Stop Review Methodology

The methodology followed as part of this review is set out in the 'Bus Stop Review Methodology Working Draft Report' produced by AECOM which is attached in Appendix C. It outlines the methodology to be followed for the bus stop reviews, the various considerations to be made when assessing a stop location, and the background reasoning for those considerations.

Figure 2.1 presents a flowchart which outlines the methodology proposed.

Each of the study components as outlined below are discussed in more detail in the remainder of this report and applied to the Proposed Scheme.

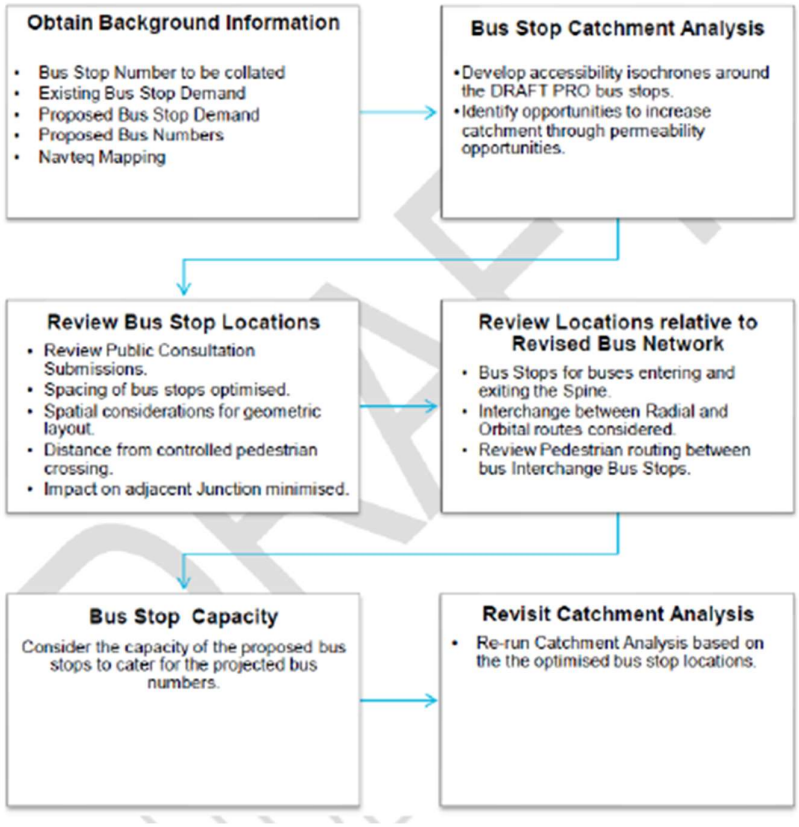


Figure 2.1: Bus Stop Review Methodology Flowchart

2.1 Obtain Background Information

In order to assess the bus stop locations with a variety of considerations in mind, certain key data was acquired, measured, or calculated. This information was compiled in a spreadsheet which can be found in **Appendix A.**

The background information obtained for the study along with the source of the information in **Table 2.1.**

Information	Source
Stop Numbers for all inbound and outbound stops along the route	Dublin Bus Automatic Vehicle Location (AVL) Data
Stop Names	Dublin Bus AVL Data
Current Stop Location Coordinates	Google Maps (MyMaps .kml export)
Current distance to previous stop	Google Maps and Topographical Surveys (Measured)
Stop location as per PRO (relative to existing location)	PRO Design Drawings
PRO Distance to previous stop	PRO Design Drawings and Google Maps
Peak Boarding and alighting volumes and times	NTA
Future Buses per hour	SYSTRA
Current distance to junction / pedestrian crossing	Google Maps and Topographical Surveys (Measured)
PRO distance to junction / pedestrian crossing	PRO Design Drawings and Google Maps
Potential for interchange with Orbital Routes	BusConnects Revised Network Layout

Table 2.1: Background information and sources

2.2 Bus Stop Catchment Analysis

To develop a baseline against which any bus stop relocation recommendations can be tested, catchment analysis was conducted on both existing and proposed populations living and working within a 15-minute walk of existing bus stops. This analysis was carried out in GIS using Navteq mapping as the network dataset, along with the coordinates of the existing bus stop locations. The current and proposed catchment of both the inbound and the outbound bus stops are shown in 5-minute walking intervals up to 15 minutes in **Figures 2.2 to 2.7** below.

2.3 Review Bus Stop Locations

The locations of the bus stops were reviewed in accordance with the 'Bus Stop Review Methodology Working Draft Report' produced by AECOM.

Appendix A provides a table of features for each bus stop which was used to consider the possible relocation of each bus stop.

The main principles considered as part of the review are as follows:

- Aim to achieve a bus stop spacing of 400m in suburban locations, and 250m in urban centres
- Locate bus stop to nearest junction/pedestrian crossing;
- Locate stop downstream of junction rather than upstream;
- Consider space requirements to provide bus stop including shelter, waiting area, cycle lane and footpath provision and information displays;
- Review existing and proposed boarding & alighting volumes to determine the size of the bus stop;
- Potential interchange orbital bus services proposed as part of BusConnects with revised network

The above principles were considered in conjunction with examination of maps and aerial photography to determine whether a bus stop should remain where it is, be relocated or be removed.

If it was found that access to a bus stop could be improved by relocating it to a better proximity to local features, the decision was made to move it. This would typically include cases where bus stops are currently upstream from a junction or crossing, or when the stop is not located optimally in terms of a catchment area or key land use access.

When a bus stop was found to be too close to a previous or following stop, the decision was made to either remove the bus stop or to consolidate it with another stop to obtain better spacing intervals.

2.4 Catchment Review

Following the review of the bus stop locations, the catchment analysis helped us to understand the impact of the changes on the bus network. The catchment population comparison tables present the number of residents and employees within each catchment zone for the existing and proposed bus stop locations, along with the difference between them. The catchment over the whole route was analysed as one zone, as assessing each stop individually would lead to much of the population being double counted.

Catchment maps were also generated for the route were also generated so that a visual review could be done to identify areas of improvement and areas that are serviced with no attraction or trip origin locations. This can be an iterative process to ensure as many of the population are within the catchment, while also trying to improve the efficiency of the stops to potentially reduce the number of stops along the route. The comparative maps give a good understanding of the improvement, as seen in **Figures 2.2 to 2.7.**

2.4.1.1 Swords to City Centre – 5min Catchments (Inbound and Outbound)

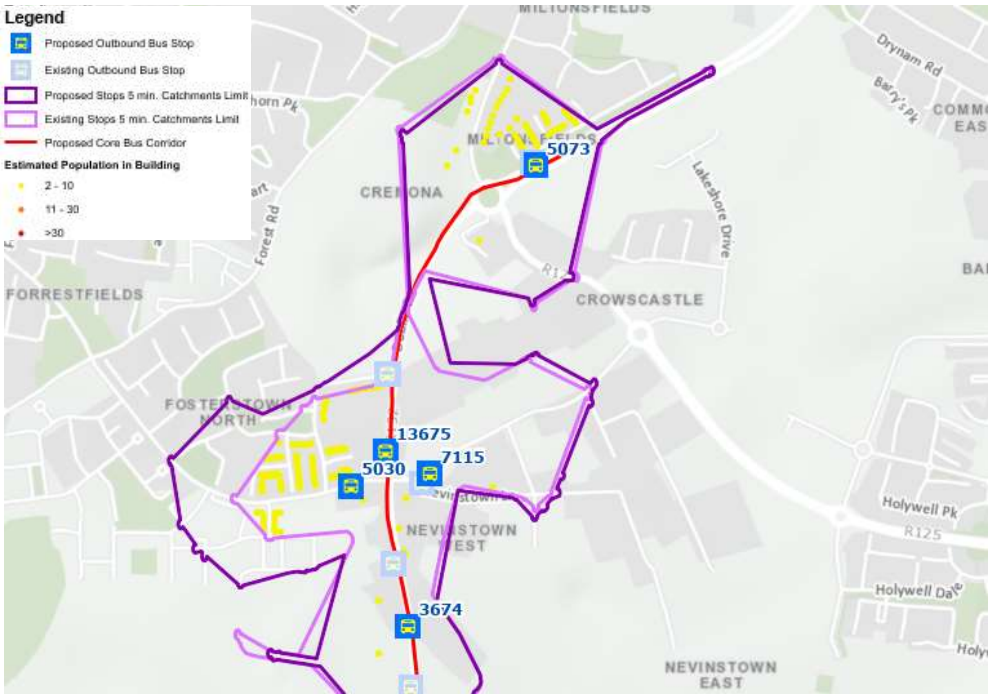


Figure 2.2a : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

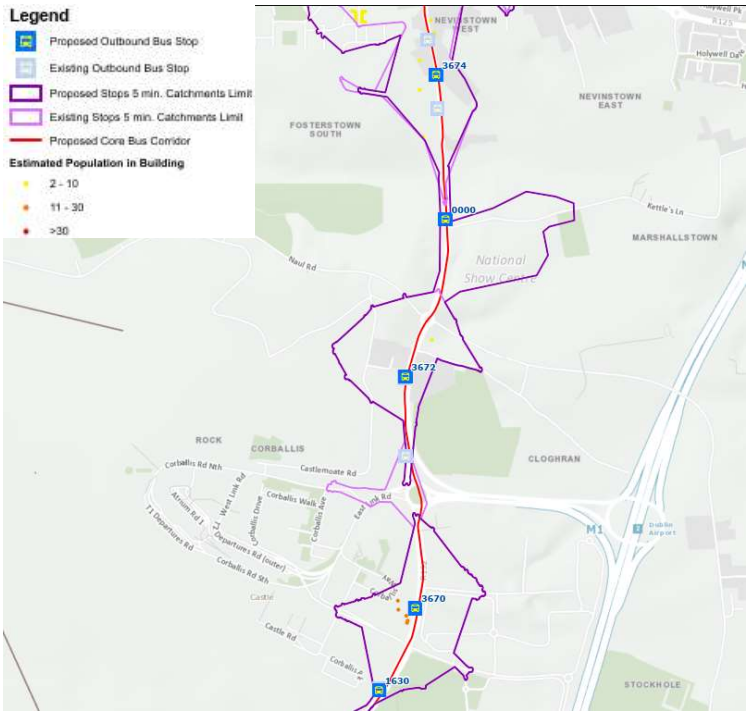


Figure 2.2b : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

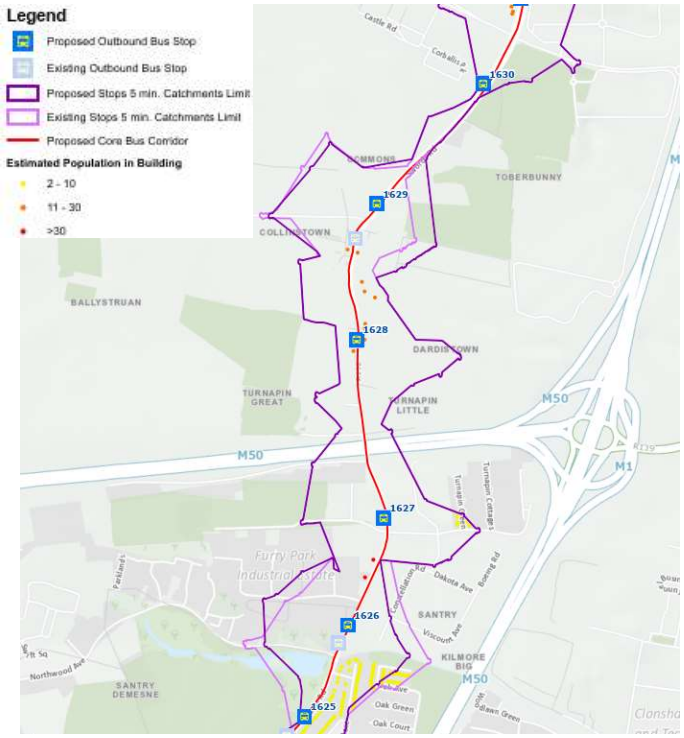


Figure 2.2c : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

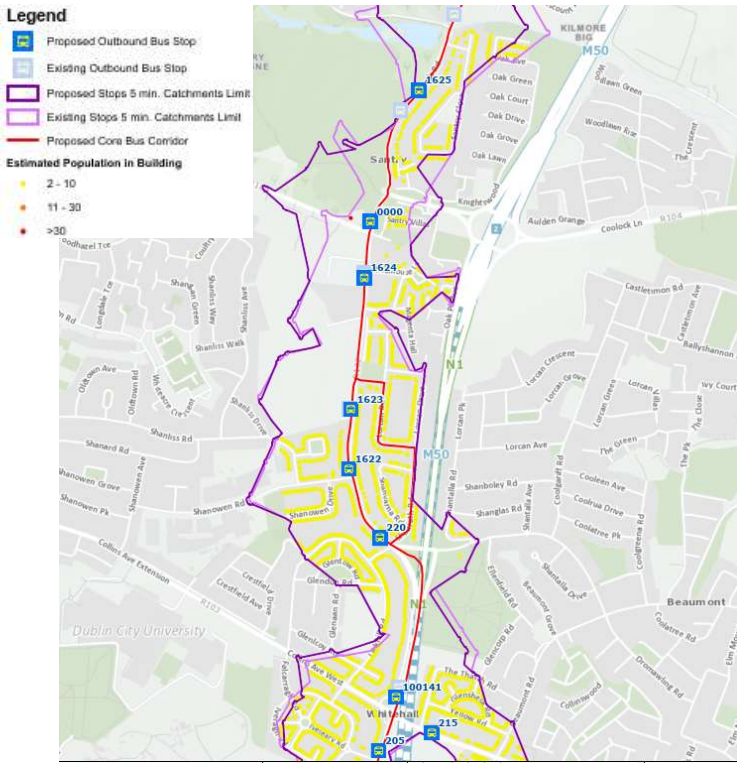


Figure 2.2d: Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

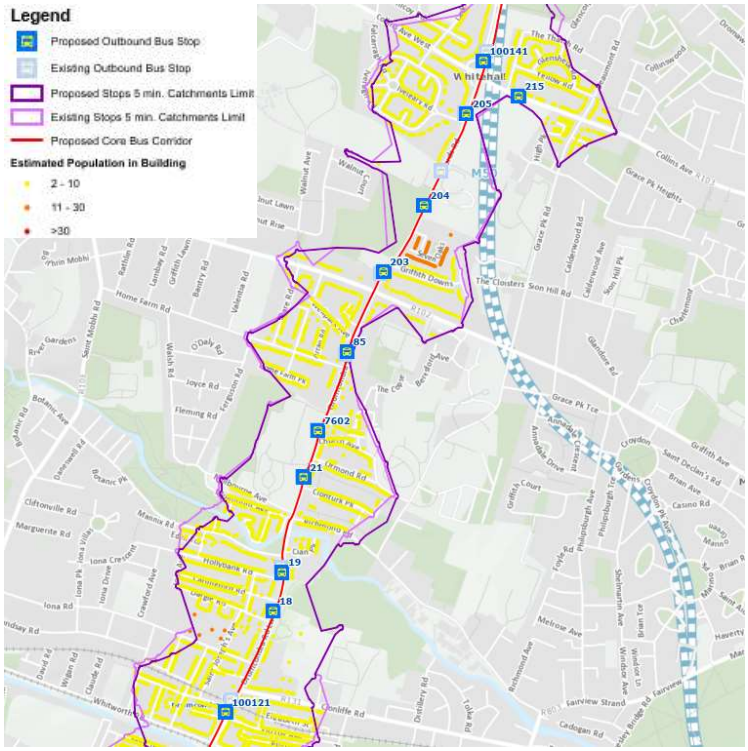


Figure 2.2e : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

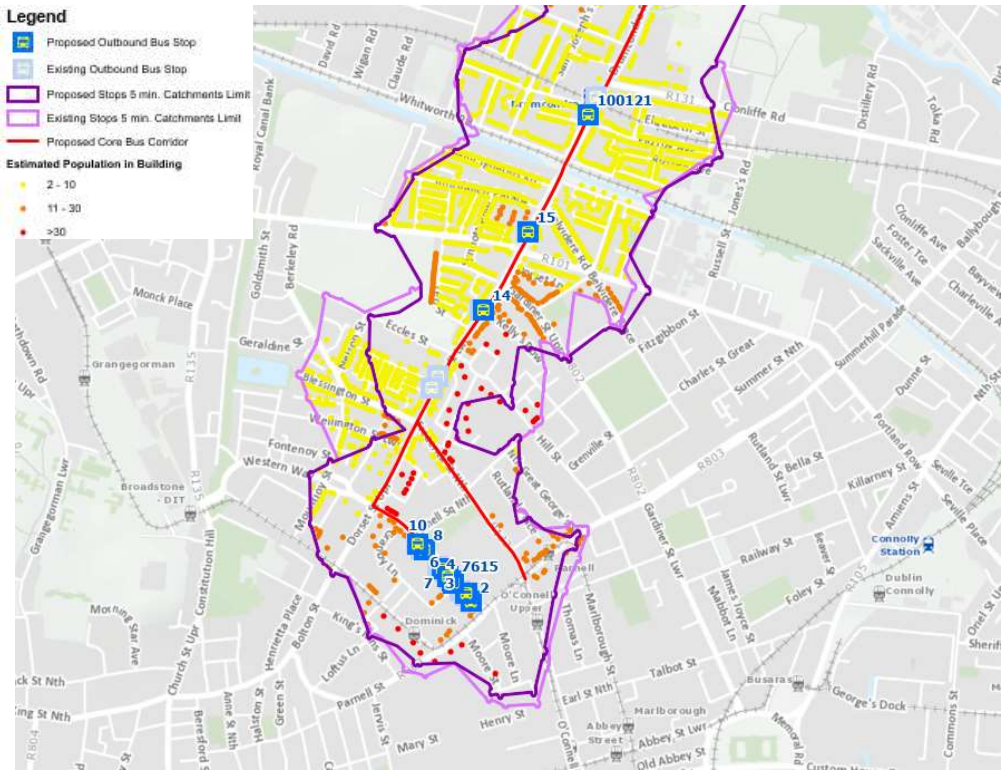


Figure 2.2f : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 5min Catchment

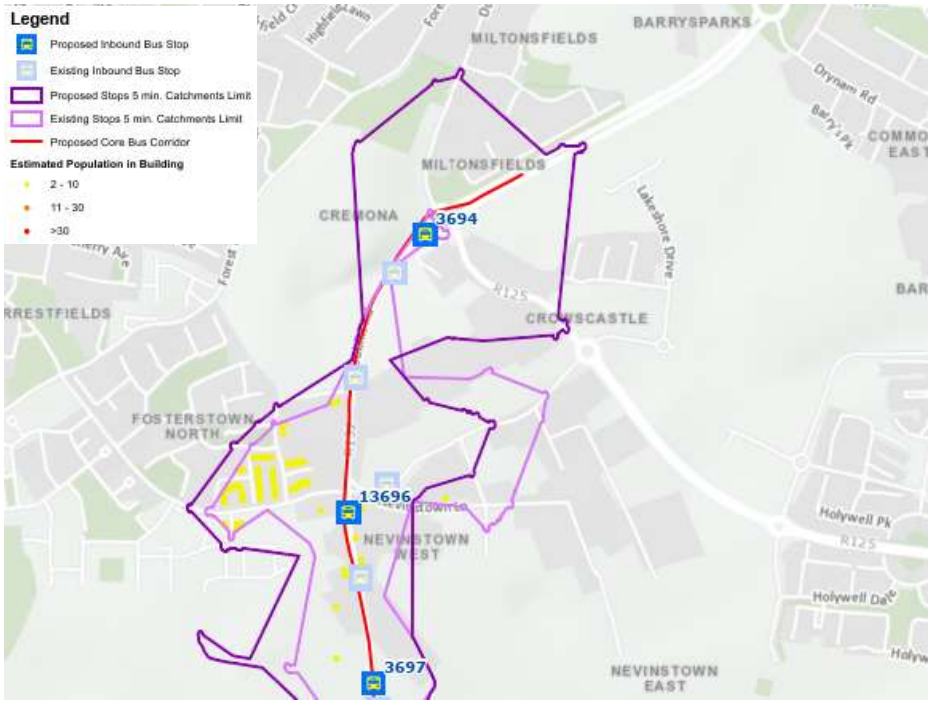


Figure 2.3a : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

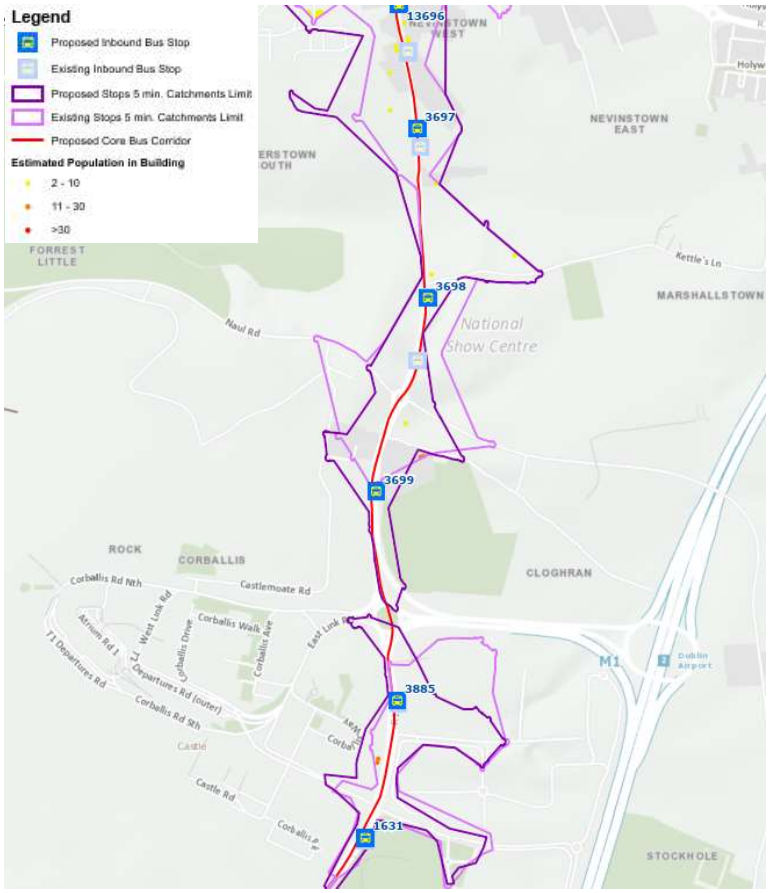


Figure 2.3b : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

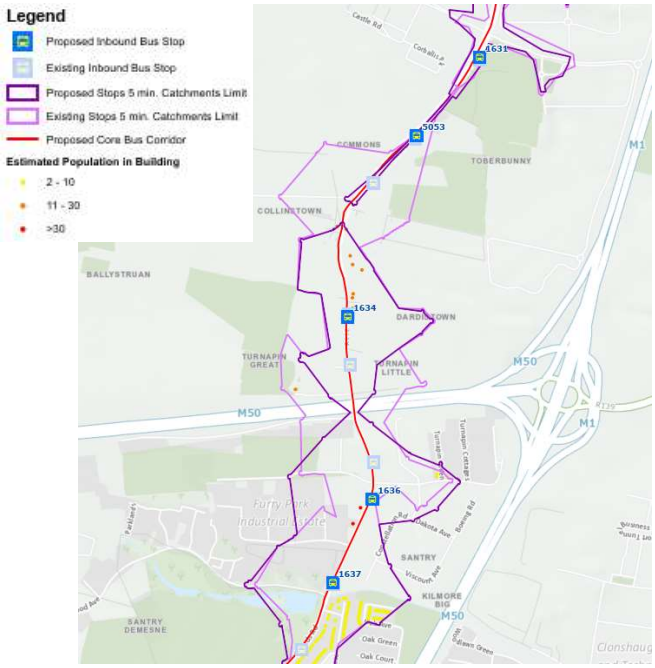


Figure 2.3c : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

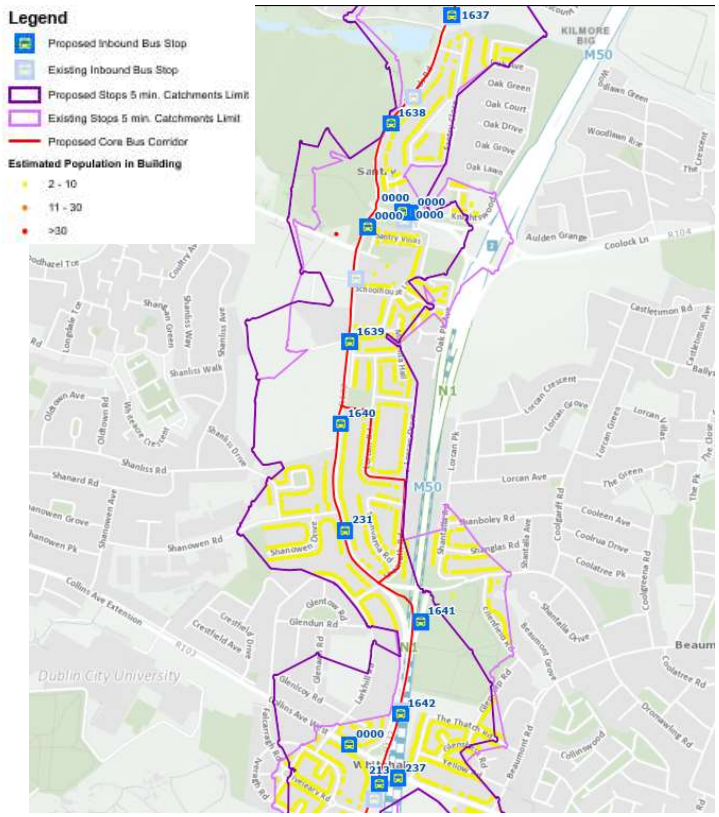


Figure 2.3d : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

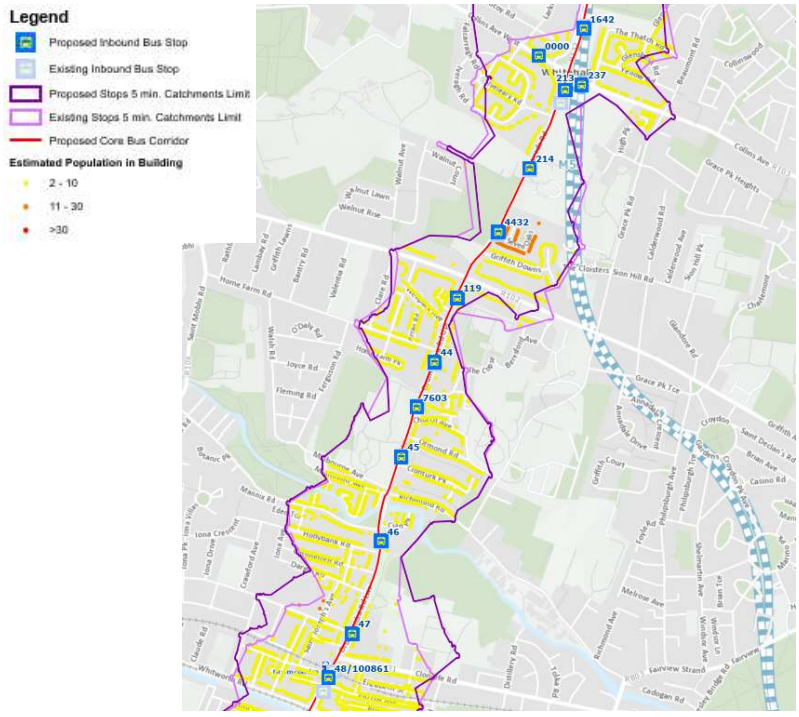


Figure 2.3e : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

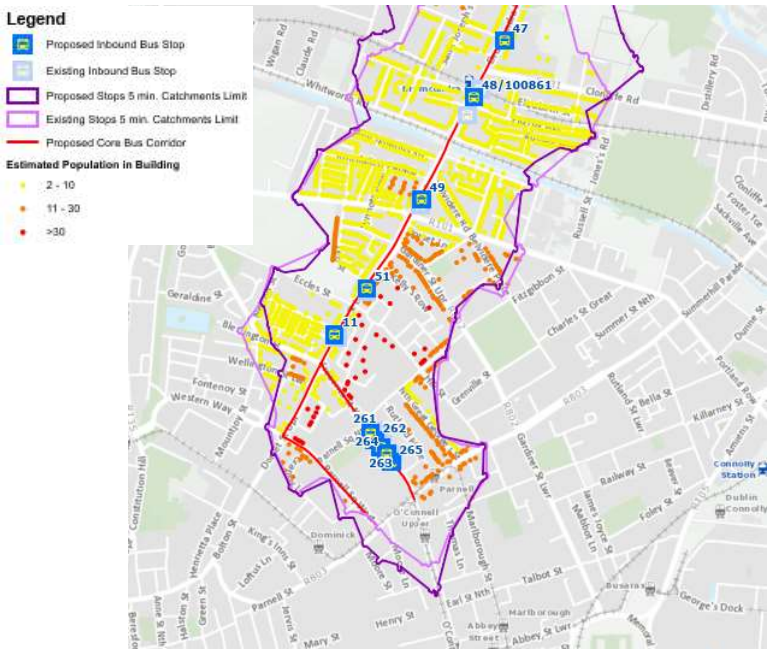


Figure 2.3f : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 5min Catchment

2.4.1.2 Swords to City Centre – 10min Catchments (Inbound and Outbound)

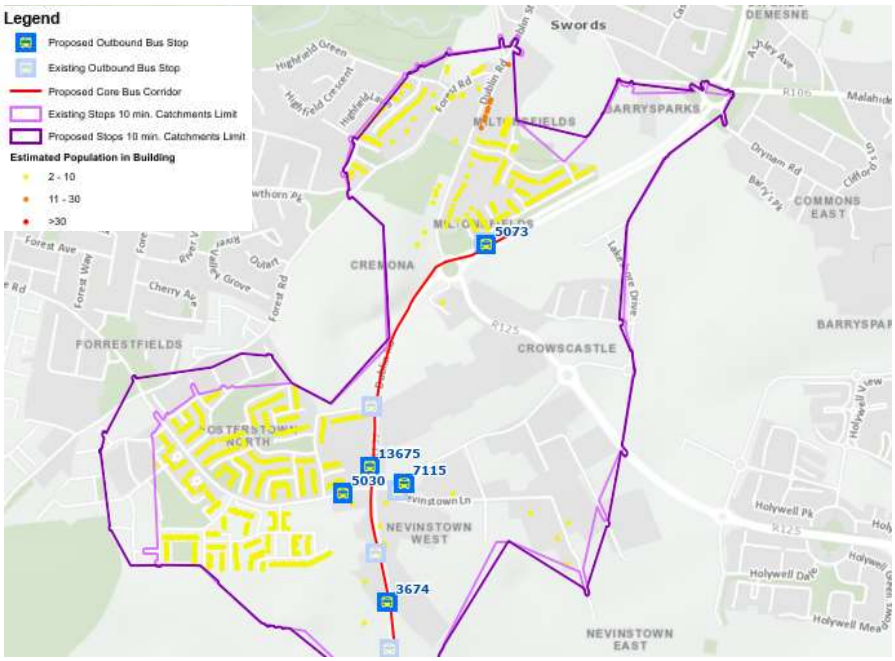


Figure 2.4a : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

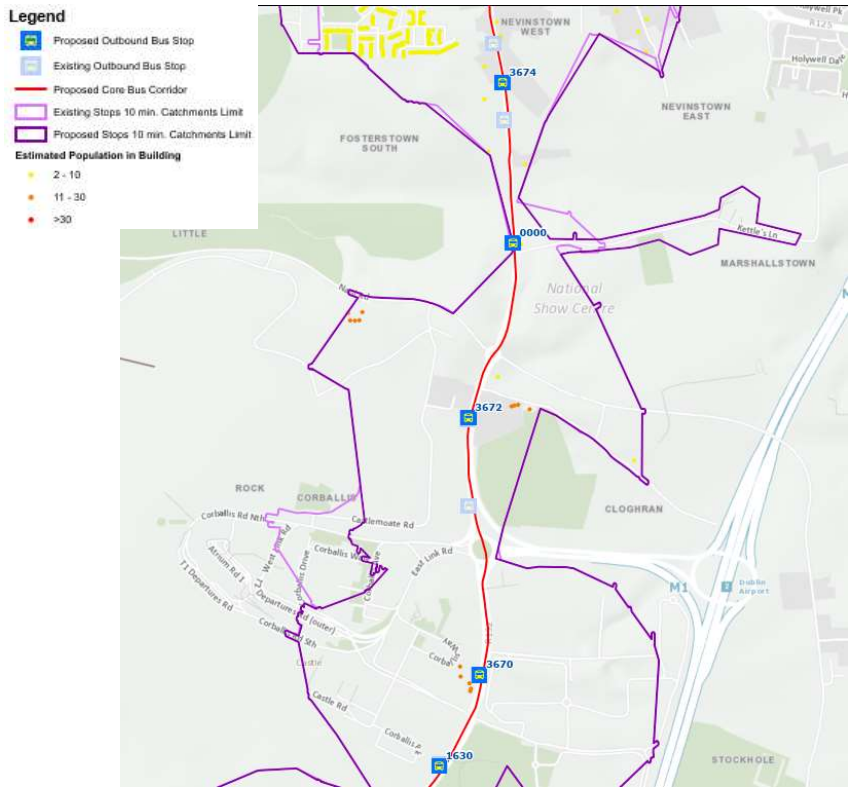


Figure 2.4b : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

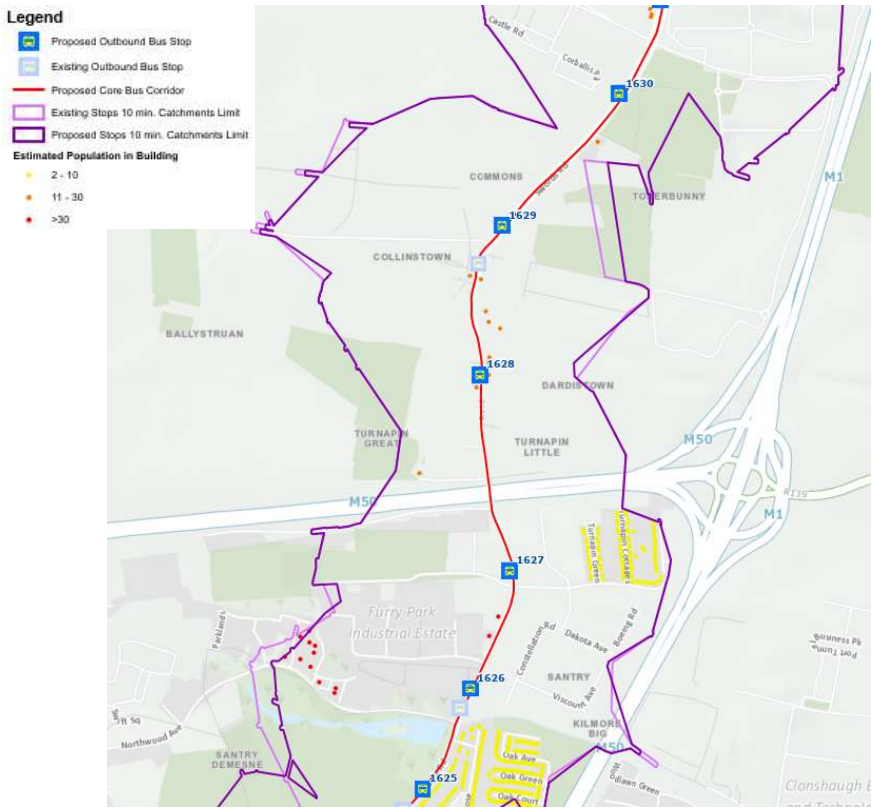


Figure 2.4c : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

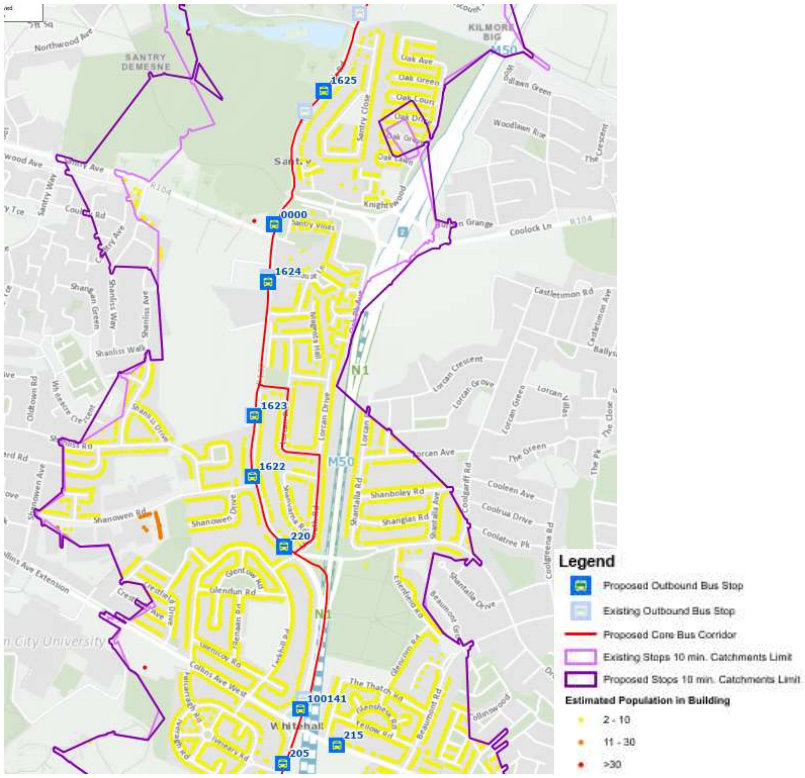


Figure 2.4d : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

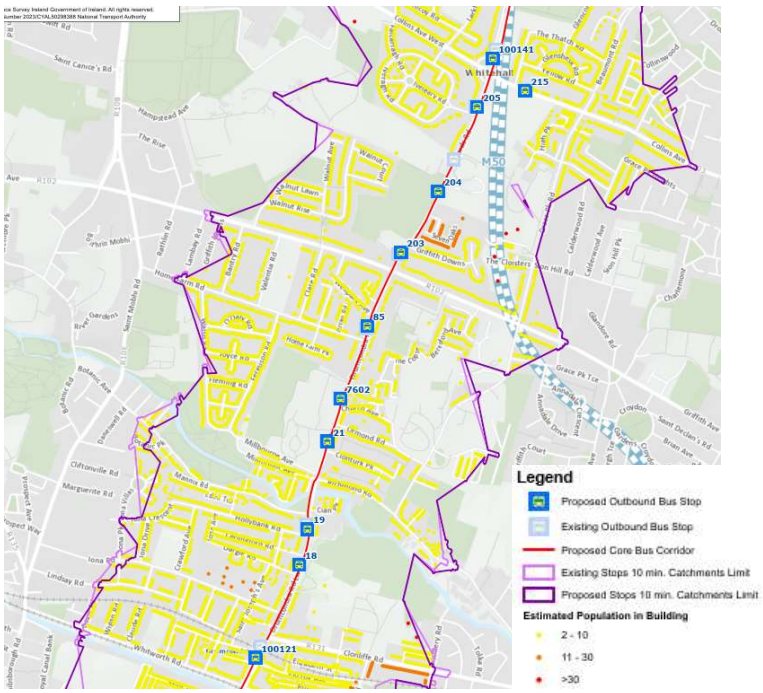


Figure 2.4e : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

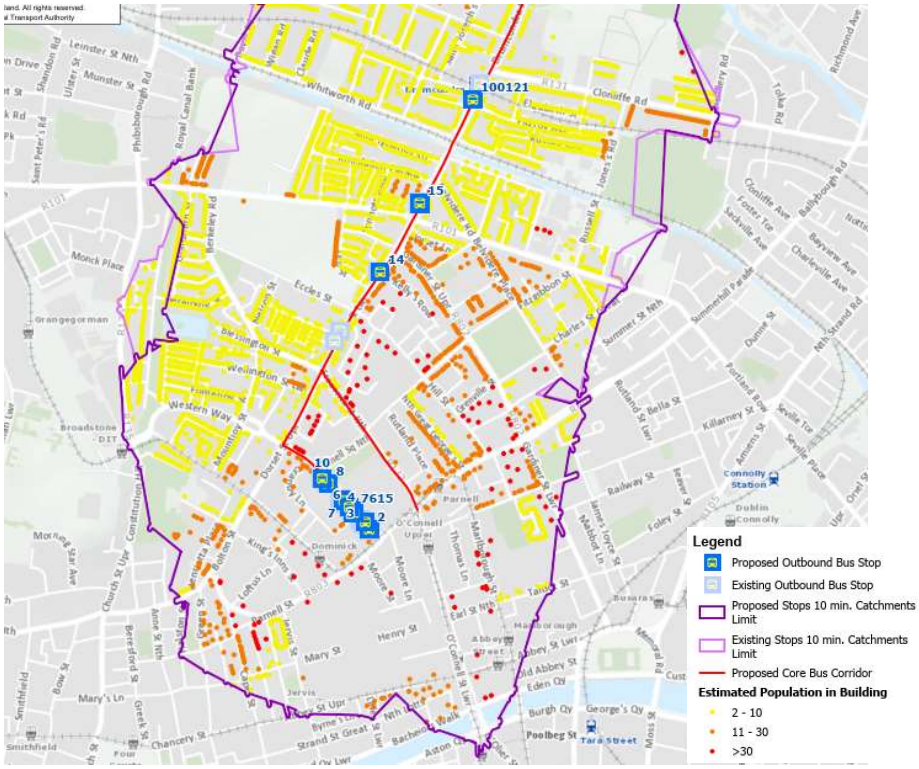


Figure 2.4f : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 10min Catchment

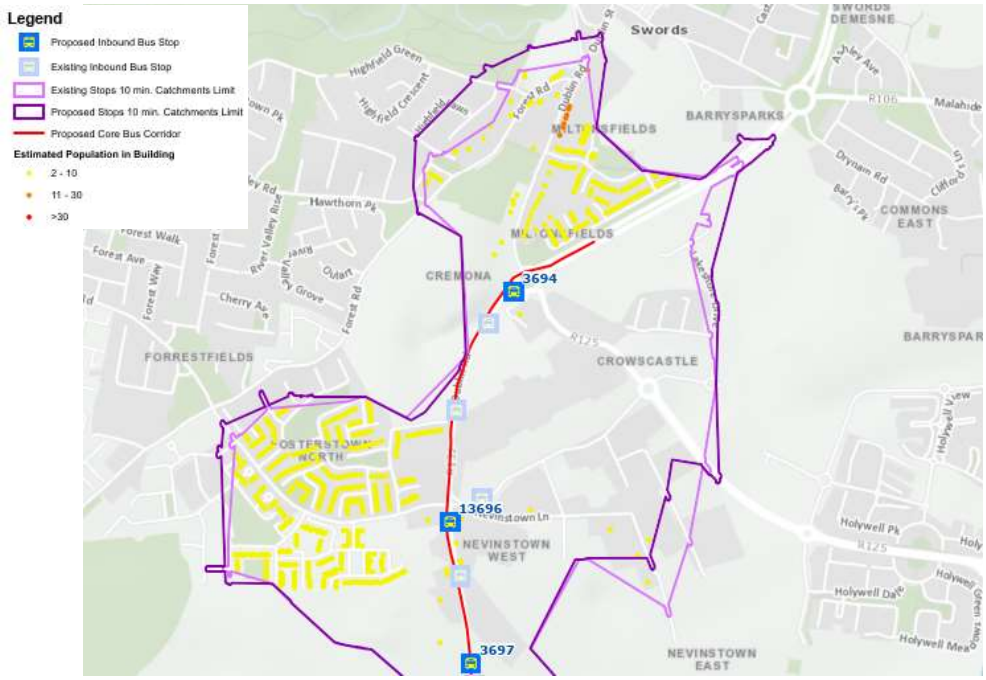


Figure 2.5a : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

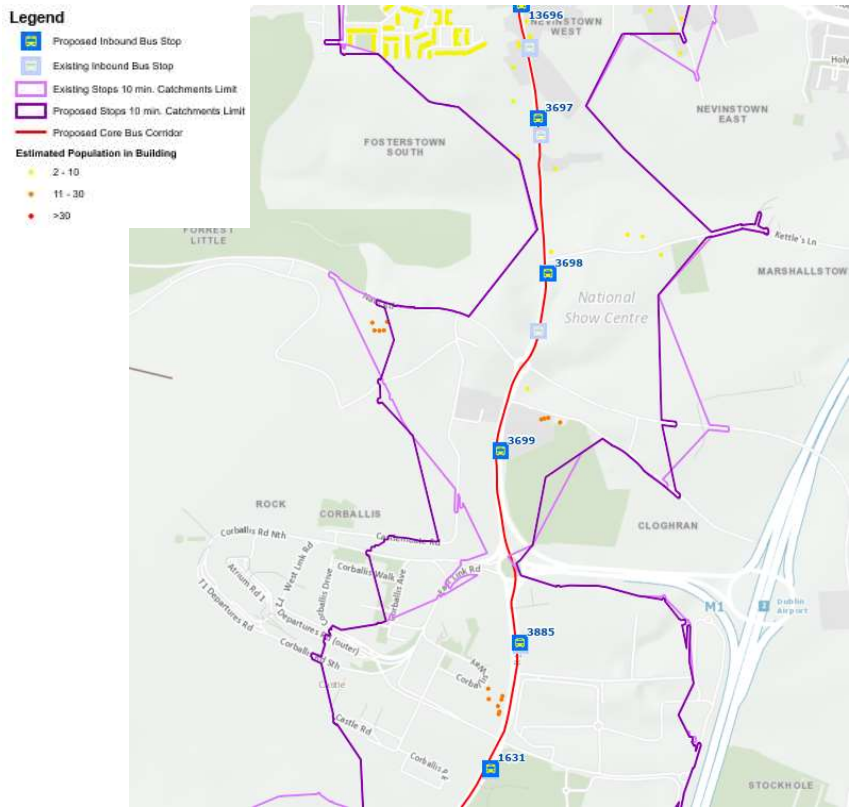


Figure 2.5b : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

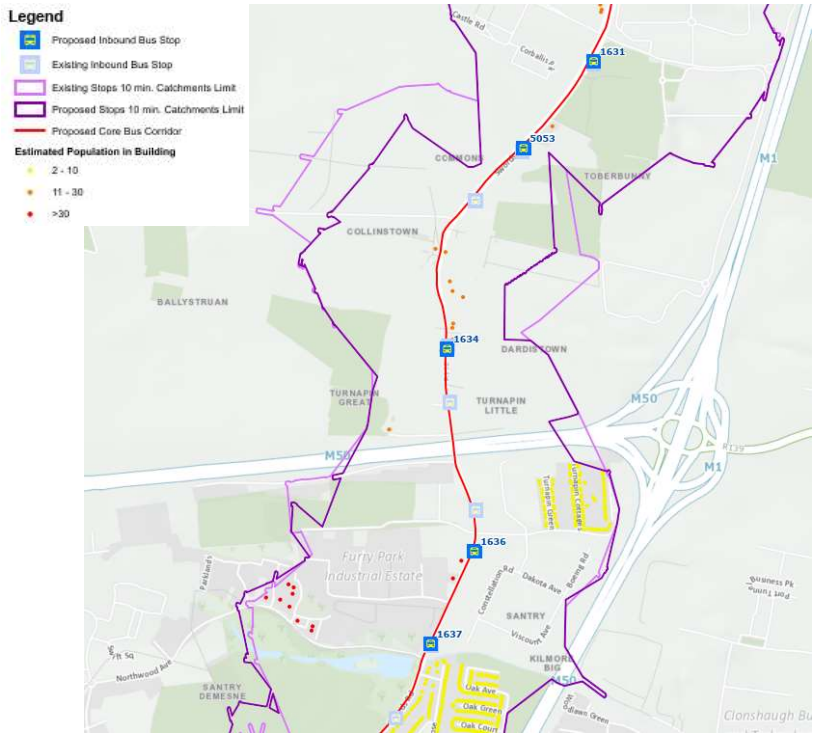


Figure 2.5c : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

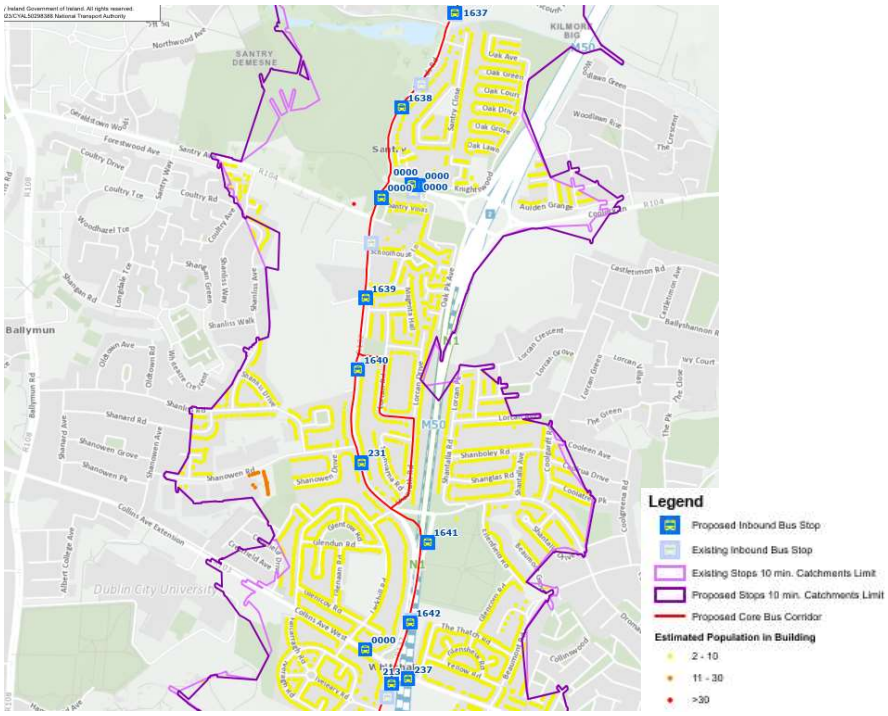


Figure 2.5d : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

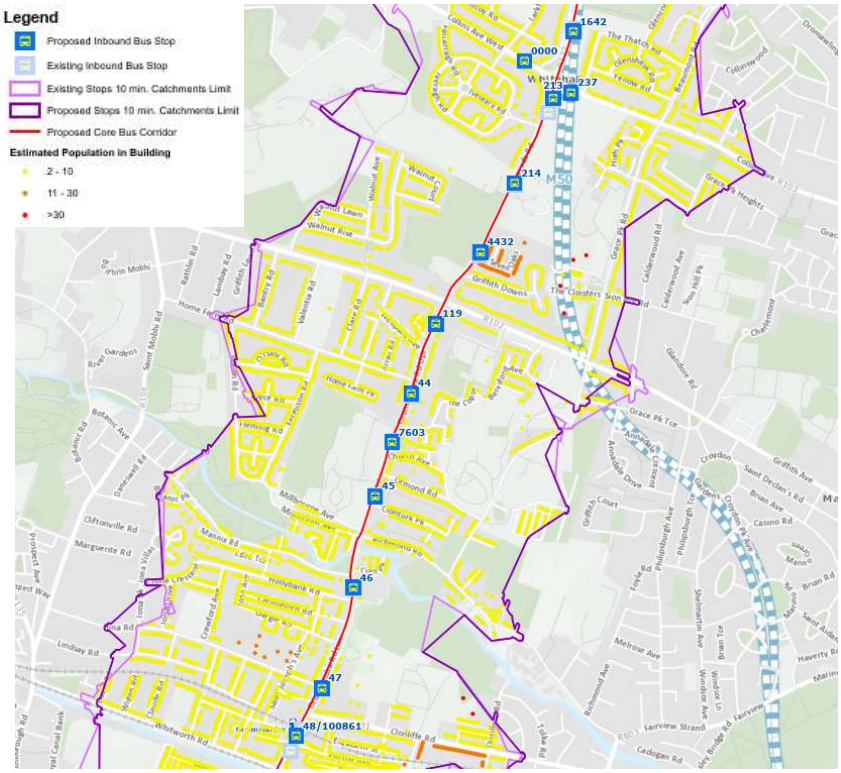


Figure 2.5e : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

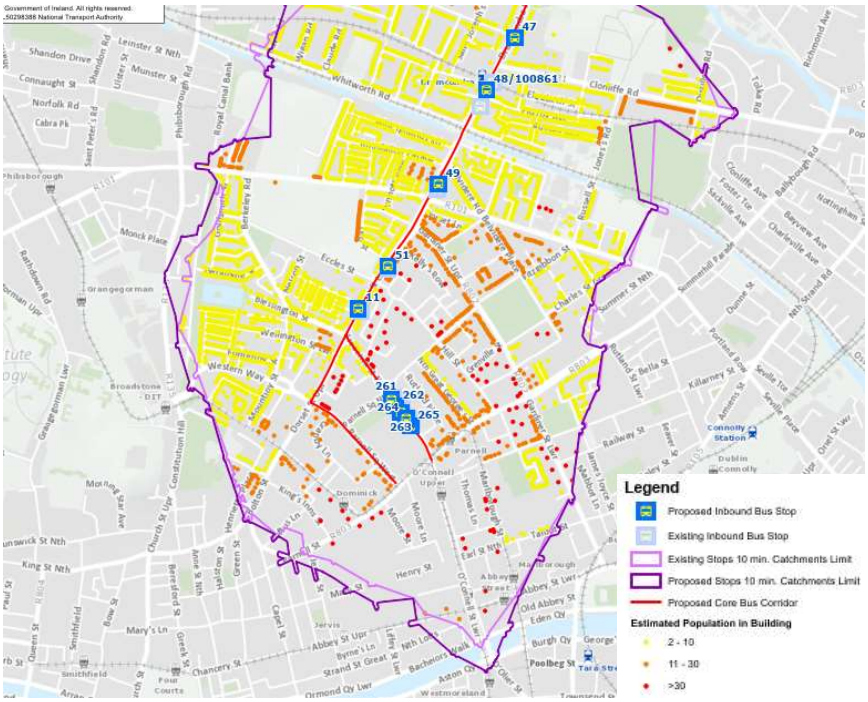


Figure 2.5f : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 10min Catchment

2.4.1.3 Swords to City Centre – 15min Catchments (Inbound and Outbound)

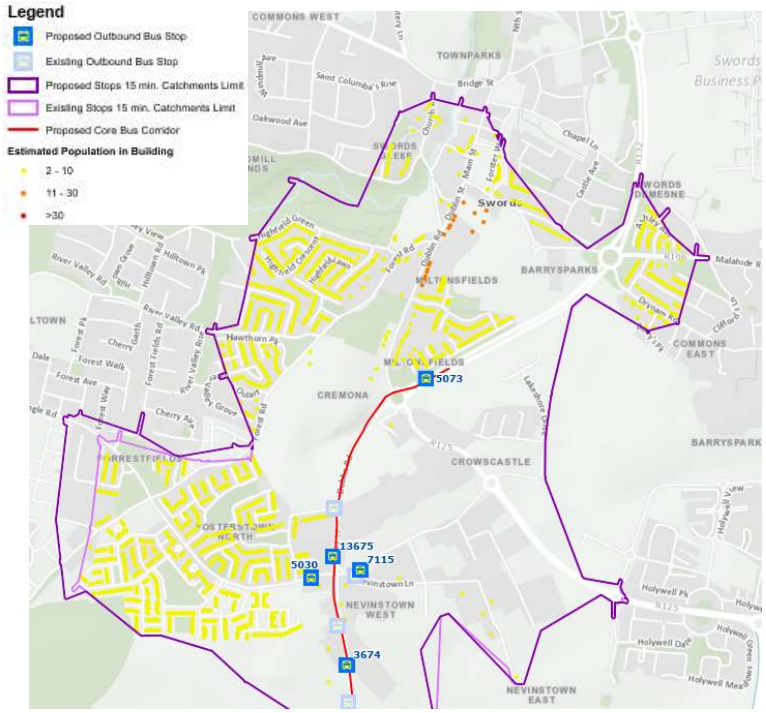


Figure 2.6a : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

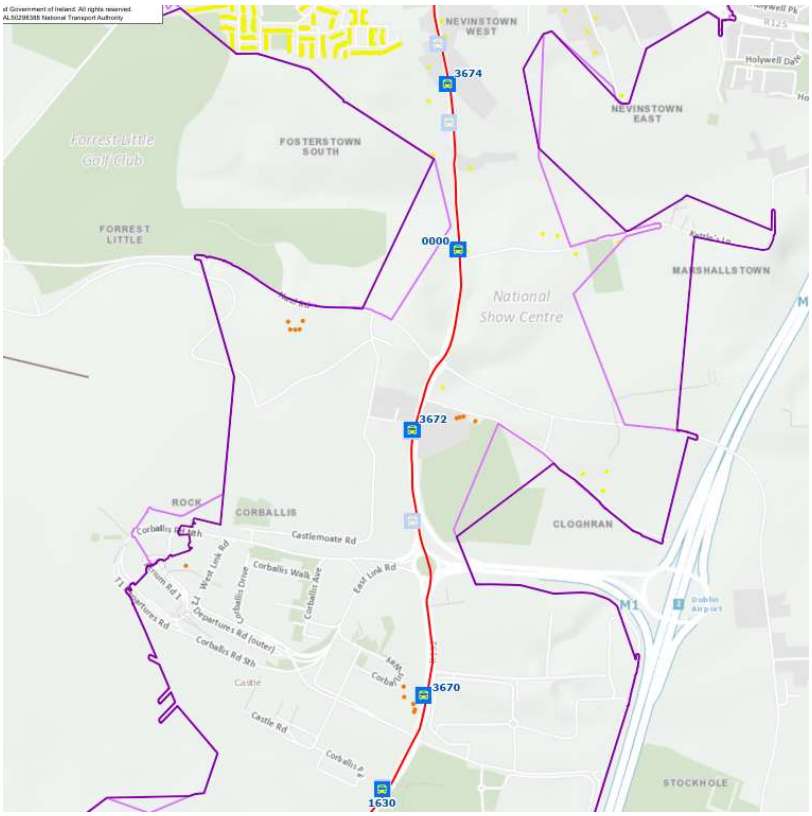


Figure 2.6b : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

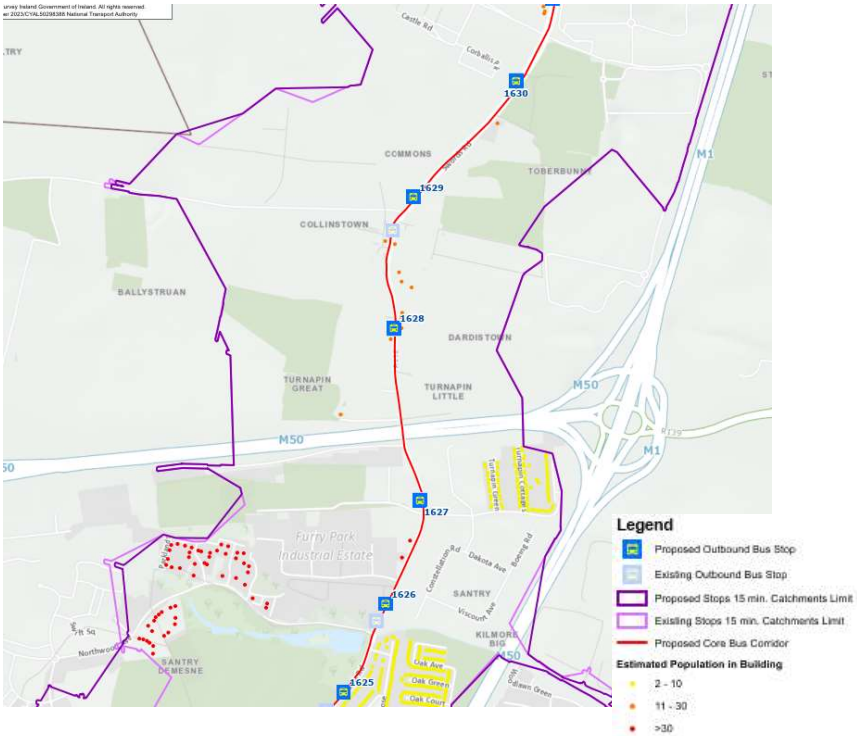


Figure 2.6c : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

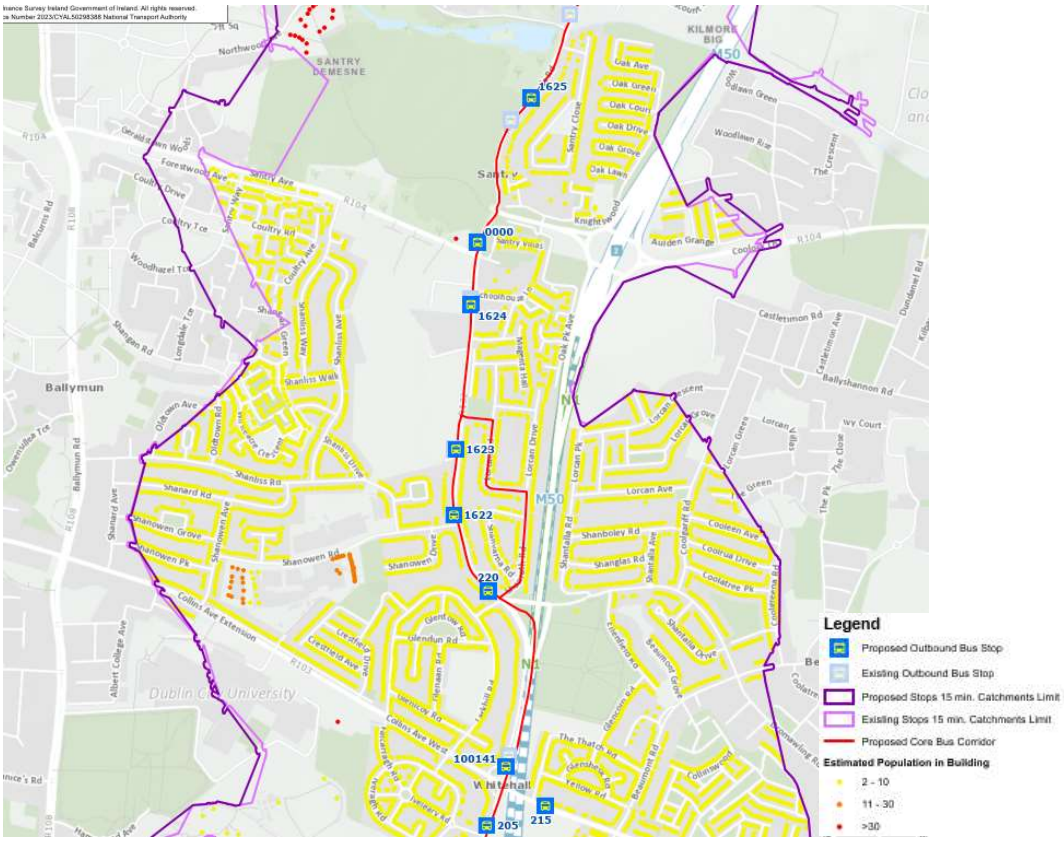


Figure 2.6d : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

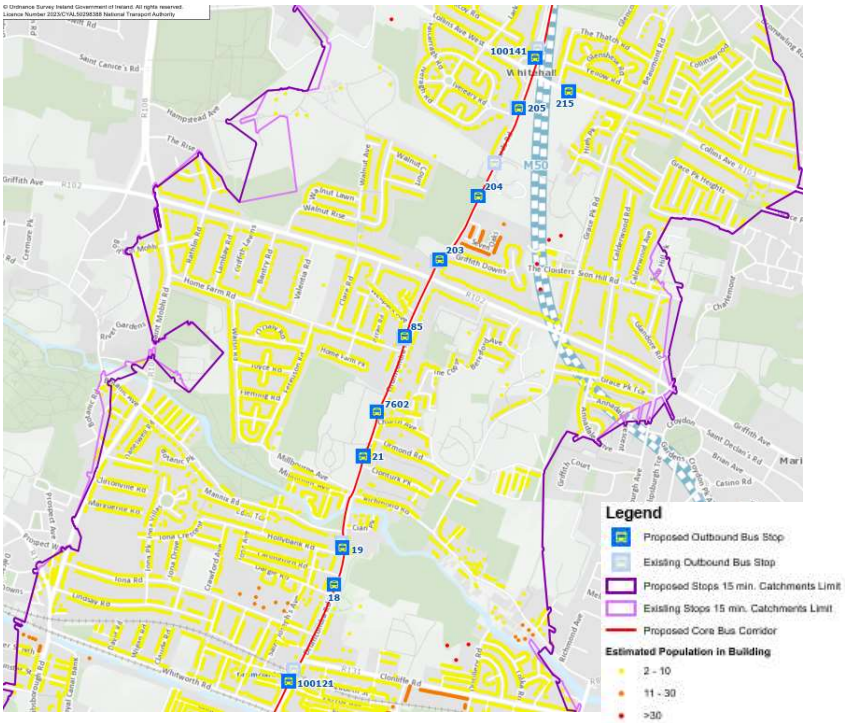


Figure 2.6e : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

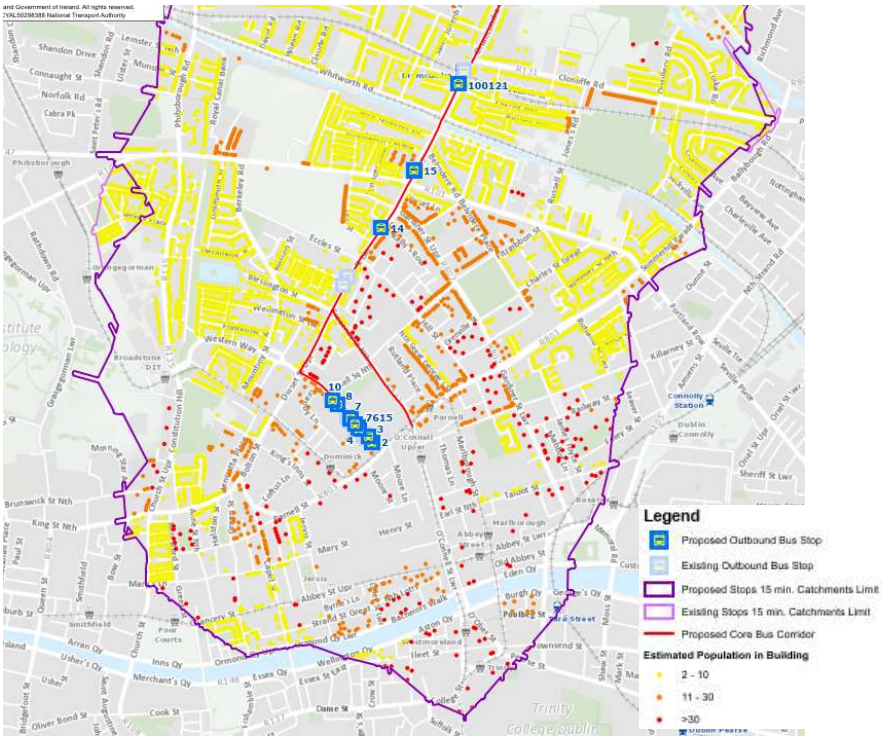


Figure 2.6f : Swords to City Centre Existing and Proposed Outbound Bus Stop Catchment – 15min Catchment

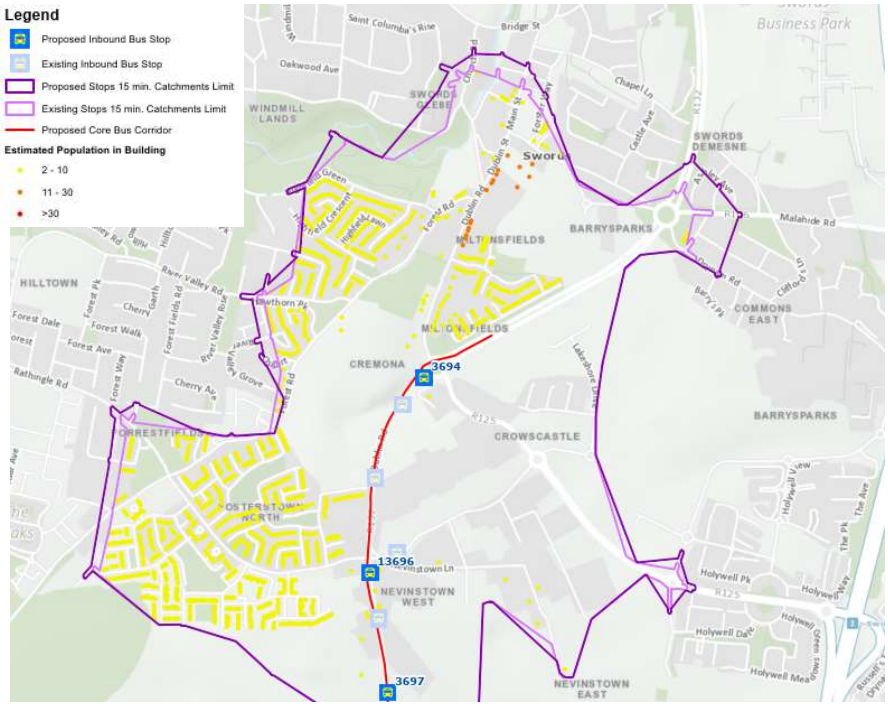


Figure 2.7a : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

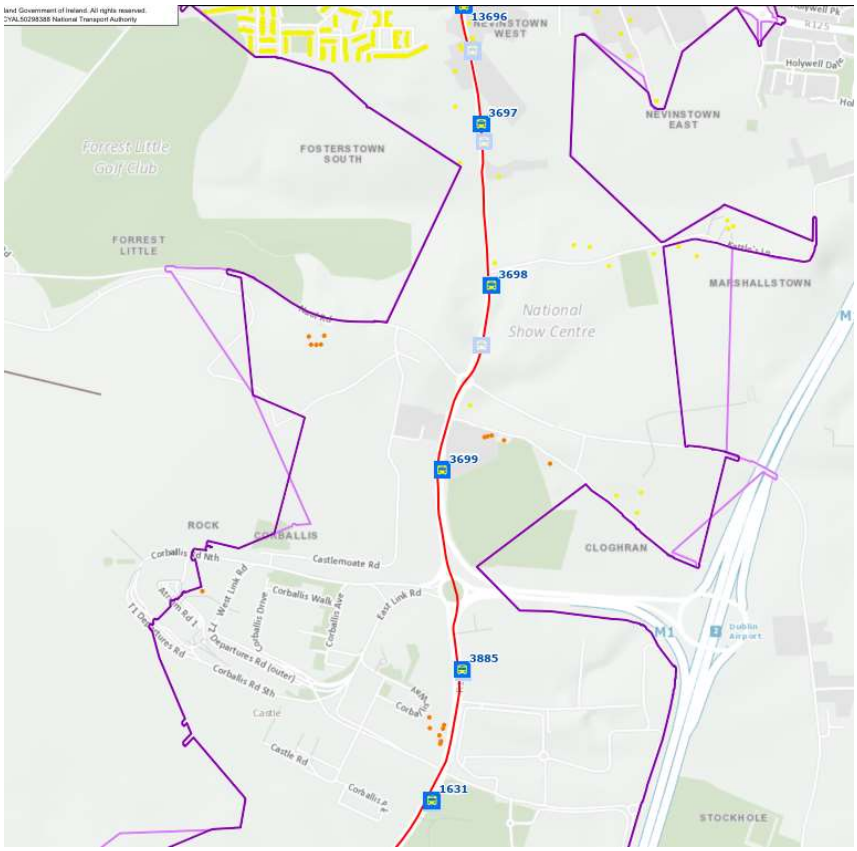


Figure 2.7b : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

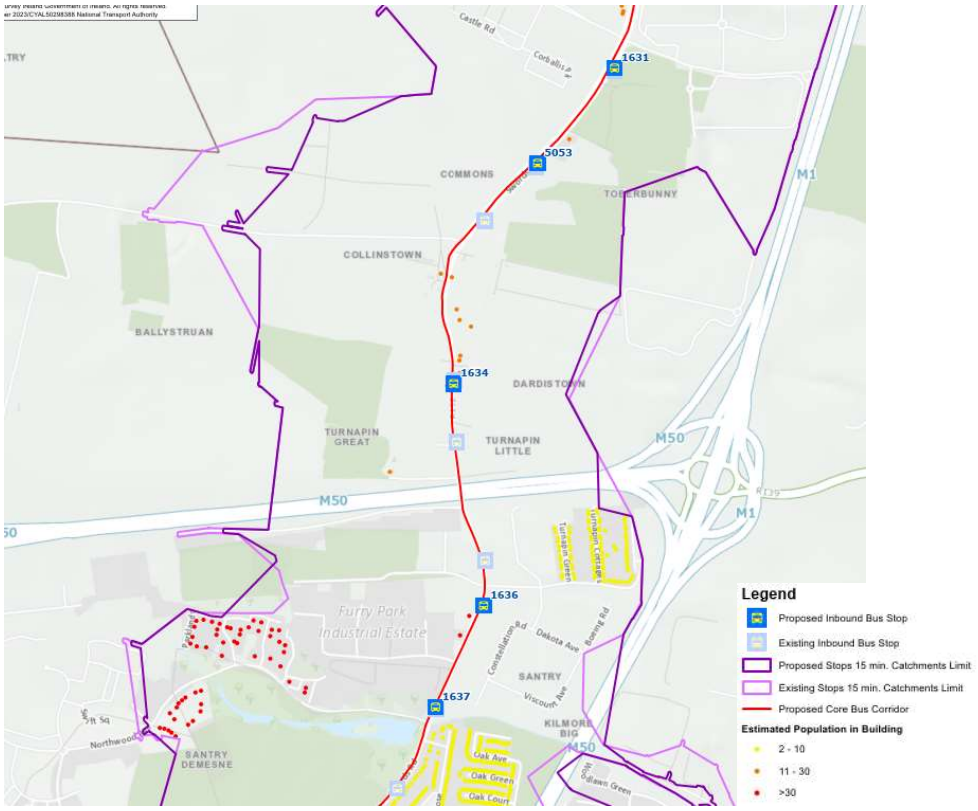


Figure 2.7c : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

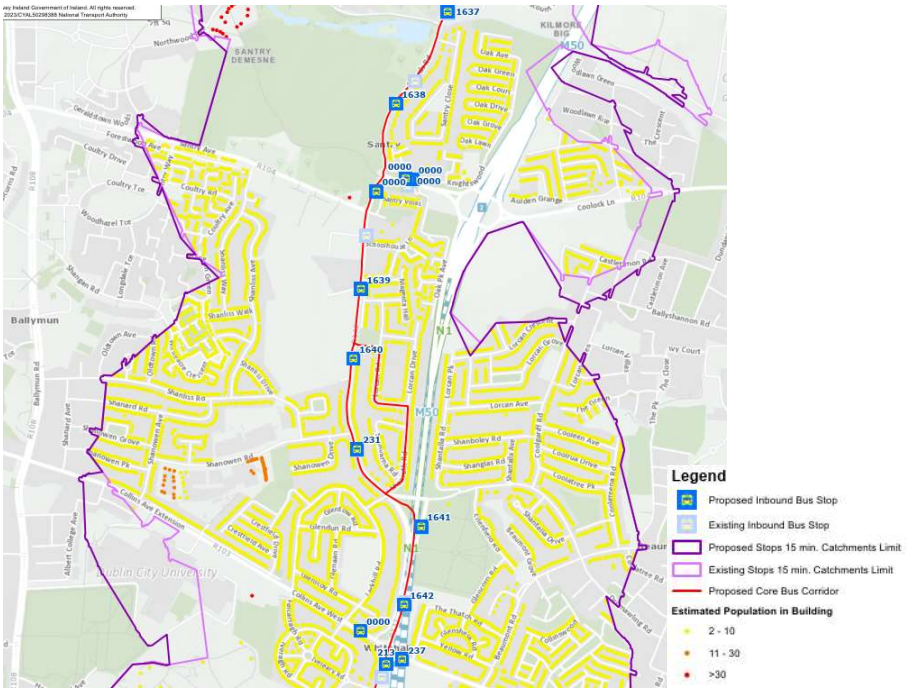


Figure 2.7d : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

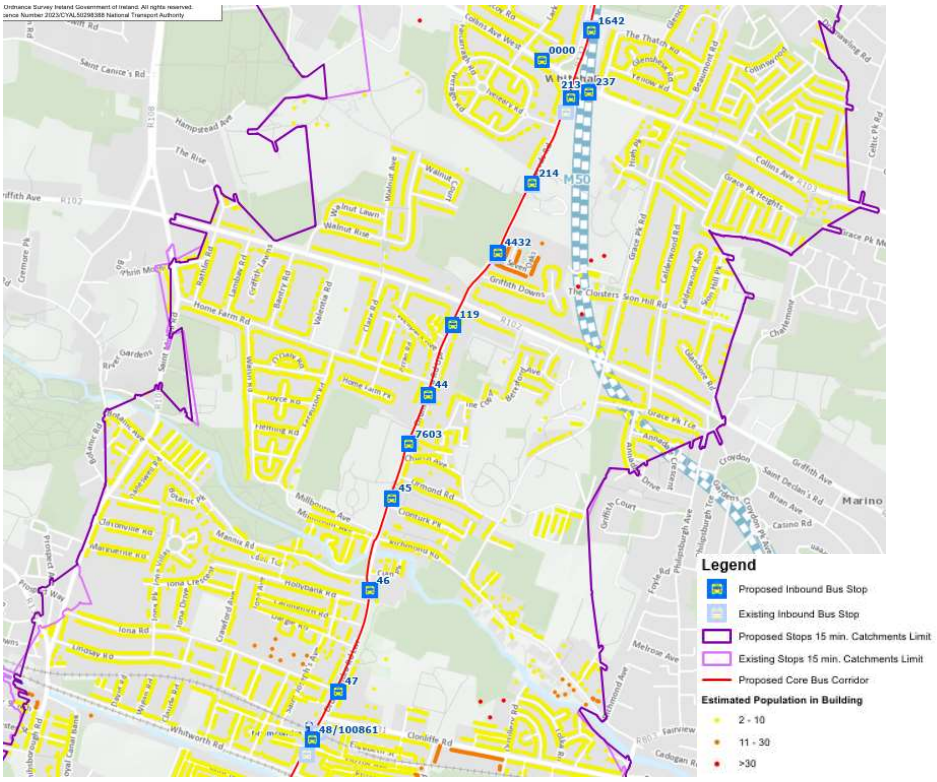


Figure 2.7e : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

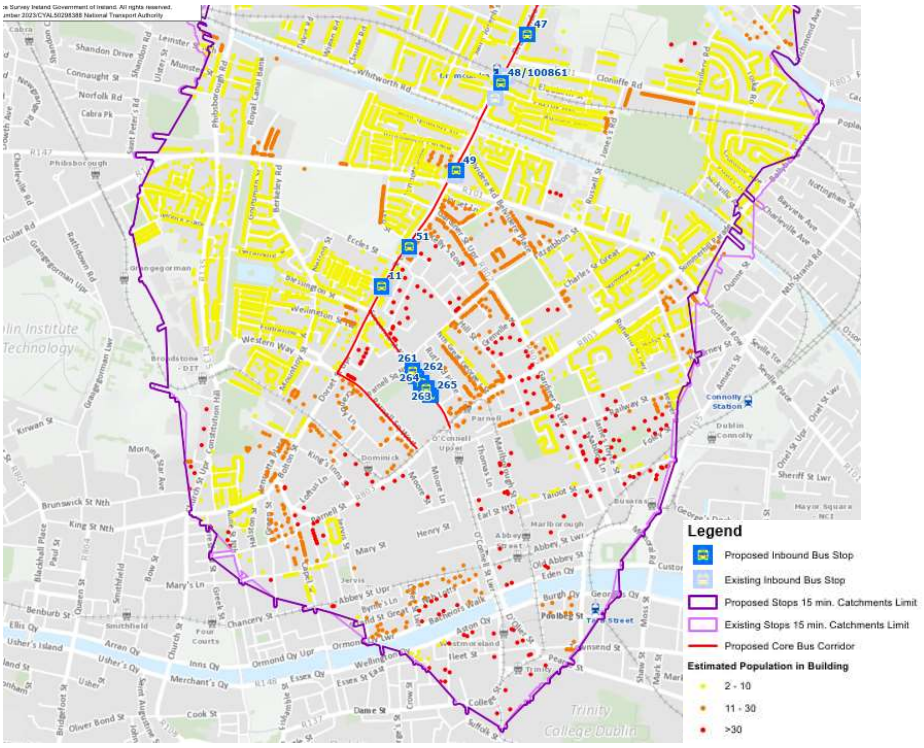


Figure 2.7f : Swords to City Centre Existing and Proposed Inbound Bus Stop Catchment – 15min Catchment

2.4.1.4 Catchment Population Comparison Tables

The catchment comparison tables for the final locations can be seen in **Tables 2.2 and 2.3**

	ESTIMATED POPULATION		
STOPS	WITHIN 5 MIN.	WITHIN 10 MIN.	WITHIN 15 MIN.
Jacobs' Proposed Stops	21764	53235	86698
Existing Stops	21416	51717	85214
Difference	348	1518	1484

Table 2.2: Inbound Catchment Population Comparison

	ESTIMATED POPULATION		
STOPS	WITHIN 5 MIN.	WITHIN 10 MIN.	WITHIN 15 MIN.
Jacobs' Proposed Stops	22370	54624	87675
Existing Stops	23052	53818	85607
Difference	-682	806	2068

Table 2.3: Outbound Catchment Population Comparison

As can be seen in the tables above, there have been gains in population across the whole route for catchments withing 10 and 15 minutes from the bus stops. This is also completed with fewer bus stops along the Scheme.

3. Route Summary

Tables 3.1 and 3.2 below provide an overview of the key changes to the locations of bus stops along the route. During the assessment, bus stops were removed in areas where they were too close together and underutilised. Also, new stops were added to poorly serviced areas and attractions.

Number of Existing Stops	41
Number of Stops Moved	14
Number of Stops Removed	2
Number of Stops Added	1

Table 3.1: Swords to City Centre Inbound Bus Stop Summary

Number of Existing Stops	31
Number of Stops Moved	12
Number of Stops Removed	1
Number of Stops Added	2

Table 3.2: Swords to City Centre Outbound Bus Stop Summary

In both cases, the number of stops was reduced, while improving the catchment populations.

4. Conclusion

A bus stop review was carried out for the Proposed Scheme. The purpose of the exercise was to rationalise the bus stop locations, to reduce the total journey duration of the route and to improve the catchment of the bus stops.

The study was carried out by reviewing key features of the inbound and outbound bus stops including location, proximity to junctions, road crossings and major land use attractions next to the route, existing and projected passenger volumes and local considerations such as space to provide shelters, waiting areas, footpaths, and cycle routes.

As part of the exercise catchment analyses have been carried out to demonstrate the impact of the proposed recommendations. The results show that the catchment footprints along the routes have increased to some extent to include larger residential and employment populations. This is largely due to the improved spacing of the stops, and the fact that stops are positioned closer to intersections, causing the catchment area to spread further along the orbital roads.

It is recommended to relocate 14 of the 41 bus stops inbound and 12 of the 31 bus stops outbound along the route. In addition, it is proposed to remove 2 of the inbound bus stops and 1 of the outbound bus stops, but to add 1 new stop inbound and 2 new stops outbound.

It is anticipated that the overall journey time along these routes will reduce as a result of these changes. The removal of stops will lead to less time lost due to dwell times at stops and the associated time lost due to deceleration and acceleration before and after the stops. Additionally, operational improvement such as the placement of stops after junctions should serve to reduce journey times.

Appendix A. Bus Stop Review Table

EXISTING																		
Existing Information											Interaction with Junctions and Ped Crossings				Network Redesign			
New or Existing	Inbound/ Outbound	Bus Stop Name	Bus Shelter	Bus Stop No.	Chainage	Distance from next Stop (m)	Dwell Time (sec) - from AVL Data	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boarding + Alighting)	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Midblock Ped Crossing	Distance (m)	No. of Buses/ Hr	Interchange with Orbital/Other Routes	Distance between Bus Stop and Orbital Route (m)	Distance of Trip attractor (m)
Existing	Inbound	Pinnock Hill	Yes	3694	320	230	13.72	12	6	18	Existing Bus stop is located to the south of the Pinnock Hill Junction	112	N/A	N/A	13	197, L89	N/A	
Existing	Inbound	Airside	Yes	3695	550	430	4.35	2	6	8	Before	219	N/A	N/A	13	22, X79, X84, L89	323	
Existing	Inbound	N1 Business Park	Yes	3696	980	270	17.92	28	6	34	After	160	N/A	N/A	16	N/A	N/A	
Existing	Inbound	Equestrian Centre	No	3697	1250	450	0.93	2	4	6	N/A	N/A			16			
Existing	Inbound	Kettles Lane	No	3698	1700	180	1.23	9	6	15	N/A	N/A			16			
Existing	Inbound	Stockhole Lane	No	3699	1880	1050	2.96	3	6	9	Before	110			19	L81, L82	670	
Existing	Inbound	Airport Parking	No	3885	2930	420	9.32	3	8	11	Before	68			9		241	
Existing	Inbound	ALSAA Sports Club	Yes	1631	3350	390	7.49	12	5	17	After	77			9		88	
Existing	Inbound	Swords road	No	5053	3740	240		1	5	6	Before	320			17			
Existing	Inbound	Dardistown Cemetery	Yes	1633	3980	590	1.17	2	7	9	Before	71			17	N8, 19, 24	98	
Existing	Inbound	Collinstown Park	No	1634	4570	180	5.02	4	8	12	After	418			14			
Existing	Inbound	Woodland Ind Est	No	1635	4750	390	4.27	6	6	12	Before	450			14			
Existing	Inbound	Turnapin Lane	Yes	1636	5140	510	17.27	57	19	76	Before	52			14			
Existing	Inbound	Santry Close	Yes	1637	5650	300	48.48	58	13	71			Near	23	14			
Existing	Inbound	Morton Stadium	Yes	1638	5950	730	9.35	11	10	21					14			
New	Inbound	-		-	-										20	N6		
Existing	Inbound	School House	Yes	1639	6680	370	34.43	38	15	53	After	70			14		82	307
Existing	Inbound	Omni Park SC	Yes	1640	7050	350	17.3	13	11	24	After	52			14			32
Existing	Inbound	Shanvarna Road Est	No	231	7400	360	28.89	14	20	34	After	52			14			75
Existing	Inbound	Ellenfield Park	Yes	1641	7760	300	21.58	10	6	16	After				14			460
Existing	Inbound	Whitehall Church	Yes	1642/104331	8060	290	16.18	15	18	33			Near	30	14			148
Existing	Inbound	Iveragh Road	Yes	213	8350	260	33.46	24	10	34	After	86			24	A1, A3, N4	101	351
Existing	Inbound	Highfield Hospital	No	214	8610	260	10.16	10	10	20			Near	19	24			129
Existing	Inbound	Griffith Downs	Yes	4432	8870	290	18.22	16	13	29			Near	30	24			198

Review Outcome										
Bus Stop Name	Bus Stop Location (use drop down menu)	No. Bus Bays	Catchment	Usage	Permeability	Junction / Mid Block Crossing	Network Re-Design	Proposed Bus Shelter	Type of Bus Stop Island or Shared Bus Stop Landing	Comment
Pinnock Hill	Move	Single < 25	There is no change in catchment after moving the bus stop	This bus stop is lightly used	This bus stop is lightly used	Existing bus stop is located 112m to the south of the new Pinnock Hill Junction.	There is no bus stop on the R125 near to the Pinnock Hill junction. There is no interface between Local Bus Route 197 and the CBC 02.	There is no issue with permeability	Existing bus stop is located 112m to the south of the new Pinnock Hill Junction.	There is no bus stop on the R125 near to the Pinnock Hill junction. There is no interface between Local Bus Route 197 and the CBC 02.
Airside	Move	Single < 25	N/A	This bus stop is seldom used because there is permeability issue with existing bus stop	This bus stop is seldom used because there is permeability issue with existing bus stop	Existing bus stop is located 219m to the North of the Airside Junction.	N/A	There is permeability issue with existing bus stop. There is no direct link to the Air side retail park from the existing stop. The proposed new location will improve the permeability and accessibility.	Existing bus stop is located 219m to the North of the Airside Junction.	N/A
N1 Business Park	Move	Single < 25		This bus stop is frequently used. It serves both the N1 Business Park and the Airside Retail Park.	This bus stop is frequently used. It serves both the N1 Business Park and the Airside Retail Park.	Existing bus stop is located 160m to the south of the Airside Junction.	CBC 02 will interface with local Route 196 and Peak Time Route X84. There is an eastbound bus stop on the L2305, located approximately 70m from the junction. The distance between the bus stop on the L2305 and the proposed Airside Junction bus stop is approximately 95m.	Existing bus stop is located between the business park and retail park.	Existing bus stop is located 160m to the south of the Airside Junction.	CBC 02 will interface with local Route 196 and Peak Time Route X84. There is an eastbound bus stop on the L2305, located approximately 70m from the junction. The distance between the bus stop on the L2305 and the proposed Airside Junction bus stop is approximately 95m.
Equestrian Centre	Move	Single < 25		This bus stop is seldom used. There is no attraction nearby.	This bus stop is seldom used. There is no attraction nearby.	A mid block crossing is proposed near the N1 Business Park. Existing bus stop is located in the middle of the Kilronan Equestrian Centre and the N1 Business Park.	N/A	Existing bus stop is located close to the N1 Business Park and Kilronan Equestrian Centre. There is no permeability issue.	A mid block crossing is proposed near the N1 Business Park. Existing bus stop is located in the middle of the Kilronan Equestrian Centre and the N1 Business Park.	N/A
Kettles Lane	Move	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	The junction between the Kettles Lane and the R132 is converted to a signalised junction. Existing bus stop is located to the far side of the pedestrian crossing.	N/A	Existing bus stop is located close to Metro point Business Park. There is no issue with permeability.	The junction between the Kettles Lane and the R132 is converted to a signalised junction. Existing bus stop is located to the far side of the pedestrian crossing.	N/A
Stockhole Lane	Move	Single < 25		This bus stop is seldom used.	This bus stop is seldom used.	Existing bus stop is located 110m to the north of the Cloghran roundabout. This bus stop, if maintain, will be located on the left turning lane, thus existing location is not ideal for bus manoeuvre. There is also no attraction nearby.	N/A	There is no permeability issue.	Existing bus stop is located 110m to the north of the Cloghran roundabout. This bus stop, if maintain, will be located on the left turning lane, thus existing location is not ideal for bus manoeuvre. There is also no attraction nearby.	N/A
Airport Parking	No Change	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	This bus stop is located to the north of the Green Long term Parking.	N/A	This bus stop is serving the Airport Parking.	This bus stop is located to the north of the Green Long-term Parking.	N/A
ALSAA Sports Club	No Change	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	This bus stop is located to the south of the Corballis Road Junction.	N/A	This bus stop is serving the ALSAA Sports Centre.	This bus stop is located to the south of the Corballis Road Junction.	N/A
Swords road	No Change	Single < 25		This bus stop is seldom used. There is no obvious attraction near this bus stop.	This bus stop is seldom used. There is no obvious attraction near this bus stop.	This bus stop is located between the Corballis Road and the Old Airport Road.	N/A	No change is proposed for this bus stop	This bus stop is located between the Corballis Road and the Old Airport Road.	N/A
Dardistown Cemetery	No Change	Single < 25		This bus stop is seldom used.	This bus stop is seldom used.	This bus stop is located 71m to the north of the Old Airport Road Junction.	N/A	There is no issue with permeability	This bus stop is located 71m to the north of the Old Airport Road Junction.	N/A
Collinstown Park	Upgrade	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	A mid block crossing is proposed near the Royal College of Surgeons Sportsgrounds. Existing bus stop is located on the far side of this crossing.	N/A	There is no issue with permeability	A mid block crossing is proposed near the Royal College of Surgeons Sportsgrounds. Existing bus stop is located on the far side of this crossing.	N/A
Woodland Ind Est	Taken off		This bus stop is merge with the Collinstown Park 1634 Bus Stop due to their proximity. There is no trips attractor between the Collinstown Park bus stop and the Turnapin Lane bus stop.							
Turnapin Lane	Move	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 70m to the north of the Turnapin Junction.	N/A	There is no issue with permeability	Existing bus stop is located 70m to the north of the Turnapin Junction.	N/A
Santry Close	Upgrade	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 25m to the north of the Northwood Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 25m to the north of the Northwood Avenue junction.	N/A
Morton Stadium	Move	Single		This bus stop is lightly used.	This bus stop is lightly used.	A mid block crossing is proposed near the Morton Stadium northern access. Existing bus stop is located 75m to the north (near side) of the pedestrian crossing.	N/A	There is no issue with permeability	A mid block crossing is proposed near the Morton Stadium northern access. Existing bus stop is located 75m to the north (near side) of the pedestrian crossing.	N/A
-	New	Single < 25	N/A	N/A	N/A	The new bus stop is proposed to the south (far side) of the Coolock Lane junction.	CBC 02 will interface with the Orbital Bus N6., and the end terminal Bus D4	N/A	The new bus stop is proposed to the south (far side) of the Coolock Lane junction.	CBC 02 will interface with the Orbital Bus N6., and the end terminal Bus D4
School House	Move	Single < 25		This bus stop is heavily used.	This bus stop is heavily …	Existing bus stop is located …	N/A	There is no issue with permeability	Existing bus stop is located 70m to the …	N/A
Omni Park SC	No Change	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 50m to the south of the Omni SC junction.	N/A	There is no issue with permeability	Existing bus stop is located 50m to the south of the Omni SC junction.	N/A
Shanvarna Road Est	No Change	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 60m to the south (far side) of the Shanowen Road.	N/A	There is no issue with permeability	Existing bus stop is located 60m to the south (far side) of the Shanowen Road.	N/A
Ellenfield Park	No Change	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 100 to the south of the Shantalla Road junction.	N/A	Existing bus stop is located on the on-ramp. It is located far away from the nearest housing estate.	Existing bus stop is located 100 to the south of the Shantalla Road junction.	N/A
Whitehall Church	Upgrade	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 30m to the south (far side) of the mid-block crossing.	N/A	There is no issue with permeability. Existing bus stop is serving the properties located to the west of the Swords road and also the Whitehall Church.	Existing bus stop is located 30m to the south (far side) of the mid-block crossing.	N/A
Iveragh Road	Move	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 85m to the south (far side) of the Collins Avenue junction.	CBC 02 will interface with the Orbital Bus Route N4, and local bus route L80. The CBC 02 route also split at this junction with A3 heading the west side and A1 heading the east side.	There is no issue with permeability	Existing bus stop is located 85m to the south (far side) of the Collins Avenue junction.	CBC 02 will interface with the Orbital Bus Route N4, and local bus route L80. The CBC 02 route also split at this junction with A3 heading the west side and A1 heading the east side.
Highfield Hospital	Upgrade	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 30m to the north (near side) of the mid-block crossing.	N/A	There is no issue with permeability	Existing bus stop is located 30m to the north (near side) of the mid-block crossing.	N/A
Griffith Downs	Upgrade	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 170m to the north (near side) of the Griffith Avenue junction	N/A	There is no issue with permeability	Existing bus stop is located 170m to the north (near side) of the Griffith Avenue junction	N/A

PROPOSED										
	Distance	Chainage	Interaction with Junctions and Ped				Network Redesign			
Bus Stop Name	New Distance (between Stops)	Chainage	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Ped Crossing	Distance (m)	Interchange with Orbital/Other Routes	Distance between Main Line Bus Stop and Orbital Route (m)	Trip attractor	Location Feasibility Notes (if any)
Pinnock Hill	N/A	200	After	22	-	-	197	N/A	Travel Lodge	Checked
Airside	340	540	N/A	N/A	Far Side	10	N/A	N/A	Only to be provided as a Metro Stop	Checked
N1 Business Park	310	850	After	25	N/A	N/A	196, 384	95m	Airside Retail Park	Checked
Equestrian Centre	370	1220	N/A	N/A	Far Side	80	N/A	N/A	Glenmore House (B&B), N1 Business Park, Kilronan Equestrian Centre	Checked
Kettles Lane	500	1720	N/A	N/A	Far Side	60	N/A	N/A	Metro point Business Park	Checked
Stockhole Lane	590	2310	After	30	N/A	N/A	N/A	N/A	Coachman's Inn	Checked
Airport Parking	620	2930	Before	80	N/A	N/A	N/A	N/A	N/A	N/A
ALSAA Sports Club	420	3350	After	80	N/A	N/A	N/A	N/A	N/A	N/A
Swords road	390	3740	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dardistown Cemetery	240	3980	Before	80	N/A	N/A	8	N/A	N/A	Checked
Collinstown Park	580	4560	N/A	N/A	Far Side	30	N/A	N/A	N/A	Checked
Woodland Ind Est	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Turnapin Lane	720	5280	After	40	N/A	N/A	N/A	N/A		Checked
Santry Close	370	5650	Before	25	N/A	N/A	N/A	N/A		Checked
Morton Stadium	400	6050	N/A	N/A	Far Side	20	N/A	N/A	Morton Stadium	Checked
-	350	6400	Before	70	N/A	N/A	Orbital Bus Route N8	130m	Orbital Bus Route N8	Checked
School House	380	6780	N/A	N/A	Near Side	40	N/A	N/A		Checked
Omni Park SC	270	7050	After	50	N/A	N/A	N/A	N/A	Omni Shopping Centre	Checked
Shanvarna Road Est	350	7400	After	50	N/A	N/A	N/A	N/A		Checked
Ellenfield Park	360	7760	After	100	N/A	N/A	N/A	N/A		Checked
Whitehall Church	300	8060	N/A	N/A	Far Side	30	N/A	N/A		Checked
Iveragh Road	230	8290	After	30	N/A	N/A	N4	100		Checked
Highfield Hospital	320	8610	N/A	N/A	Near Side	30	N/A	N/A		Checked
Griffith Downs	260	8870	N/A	N/A	Near Side	70	N/A	N/A	N/A	N/A

EXISTING																		
Existing Information											Interaction with Junctions and Ped Crossings				Network Redesign			
New or Existing	Inbound/ Outbound	Bus Stop Name	Bus Shelter	Bus Stop No.	Chainage	Distance from next Stop (m)	Dwell Time (sec) - from AVL Data	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boarding + Alighting)	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Midblock Ped Crossing	Distance (m)	No. of Buses/ Hr	Interchange with Orbital/Other Routes	Distance between Bus Stop and Orbital Route (m)	Distance of Trip attractor (m)
Existing	Inbound	The Village	Yes	119	9160	250	18.61	8	12	20	After	66			24	N2	81	327
Existing	Inbound	Skylon Hotel	Yes	44	9410	160	16.99	8	10	18			Near	47	25	19	37	78
Existing	Inbound	St Patrick's College	Yes	7603	9570	210	19.19	10	11	21			Near	12	25			49
Existing	Inbound	DCU St Patrick's	Yes	45	9780	320	19.04	9	11	20			Far	90	25			63
Existing	Inbound	Botanic Avenue	Yes	46	10100	390	18.36	9	14	23			Near	35	25			273
Existing	Inbound	Drumcondra Rail Stn	Yes	47	10490	210	24.17	3	13	16			Near	40	25			77
Existing	Inbound	Fitzroy Avenue	Yes	48/ 100861	10700	280	0.25	The excel sheet does not have the dwell time		-	Before	45			25		56	39
Existing	Inbound	Dorset Street Lower	Yes	49	10980	300	45.44	8	42	50	Before	10	Near	12	37			208
Existing	Inbound	Temple Street	Yes	51	11280	140	26.62	5	29	34	Before	30			37			75
Existing	Inbound	Dorset Street Upper	Yes	52	11420	340	16.94	3	26	29	After	80			37			268
Existing	Inbound		No	261	C260	20	39.15		1	1			Near	28	33			221
Existing	Inbound		No	262	C280	20							Near	53	33			198
Existing	Inbound		No	263	C300	20	35.08	22	10	32			Near	80	33			162
Existing	Inbound		No	264	C310	10							Far	100	33			145
Existing	Inbound		No	265	C330	20	45.78	11	24	35			Near	92	33			121
Existing	Outbound	Collins Avenue	No	212	B 420	170												
Existing	Outbound	Pinnock Hill	Yes	5073	40			3	9	12	After	75			5			270
Existing	Outbound	Airside / Airside Retail Park	No	3676 / 100161	600	560		2	13	15	After	177			13			172
Existing	Outbound	N1 Business Park	No	3675	970	370	16.85	3	19	22	Before	140			16	22, X79, X84, L89	164	
Existing	Outbound	Equestrian Centre	No	3674	1230	260	3.25	2	10	12	Before	400			16			
New	Outbound	-	-	-	-	-												
Existing	Outbound	Stockhole Lane	yes	3672	2250	1020	1.91	3	17	20			Near	46	28	L81, L82	208	
Existing	Outbound	Airport Roundabout	Yes	3671	2530	280	8.19	3	14	17	After	110			28		122	
Existing	Outbound	Airport Parking	Yes	3670	3110	580	13.31	10	6	16	Before	50			9			
Existing	Outbound	ALSAA Sports Club	Yes	1630	3450	340	3.73	5	20	25	Before	162			17	N8, 19, 24	178	
Existing	Outbound	Dardistown Cemetery	Yes	1629	4160	710	2.62	3	21	24	Before	36			14			
Existing	Outbound	Collinstown Park	Yes	1628	4525	365	4.19	4	12	16	Before	181			14			

Bus Stop No.	Review Outcome									
	Bus Stop Location (use drop down menu)	No. Bus Bays	Catchment	Usage	Permeability	Junction / Mid Block Crossing	Network Re-Design	Proposed Bus Shelter	Type of Bus Stop Island or Shared Bus Stop Landing	Comment
119	Upgrade	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 80m to the south (far side) of the Griffith Avenue junction.	CBC 02 will interface with the Orbital Bus Route N2. Interchange between the N2 Orbital Route and CBC 02 is required.	There is no issue with permeability	Existing bus stop is located 80m to the south (far side) of the Griffith Avenue junction.	CBC 02 will interface with the Orbital Bus Route N2. Interchange between the N2 Orbital Route and CBC 02 is required.
44	Upgrade	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 40m south (far side) of the Home Farm Road junction.	The CBC 02 will interface with the citybound bus route 19. Interchange between bus route 19 and the CBC 02 is required.	There is no issue with permeability	Existing bus stop is located 40m south (far side) of the Home Farm Road junction.	The CBC 02 will interface with the citybound bus route 19. Interchange between bus route 19 and the CBC 02 is required.
7603	Move	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 12m south (far side) of the DCU St' Patrick College mid-block crossing.	N/A	There is no issue with permeability	Existing bus stop is located 12m south (far side) of the DCU St' Patrick College mid-block crossing.	N/A
45	Move	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 100m south (far side) of the DCU St' Patrick College mid-block crossing.	N/A	There is no issue with permeability	Existing bus stop is located 100m south (far side) of the DCU St' Patrick College mid-block crossing.	N/A
46	Upgrade	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 40m south (far side) of the Botanic Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 40m south (far side) of the Botanic Avenue junction.	N/A
47	Move	Double 25>, <40		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 40m north (near side) of the Clonliffe Road junction.	N/A	Existing bus stop is located too far from the rail station.	Existing bus stop is located 40m north (near side) of the Clonliffe Road junction.	N/A
48/ 100861	Taken off		This bus stop is to merge with the relocated Drumcondra Rail Stn 47 Bus Stop due to their proximity.							
49	Move	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 10m north (near side) of the North Circular Rd Junction.	There is no interaction from F Spine bus user on this bus stop.		Existing bus stop is located 10m north (near side) of the North Circular Rd Junction.	There is no interaction from F Spine bus user on this bus stop.
51	Upgrade	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 30m north (near side) of the Hardwicke Place Junction.	N/A		Existing bus stop is located 30m north (near side) of the Hardwicke Place Junction.	N/A
52	Taken off	Double 25>, <40	This bus stop is located in close proximity with the Temple street Bus stop (52). This bus stop is also located close to bus interchange point at North Frederick Street/Granby Row, where most users will board or alight. This bus stop is also located at a narrow section of the Dorser Street Upper. Therefore it is proposed to remove this bus stop.							
261	Upgrade	Bus Bay >40	Existing bus stops on the North Frederick Street to remain.							
262	Upgrade	Bus Bay >41								
263	Upgrade	Bus Bay >42								
264	Upgrade	Bus Bay >43								
265	Upgrade	Bus Bay >44								
212	Upgrade									
5073	Upgrade	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 90m to the north of the new Pinnock Hill Junction.	There is no interface between Local Bus Route 197 and the CBC 02.	There is no issue with permeability	Existing bus stop is located 90m to the north of the new Pinnock Hill Junction.	There is no interface between Local Bus Route 197 and the CBC 02.
3676 / 100161	Move	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 200m to the north of the Airside Junction.	N/A	A pedestrian link between the Boroimhe Willows and the Swords Road will improve permeability.	Existing bus stop is located 200m to the north of the Airside Junction.	N/A
3675	No Change	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 150m to the south of the Airside Junction.	Bus Route 82 and L82 are both city bound and Route 82 shared the same bus corridor with CBC 02. Therefore CBC 02 will not interface with City Bound Route 82 and Peak Time Route 382.	Existing bus stop is located between the Airside business park and retail park. Combining the N1 Business Park bus stop with the relocated Airside bus stop will increase the distance between the N1 Business Park and the bus stop from 110m to 220m.	Existing bus stop is located 150m to the south of the Airside Junction.	Bus Route 82 and L82 are both city bound and Route 82 shared the same bus corridor with CBC 02. Therefore CBC 02 will not interface with City Bound Route 82 and Peak Time Route 382.
3674	Move	Single < 25		This bus stop is seldom used. There is no attraction nearby.	This bus stop is seldom used. There is no attraction nearby.	A mid block crossing is proposed near the N1 Business Park. Existing bus stop is located in the middle of the Kilronan Equestrian Centre and the N1 Business Park.	N/A	Existing bus stop is located close to the N1 Business Park and Kilronan Equestrian Centre. There is no permeability issue.	A mid block crossing is proposed near the N1 Business Park. Existing bus stop is located in the middle of the Kilronan Equestrian Centre and the N1 Business Park.	N/A
-	New	Single < 25	N/A	N/A	N/A	The Kettles Lane junction is converted from a priority junction to a signalised junction.	N/A	N/A	The Kettles Lane junction is converted from a priority junction to a signalised junction.	N/A
3672	Upgrade	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located close to the mid block crossing near Coachman's Inn.	N/A	The is no permeability issue. The new location will be able to cater for both National shows centre and the Coachman's Inn. Distance to junction is 30m, and distance to Coachman's Inn is 120m	Existing bus stop is located close to the mid block crossing near Coachman's Inn.	N/A
3671	Taken off			This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 100m to the north of the Airport Roundabout.	N/A	There is no issue with permeability	Existing bus stop is located 100m to the north of the Airport Roundabout.	N/A
3670	No Change	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 60m to the south (near side) of the green parking.	N/A	There is no issue with permeability	Existing bus stop is located 60m to the south (near side) of the green parking.	N/A
1630	No Change	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	This bus stop is located to the south of the Corballis Road Junction.	N/A	This bus stop is serving the ALSAA Sports Centre.	This bus stop is located to the south of the Corballis Road Junction.	N/A
1629	Move	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	This bus stop is located 120m to the south of the Old Airport Road Junction.	The CBC 02 will interface with the citybound bus route 8. Citybound Route 8 will start and end at the airport. Bus users on the City bound route 8 that are going to Swords will need to change bus at bus stops between the old airport route and the airport roundabout. A bus stop north of the old airport road junction is preferred.	There is no issue with permeability	This bus stop is located 120m to the south of the Old Airport Road Junction.	The CBC 02 will interface with the citybound bus route 8. Citybound Route 8 will start and end at the airport. Bus users on the City bound route 8 that are going to Swords will need to change bus at bus stops between the old airport route and the airport roundabout. A bus stop north of the old airport road junction is preferred.
1628	Move	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	A mid block crossing is proposed near the Royal College of Surgeons Sportsgrounds. Existing bus stop is located to the far side of this crossing.	N/A	There is no issue with permeability	A mid block crossing is proposed near the Royal College of Surgeons Sportsgrounds. Existing bus stop is located to the far side of this crossing.	N/A

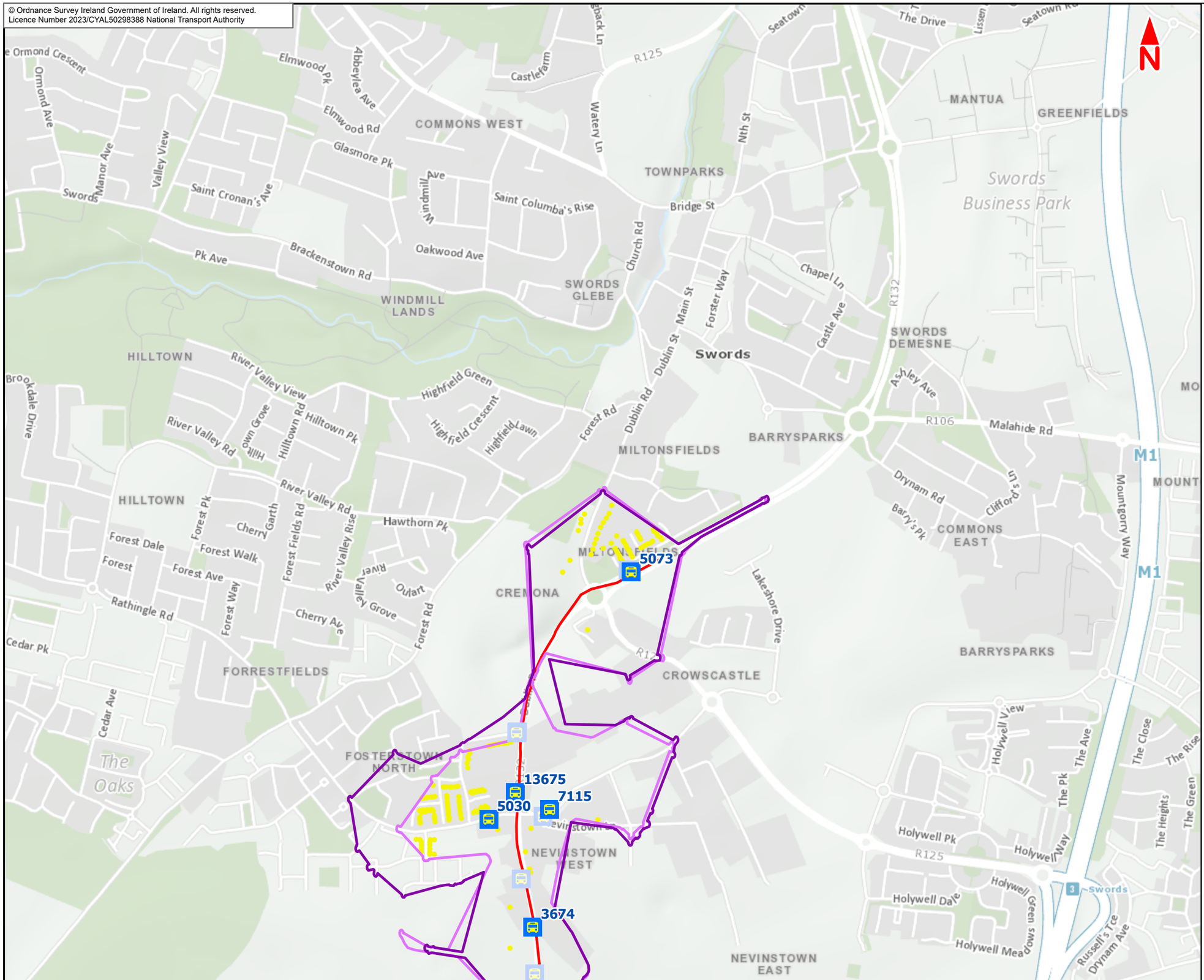
Bus Stop No.	PROPOSED									
	Distance	Chainage	Interaction with Junctions and Ped				Network Redesign			
	New Distance (between Stops)	Chainage	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Ped Crossing	Distance (m)	Interchange with Orbital/Other Routes	Distance between Main Line Bus Stop and Orbital Route (m)	Trip attractor	Location Feasibility Notes (if any)
119	290	9160	After	70	N/A	N/A	N2	Recommended distance 100m		Checked
44	250	9410	After	40	N/A	N/A	94	N/A		Checked
7603	160	9570	N/A	N/A	Far Side	50	N/A	N/A	DCU St Patrick's	Checked
45	210	9780	N/A	N/A	Far Side	100	N/A	N/A	DCU St Patrick's	N/A
46	320	10100	After	40	Far Side	N/A	N/A	N/A		Checked
47	350	10450	N/A	N/A	Near Side	80	N/A	N/A	Coach Stop	Checked
48/ 100861	180	10630	N/A	N/A	Far Side	30	N/A	N/A	Drumcondra Station	Checked
49	340	10970	Before	10	N/A	N/A	N/A	N/A	N/A	Checked
51	290	11260	Before	30	N/A	N/A	N/A	N/A	N/A	Checked
52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
261	500	260								
262	20	280								
263	20	300								
264	10	310								
265	20	330								
212										
5073	N/A	40	After	95	-	-	197	N/A	Travel Lodge	Checked
3676 / 100161	450	490	N/A	N/A	Far Side	10	N/A	N/A	Only to be provided as a Metro Stop	Checked
3675	260	750	After	30	N/A	N/A	N/A	N/A	Airside Retail Park	Checked
3674	350	1100	N/A	N/A	Far Side	25	N/A	N/A	Glenmore House (B&B), N1 Business Park, Kilronan Equestrian Centre	Checked
-	540	1640	N/A	N/A	Far Side	20	N/A	N/A	N/A	Checked
3672	610	2250	After	30	N/A	N/A	N/A	N/A	Coachman's Inn	Checked
3671	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3670	860	3110	Before	90	N/A	N/A	N/A	N/A	Airport parking	Checked
1630	340	3450	Before	190	N/A	N/A	N/A	N/A	ALSAA Sports Centre	N/A
1629	570	4020	After	50	N/A	N/A	8	N/A	N/A	Checked
1628	510	4530	N/A	N/A	Far Side	20	N/A	N/A	N/A	Checked

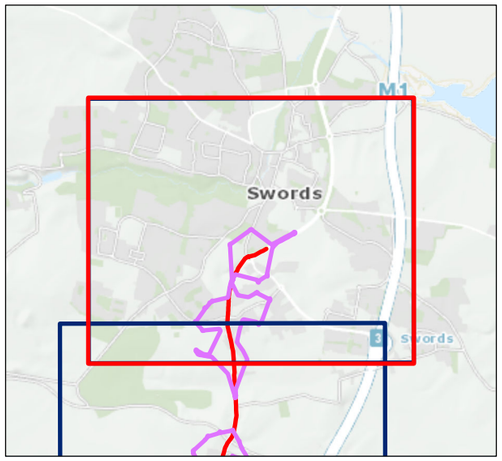
EXISTING																		
Existing Information											Interaction with Junctions and Ped Crossings				Network Redesign			
New or Existing	Inbound/ Outbound	Bus Stop Name	Bus Shelter	Bus Stop No.	Chainage	Distance from next Stop (m)	Dwell Time (sec) - from AVL Data	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boarding + Alighting)	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Midblock Ped Crossing	Distance (m)	No. of Buses/ Hr	Interchange with Orbital/Other Routes	Distance between Bus Stop and Orbital Route (m)	Distance of Trip attractor (m)
Existing	Outbound	Santry Retail Park	Yes	1627	5170	645	13.43	15	54	69	After	35			14			90
Existing	Outbound	Santry Close	Yes	1626	5660	490	24.97	16	19	35	After	16			14			
Existing	Outbound	Morton Stadium	yes	1625	6050	390	9.6	6	15	21	After	211			14			
New	Outbound	-	-	-	-	-									14	N6		
Existing	Outbound	Schoolhouse Lane	Yes	1624	6620	570	23.05	21	17	38			Far	106	14			300
Existing	Outbound	Omni Park SC	Yes	1623	7100	480	22.74	11	12	23	Before	78			14			60
Existing	Outbound	Shanowen Road	Yes	1622	7310	210	13.71	12	6	18			Near	11	14			
Existing	Outbound	Swords Road	Yes	220	7570	260	17.44	15	6	21	After	23			14			
Existing	Outbound	Whitehall	Yes	1620/ 100141	8150	580	8.24				After	54			14	N4	60	
Existing	Outbound	Iveragh Road	Yes	205	8380	230	25.38	8	8	16			Near	8	24			
Existing	Outbound	Highfield Hospital	Yes	204	8580	200	6.49	10	11	21			Near	46	24			260
Existing	Outbound	Whitehall College / Whitehall Garda St	Yes	203 / 104351	9000	420		20	7	27	After	44			24	N2	61	
Existing	Outbound	Wellpark Avenue	Yes	85	9310	310	10.7	12	7	19			Near	42	25			
Existing	Outbound	St Patrick's College of Education	Yes	7602	9610	300	29.41	NA	NA	#VALUE!			Near	28	25			
Existing	Outbound	DCU St Patrick's	Yes	21	9770	160	25.18	11	10	21			Near	70	25			54
Existing	Outbound	Botanic Avenue	Yes	19	10100	330	18.5	6	6	12	Before	24			25			
Existing	Outbound	Dargle Road	Yes	18	10250	150	6.44	2	4	6			Far	173	25			
Existing	Outbound	Drumcondra Rail Stn	Yes	17/100121	10620	370	33.87	54	6	60	Before	59			37			
Existing	Outbound	Innisfallen Parade	Yes	15	10960	340	29.11	60	5	65	Before	38			37			
Existing	Outbound	Dorset Street Lower	Yes	14	11180	220	16	7	3	10	After	46			37			
Existing	Outbound	St Joseph's Parade	Yes	11	11380	200	21.14				After	71			37			106
Existing	Outbound	Parnell Square West	No	10	D140	430	35.85						Near	38	33			
Existing	Outbound	Parnell Square West	No	8	D160	20	46.62						Near	44	33			
Existing	Outbound	Parnell Square West	No	7	D240	100	40.59	39	3	42			Near	66	33			
Existing	Outbound	Parnell Square West	No	6	D260	20							Near	85	33			
Existing	Outbound	Parnell Square West	No	4	D270	10							Far	103	33			
Existing	Outbound	Granby Place	No	7615	D260	20	29.2						Far	117	33			
Existing	Outbound	Parnell Square West	No	3	D320	50	64.69	40	9	49			Far	128	33			
Existing	Outbound	Parnell Square West	No	2	D340	20		32	13	45			Far	109	33			

Review Outcome										
(Bus Stop Name)	Bus Stop Location (use drop down menu)	No. Bus Bays	Catchment	Usage	Permeability	Junction / Mid Block Crossing	Network Re-Design	Proposed Bus Shelter	Type of Bus Stop Island or Shared Bus Stop Landing	Comment
Santry Retail Park	Upgrade	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 40m to the north of the Turnapin Junction.	N/A	There is no issue with permeability	Existing bus stop is located 40m to the north of the Turnapin Junction.	N/A
Santry Close	Move	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 25m to the north of the Northwood Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 25m to the north of the Northwood Avenue junction.	N/A
Morton Stadium	Move	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	A mid block crossing is proposed near the Morton Stadium northern access. Existing bus stop is located 30m to the south (near side) of the pedestrian crossing.	N/A	There is no issue with permeability	A mid block crossing is proposed near the Morton Stadium northern access. Existing bus stop is located 30m to the south (near side) of the pedestrian crossing.	N/A
-	New	Single < 25	N/A	N/A	N/A	This new bus stop Is proposed to the north (far side) of the Santry Avenue.	CBC 02 will interface with the Orbital Bus Route N6, and the end terminal Bus D4	N/A	This new bus stop Is proposed to the north (far side) of the Santry Avenue.	CBC 02 will interface with the Orbital Bus Route N6, and the end terminal Bus D4
Schoolhouse Lane	Move	Single < 25		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located 80m to the south of the Santry Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 80m to the south of the Santry Avenue junction.	N/A
Omni Park SC	Upgrade	Single		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 90m to the south of the Omni SC junction.	N/A	There is no issue with permeability	Existing bus stop is located 90m to the south of the Omni SC junction.	N/A
Shanowen Road	No Change	Single		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 20m to the north (far side) of the Shanowen Road.	N/A	There is no issue with permeability	Existing bus stop is located 20m to the north (far side) of the Shanowen Road.	N/A
Swords Road	No Change	Single		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 40m to the north (far side) of the Shanrath Road junction.	N/A	There is no issue with permeability	Existing bus stop is located 40m to the north (far side) of the Shanrath Road junction.	N/A
Whitehall	Move	Single		No boarding and alighting information	No boarding and alighting information	Existing bus stop is located 80m to the north (far side) of the Collins Avenue junction.	CBC 02 will interface with the Orbital Bus Route N4, and local bus route 280. The CBC 02 route also split at this junction with A3 heading the west side and A1 heading the east side.	There is no issue with permeability. Existing bus stop is serving the properties located to the west of the Swords road and also the Whitehall Church.	Existing bus stop is located 80m to the north (far side) of the Collins Avenue junction.	CBC 02 will interface with the Orbital Bus Route N4, and local bus route 280. The CBC 02 route also split at this junction with A3 heading the west side and A1 heading the east side.
Iveragh Road	Move	Single < 25		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 130m to the south (near side) of the Collins Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 130m to the south (near side) of the Collins Avenue junction.	N/A
Highfield Hospital	Move	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 50m to the north (far side) of the mid-block crossing.	N/A	There is no issue with permeability	Existing bus stop is located 50m to the north (far side) of the mid-block crossing.	N/A
Whitehall College / Whitehall Garda St	Upgrade	Single < 25		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 7m to the north (far side) of the Griffith Avenue junction.	CBC 02 will interface with the Orbital Bus Route N2. Interchange between the N2 Orbital Route and CBC 02 is required.	There is no issue with permeability	Existing bus stop is located 7m to the north (far side) of the Griffith Avenue junction.	CBC 02 will interface with the Orbital Bus Route N2. Interchange between the N2 Orbital Route and CBC 02 is required.
Wellpark Avenue	Upgrade	Double 25>, <40		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 30m north (far side) of the Home Farm Road junction.	The CBC 02 will interface with the citybound bus route 94. Interchange between bus route 19 and the CBC 02 is required.	There is no issue with permeability	Existing bus stop is located 30m north (far side) of the Home Farm Road junction.	The CBC 02 will interface with the citybound bus route 94. Interchange between bus route 19 and the CBC 02 is required.
St Patrick's College of Education	Taken off			This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 40m south (far side) of the DCU St' Patrick College mid-block crossing.		There is no issue with permeability	Existing bus stop is located 40m south (far side) of the DCU St' Patrick College mid-block crossing.	
DCU St Patrick's	Upgrade	Double 25>, <40		This bus stop is regularly used.	This bus stop is regularly used.	Existing bus stop is located 80m south to the mid block crossing near Ormond Road. It is proposed to move this bus stop 60m north closer to the mid-block crossing.	N/A	There is no issue with permeability	Existing bus stop is located 80m south to the mid block crossing near Ormond Road. It is proposed to move this bus stop 60m north closer to the mid-block crossing.	N/A
Botanic Avenue	Move	Double 25>, <40		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 50m south (near side) of the Botanic Avenue junction.	N/A	There is no issue with permeability	Existing bus stop is located 50m south (near side) of the Botanic Avenue junction.	N/A
Dargle Road	No Change			This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located 150m from the Botanic Avenue Bus Stop.	N/A	There is no issue with permeability	Existing bus stop is located 150m from the Botanic Avenue Bus Stop.	N/A
Drumcondra Rail Stn	Move	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located at the proposed mid-block crossing, so existing bus stop will need to be moved.	N/A	There is no issue with permeability	Existing bus stop is located at the proposed mid-block crossing, so existing bus stop will need to be moved.	N/A
Innisfallen Parade	Upgrade	Double 25>, <40		This bus stop is heavily used.	This bus stop is heavily used.	Existing bus stop is located in the middle of Innisfallen Parade and north circular road junctions.	N/A	There is no issue with permeability	Existing bus stop is located in the middle of Innisfallen Parade and north circular road junctions.	N/A
Dorset Street Lower	Upgrade	Double 25>, <40		This bus stop is lightly used.	This bus stop is lightly used.	Existing bus stop is located in the middle of Synott Place and Eccles Street junctions.	N/A	There is no issue with permeability	Existing bus stop is located in the middle of Synott Place and Eccles Street junctions.	N/A
St Joseph's Parade	Taken off									
Parnell Square West	Upgrade	Bus Bay >40	Existing bus stops on the Granby Row to remain.							
Parnell Square West	Upgrade	Bus Bay >41								
Parnell Square West	Upgrade	Bus Bay >42								
Parnell Square West	Upgrade	Bus Bay >43								
Parnell Square West	Upgrade	Bus Bay >44								
Granby Place	Upgrade	Bus Bay >45								
Parnell Square West	Upgrade	Bus Bay >46								
Parnell Square West	Upgrade	Bus Bay >47								

PROPOSED										
	Distance	Chainage	Interaction with Junctions and Ped				Network Redesign			
(Bus Stop Name)	New Distance (between Stops)	Chainage	Before/ After the Junction (in the direction of travel)	Bus Stop Distance from nearest Junction (m)	Near/ Far from Ped Crossing	Distance (m)	Interchange with Orbital/Other Routes	Distance between Main Line Bus Stop and Orbital Route (m)	Trip attractor	Location Feasibility Notes (if any)
Santry Retail Park	640	5170	After	30	N/A	N/A	N/A	N/A		Checked
Santry Close	420	5590	After	100	N/A	N/A	N/A	N/A		Checked
Morton Stadium	360	5950	N/A	N/A	Far Side	90	N/A	N/A	Morton Stadium	Checked
-	500	6450	After	20	N/A	N/A	N8			Checked
Schoolhouse Lane	210	6660	After	90	N/A	N/A	N/A	N/A		Checked
Omni Park SC	440	7100	Before	80	N/A	N/A	N/A	N/A	Omni Shopping Centre	Checked
Shanowen Road	210	7310	After	20	N/A	N/A	N/A	N/A		Checked
Swords Road	260	7570	After	40	N/A	N/A	N/A	N/A		Checked
Whitehall	600	8170	After	50	N/A	N/A	N4	140		Checked
Iveragh Road	200	8370	N/A	N/A	Far Side	20	N/A	N/A		Checked
Highfield Hospital	360	8730	N/A	N/A	Near Side	80	N/A	N/A		Checked
Whitehall College / Whitehall Garda St	270	9000	After	50	N/A	N/A	N2	Recommended distance 100m		Checked
Wellpark Avenue	310	9310	After	40	N/A	N/A	94	N/A		Checked
St Patrick's College of Education	300	9610	N/A	N/A	Far Side	40	N/A	N/A	N/A	N/A
DCU St Patrick's	160	9770	N/A	N/A	Far Side	80	N/A	N/A	DCU	Checked
Botanic Avenue	350	10120	Before	60	N/A	N/A	N/A	N/A		Checked
Dargle Road	130	10250	Before	180	N/A	N/A	N/A	N/A	N/A	Checked
Drumcondra Rail Stn	400	10650	N/A	N/A	Near Side	30	N/A	N/A	Drumcondra railway station	Checked
Innisfallen Parade	310	10960	After	60	N/A	N/A	N/A	N/A		Checked
Dorset Street Lower	220	11180	Before	70	N/A	N/A	N/A	N/A		Checked
St Joseph's Parade	240	11420	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Parnell Square West	410	140								
Parnell Square West	20	160								
Parnell Square West	80	240								
Parnell Square West	20	260								
Parnell Square West	10	270								
Granby Place	-10	260								
Parnell Square West	60	320								
Parnell Square West	20	340								

Appendix B. Bus Stop Catchment Maps





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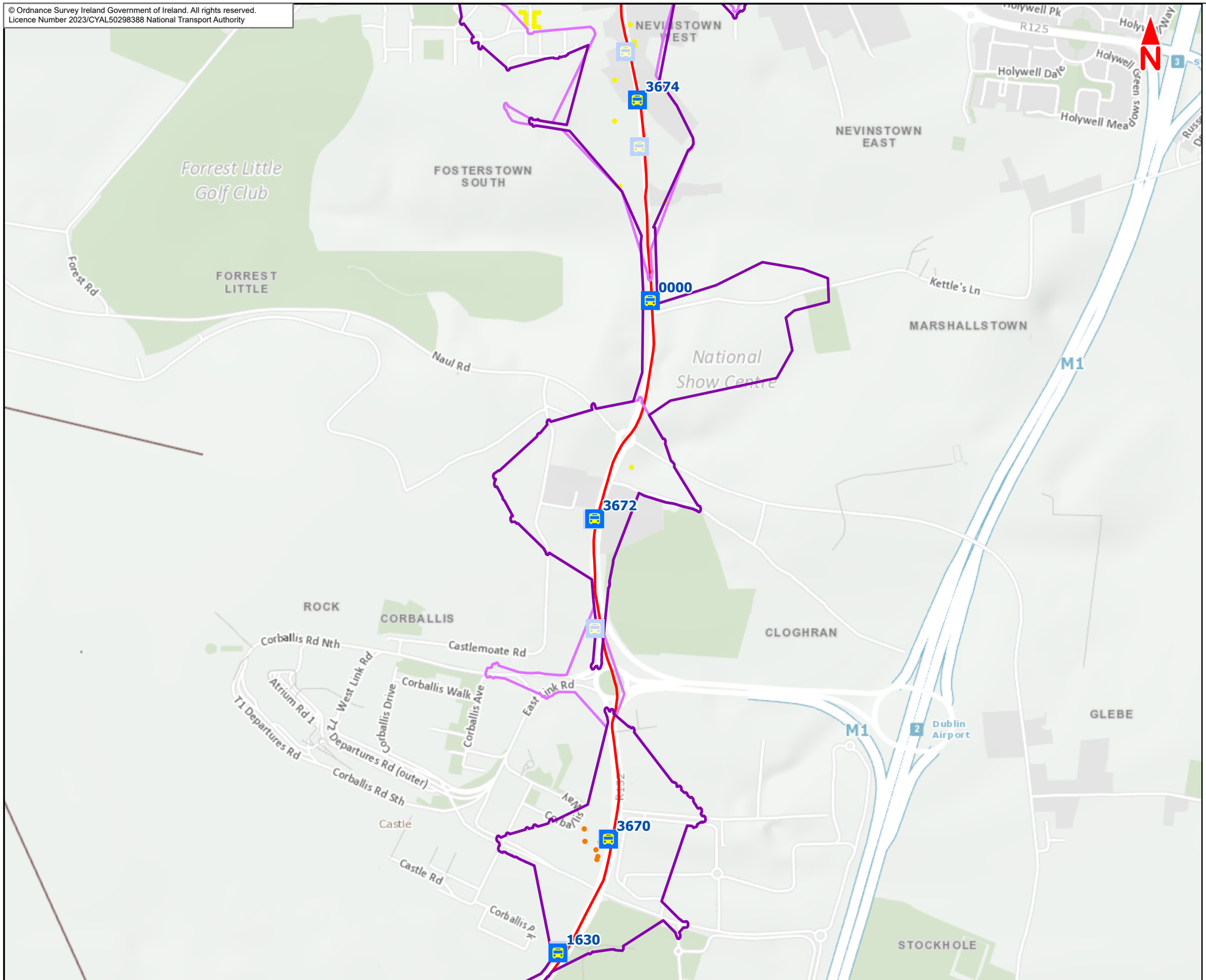

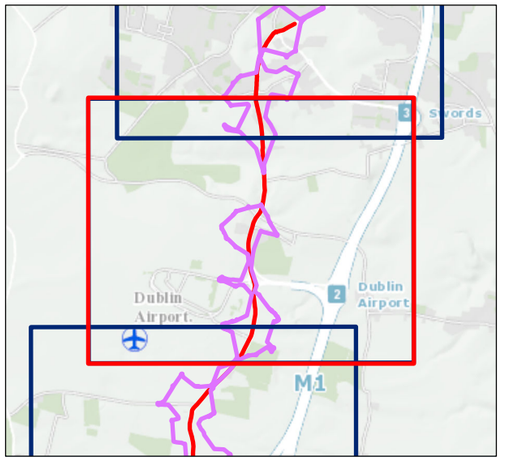

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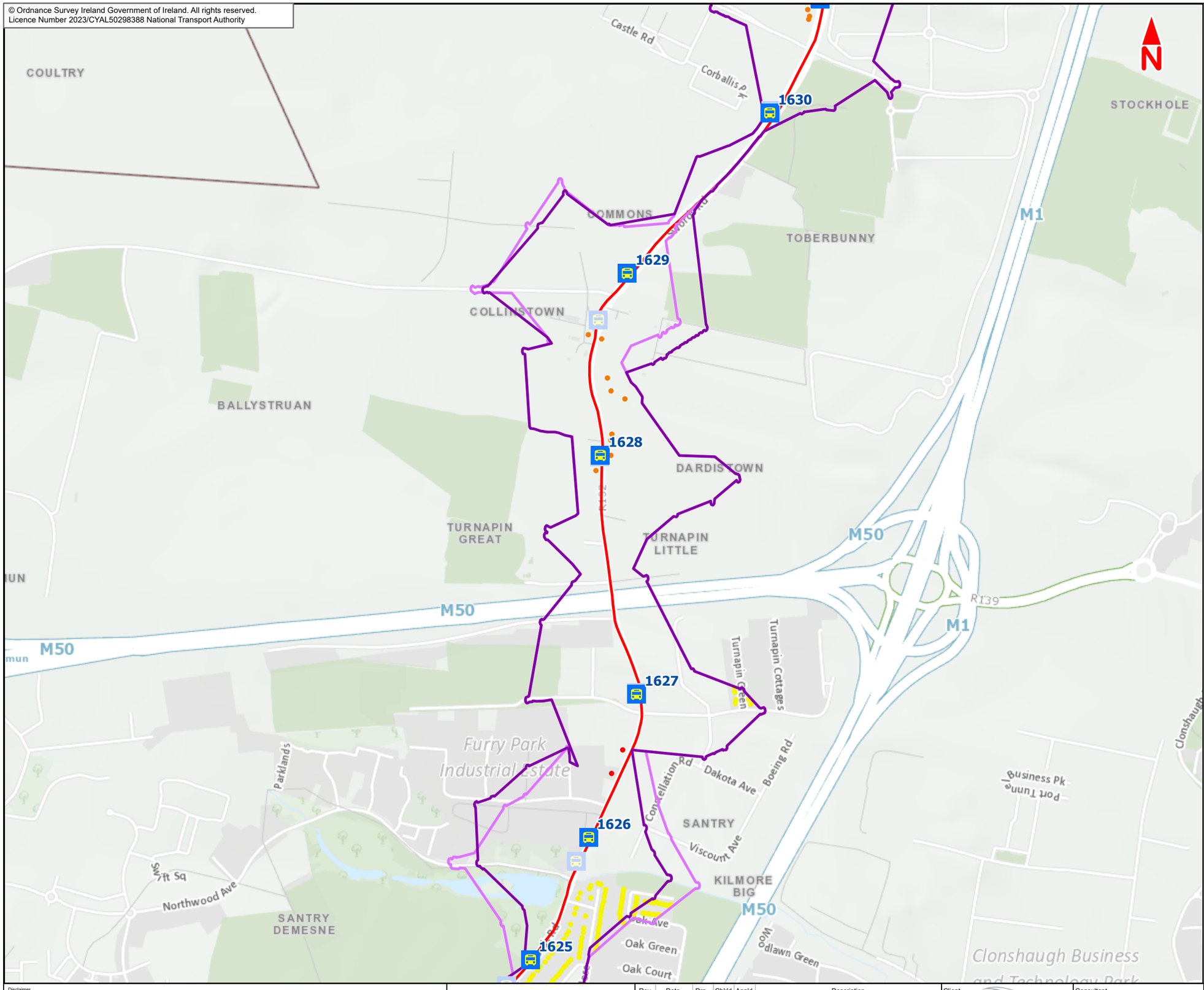

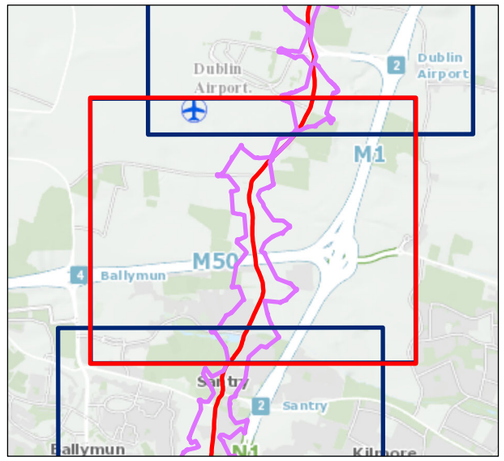

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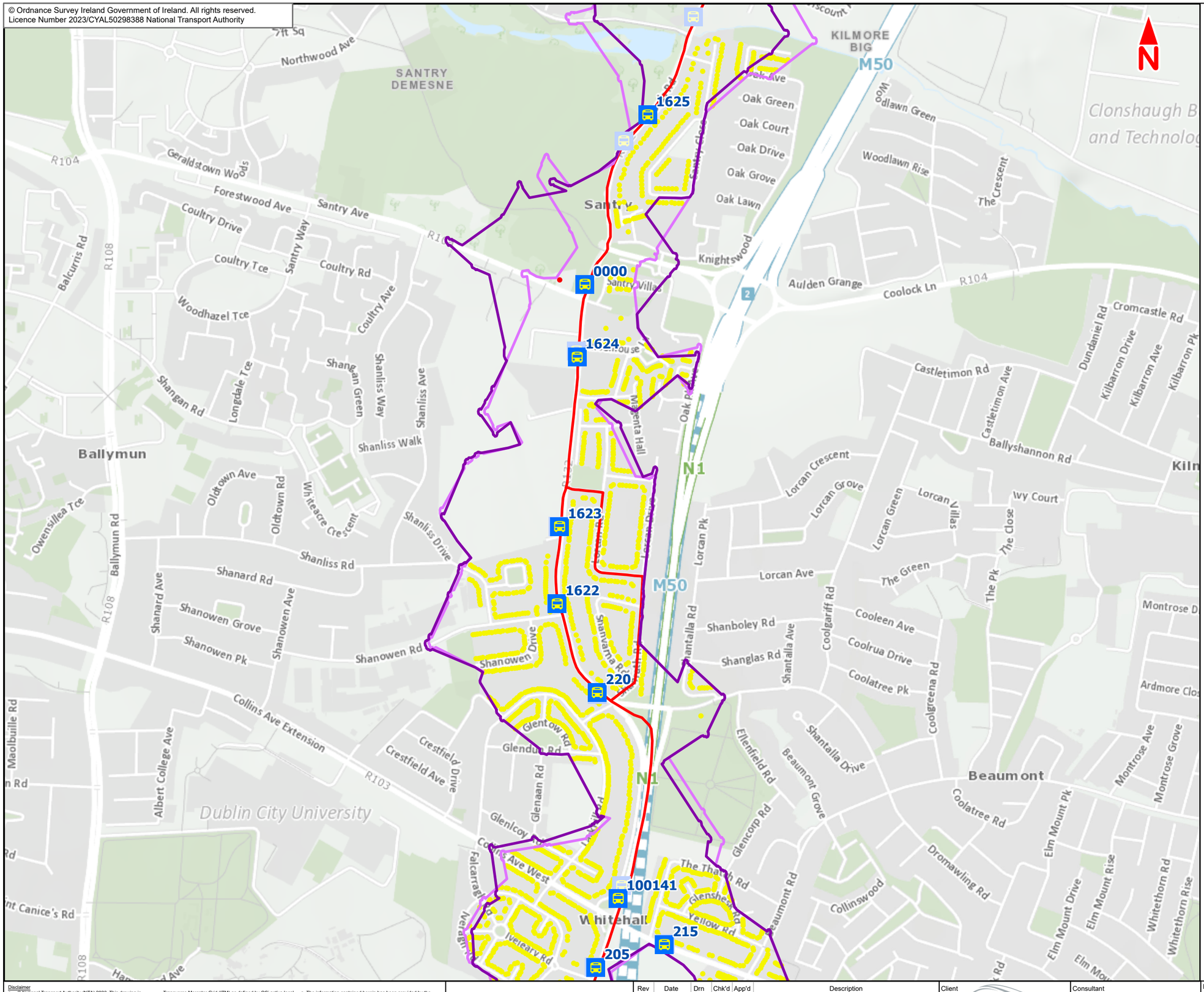

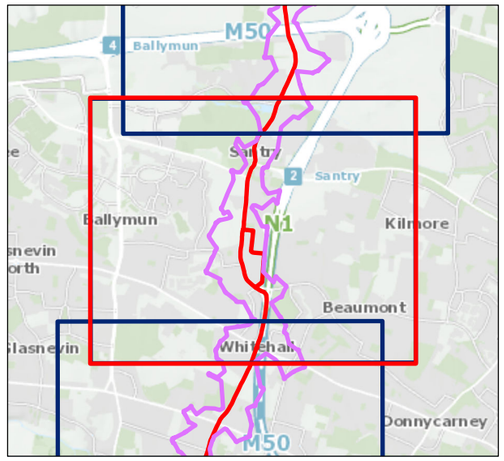

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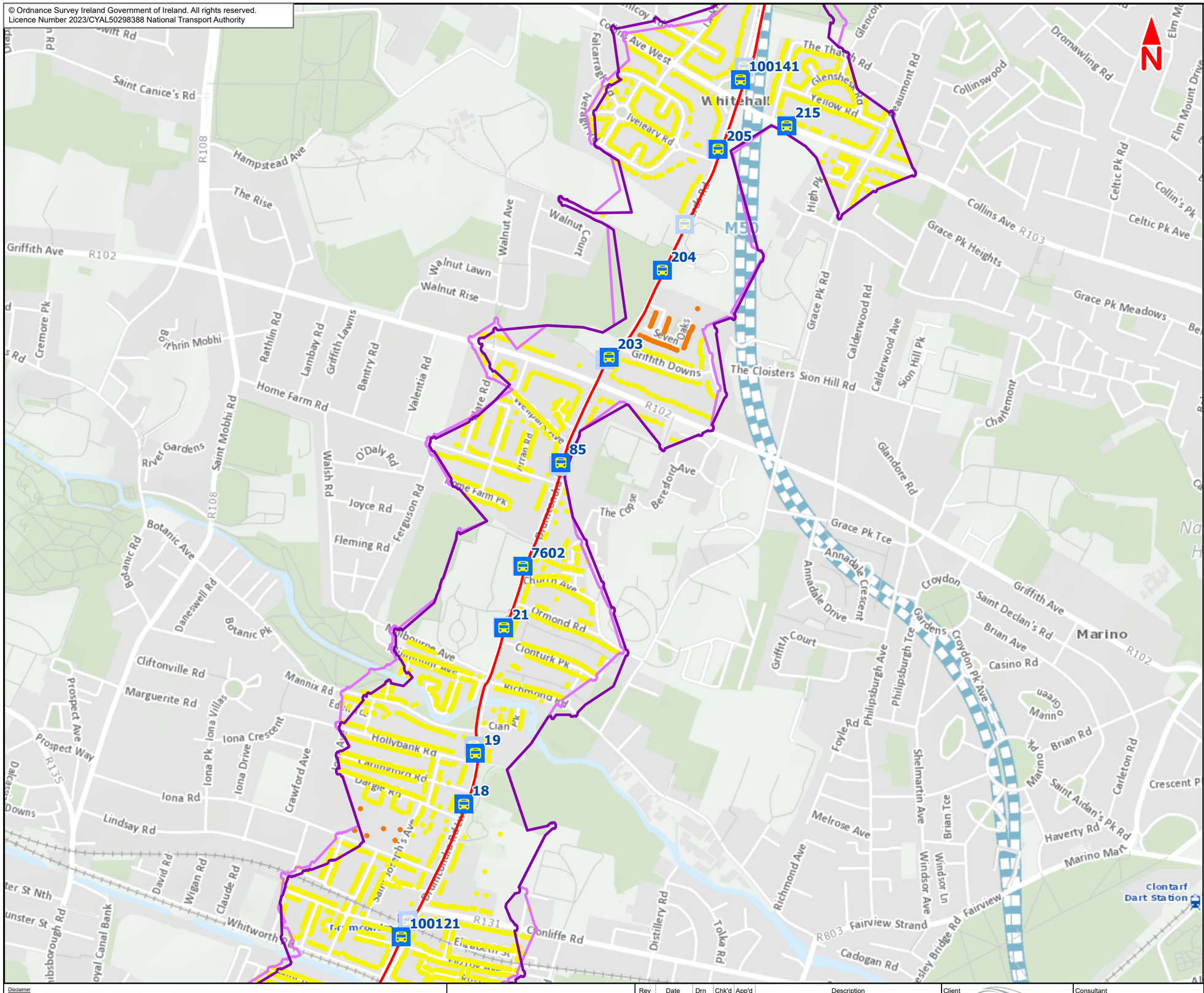

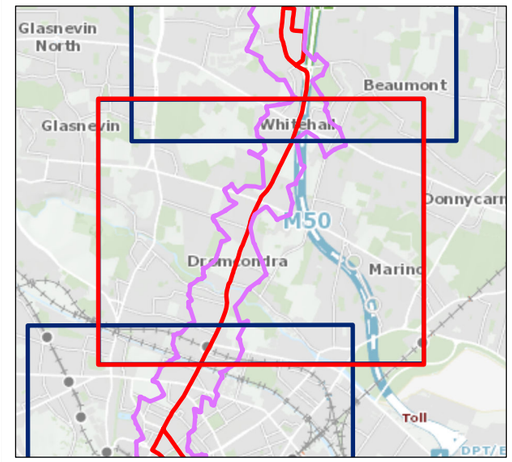

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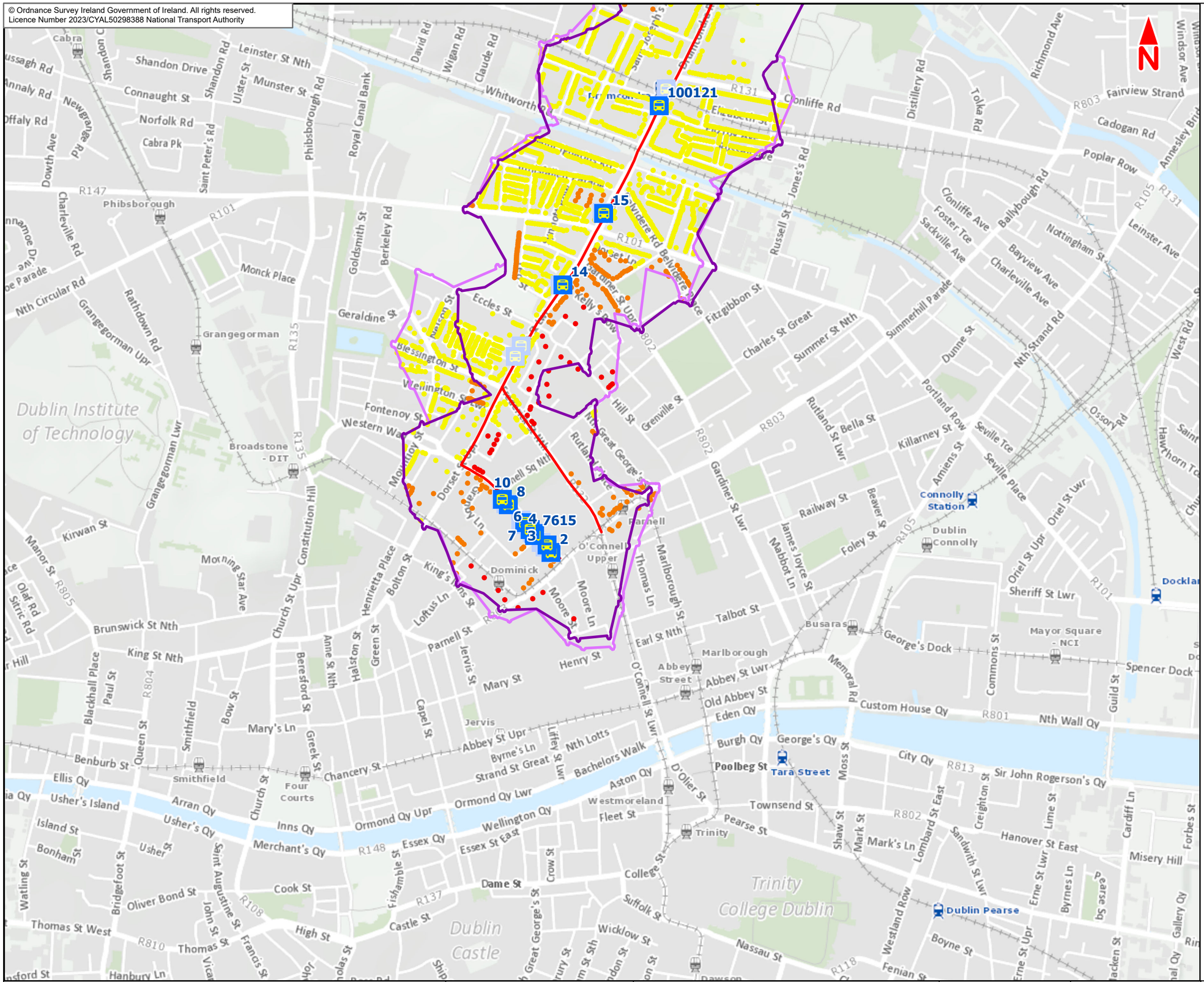

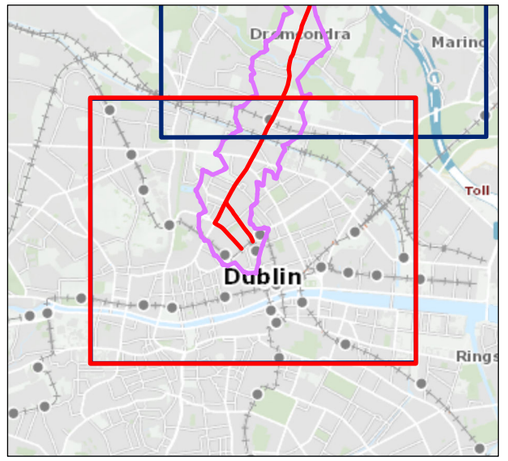

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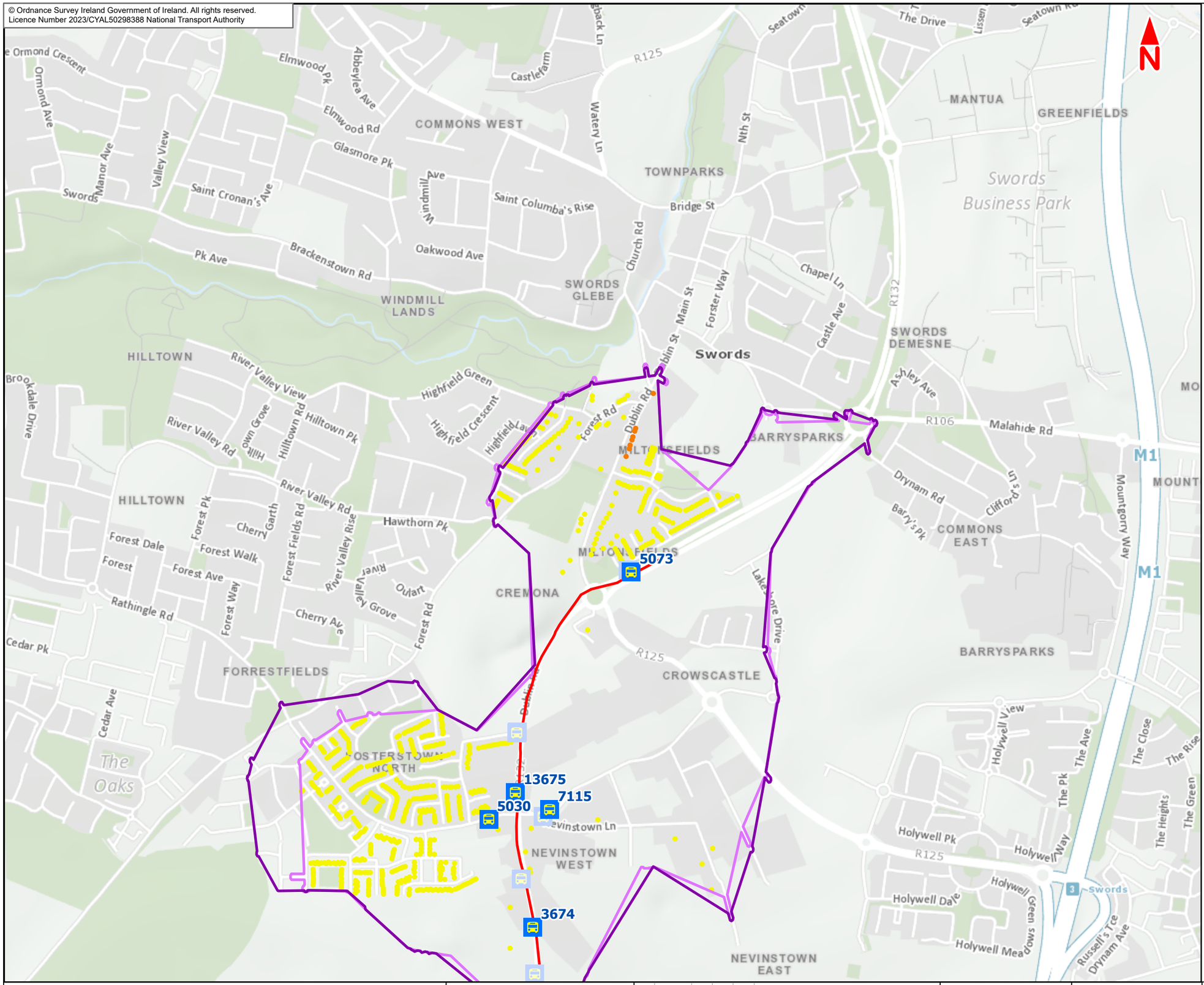

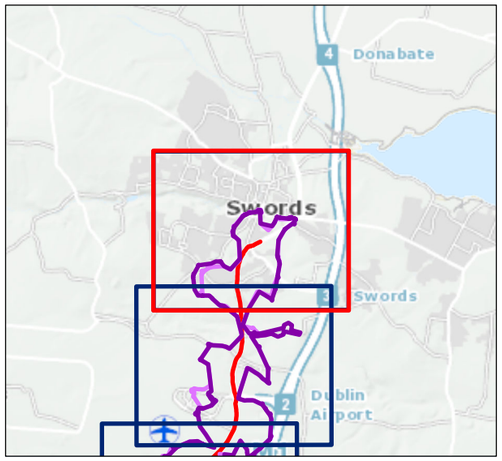

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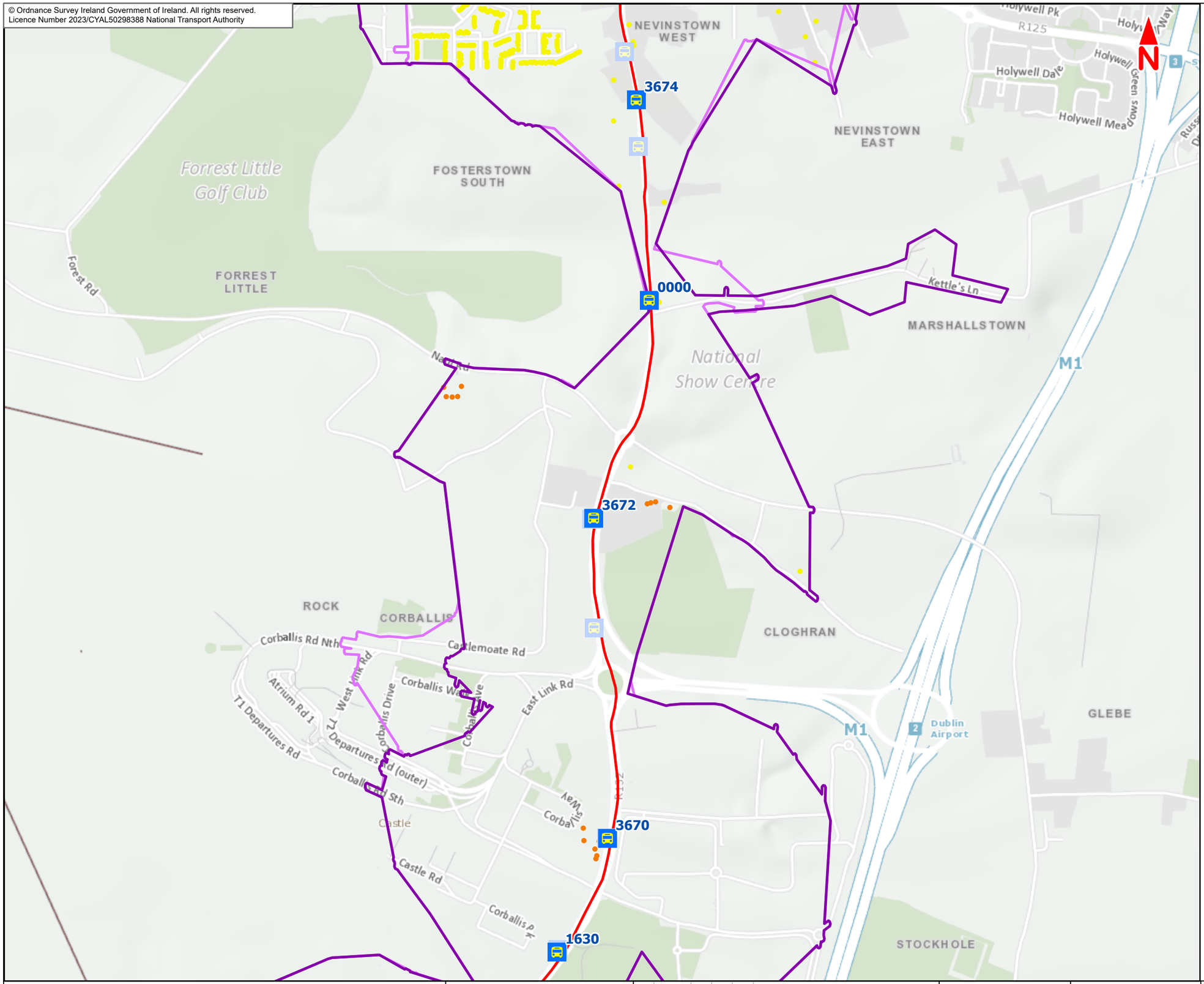

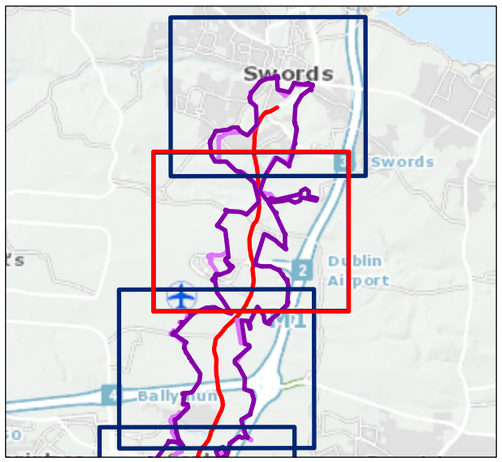

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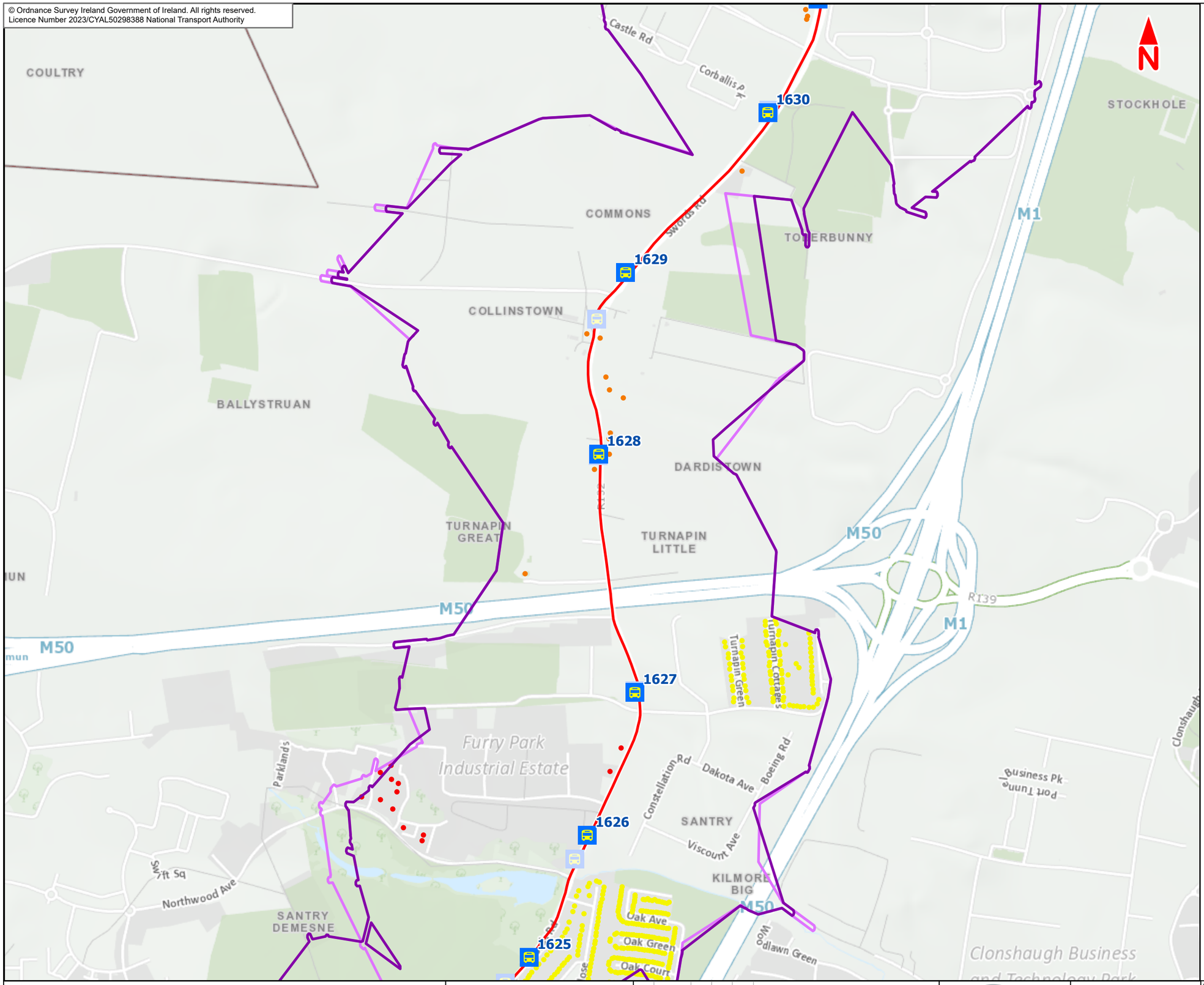

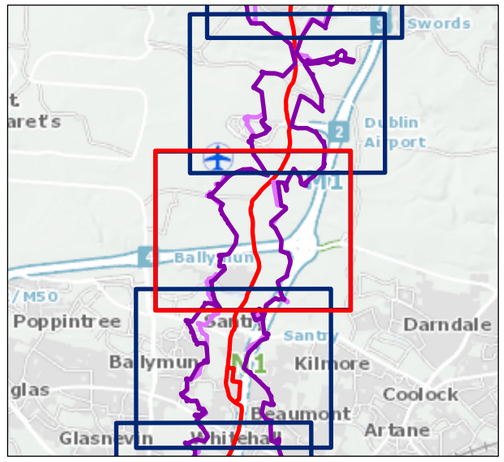

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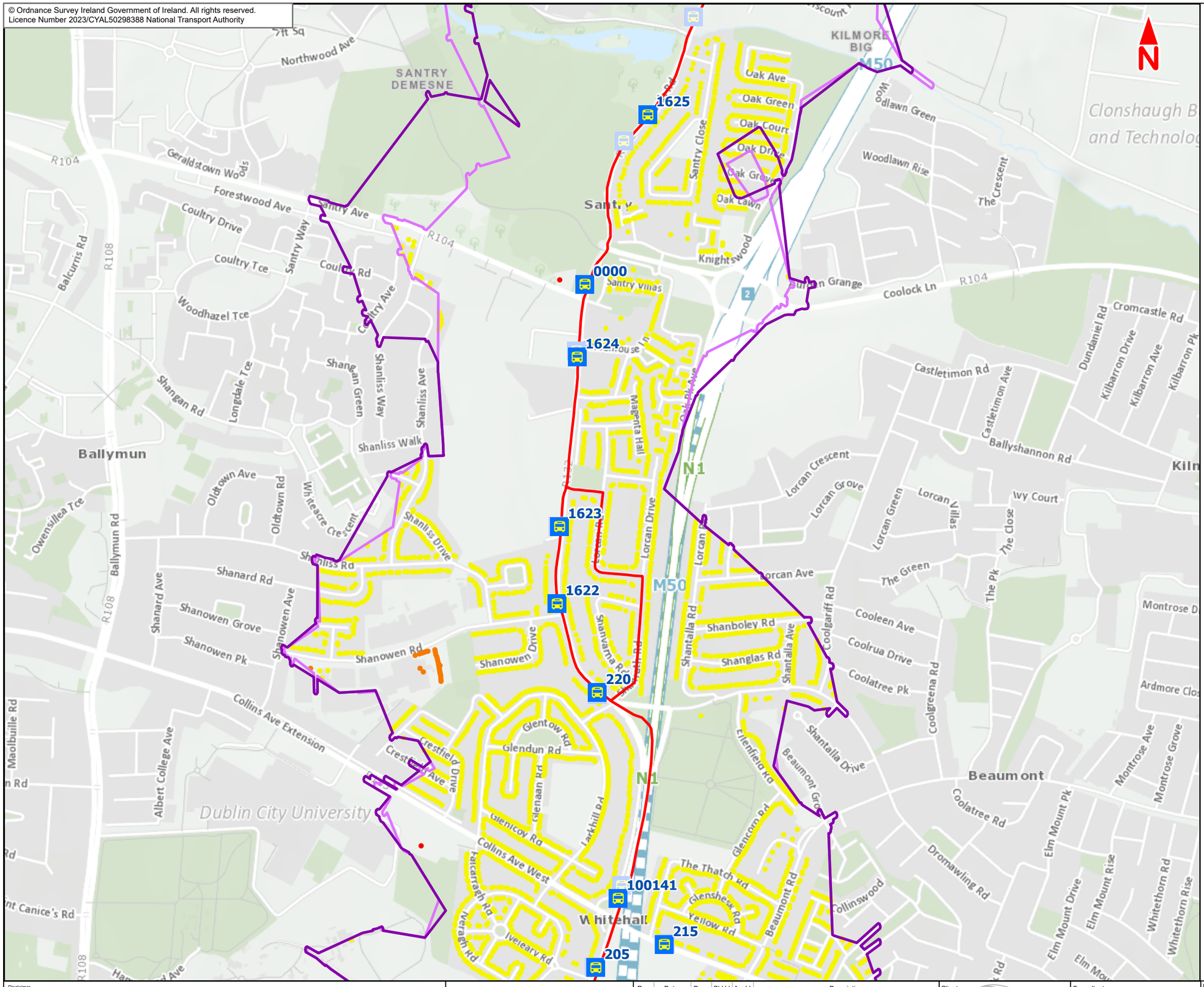

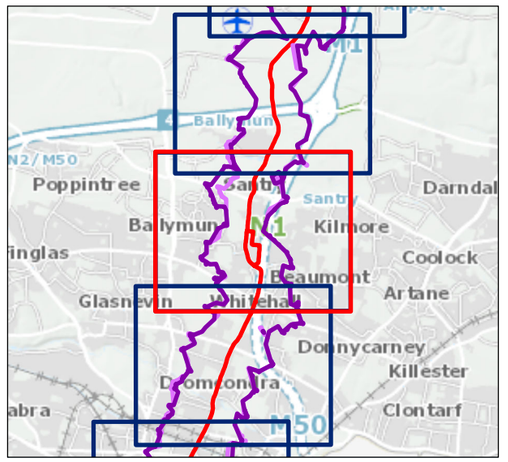

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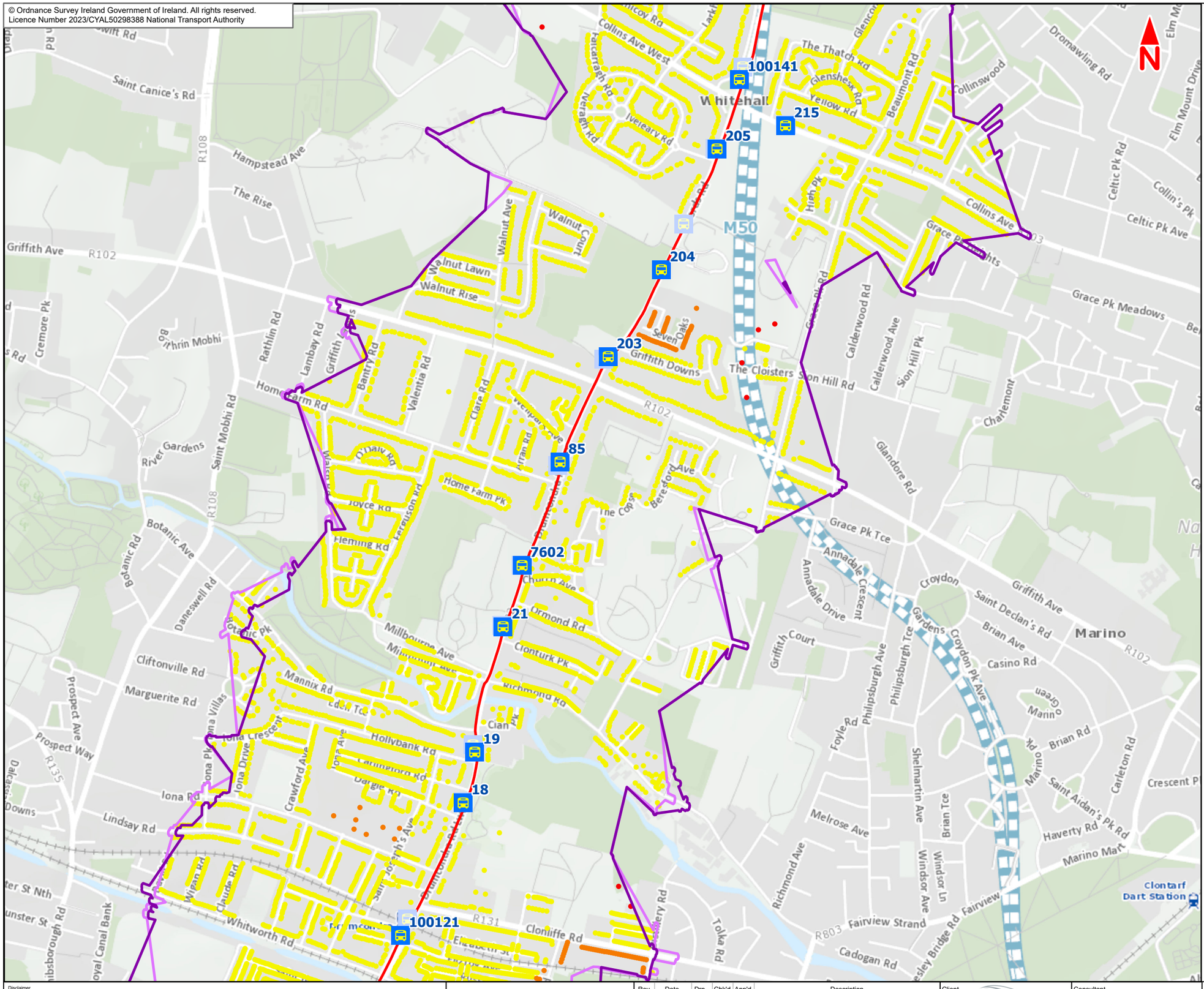

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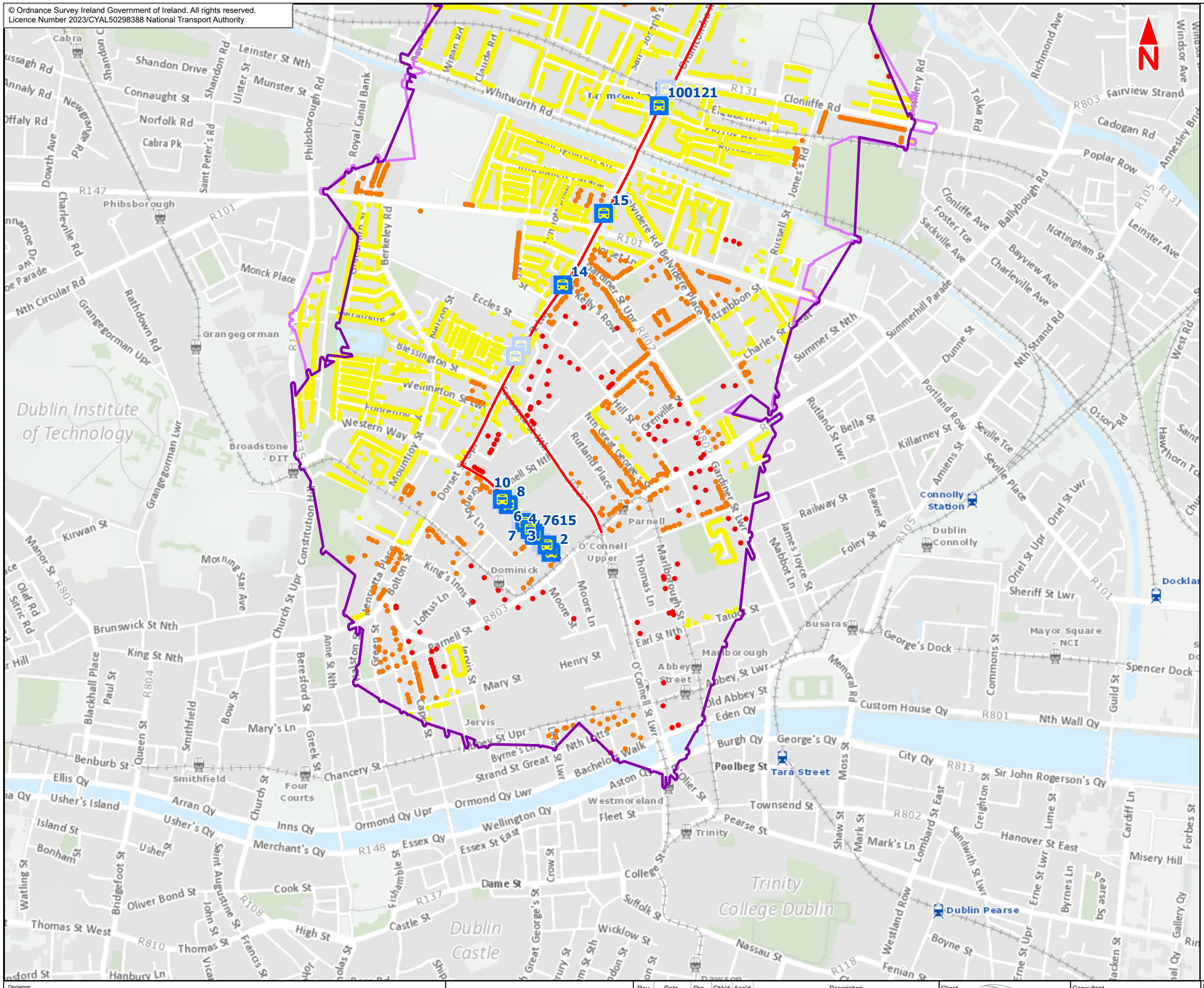

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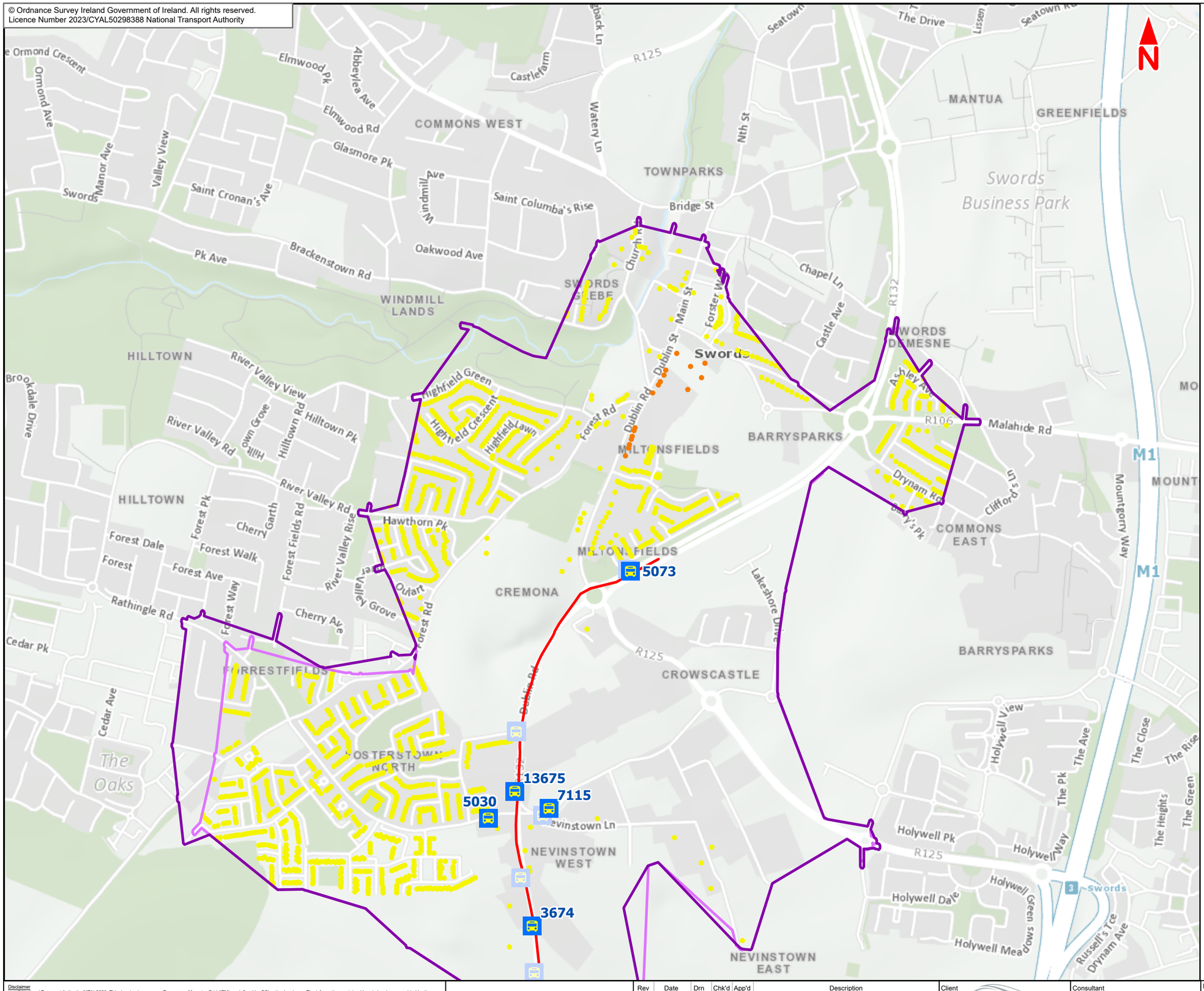
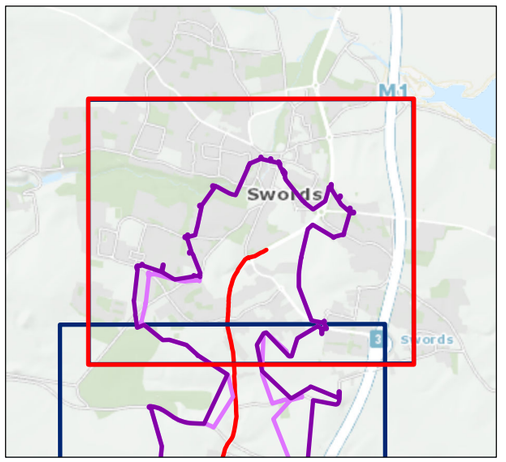
Project Code	Originator Code	QMS Code
32110900	JAC	

Project Title: BUSCONNECTS Core Bus Corridors

Drawing Title: Proposed Outbound Stops 10min. Catchment

Drawing File Reference	Sheet Number	Status	Rev
	6 of 6	FINAL	M01





Legend

- Proposed Outbound Bus Stop
- Existing Outbound Bus Stop
- Proposed Stops 15 min. Catchments Limit
- Existing Stops 15 min. Catchments Limit
- Proposed Core Bus Corridor

Estimated Population in Building

- 2 - 10
- 11 - 30
- >30

0 50 100 200 300 400 500 m

BAR SCALE

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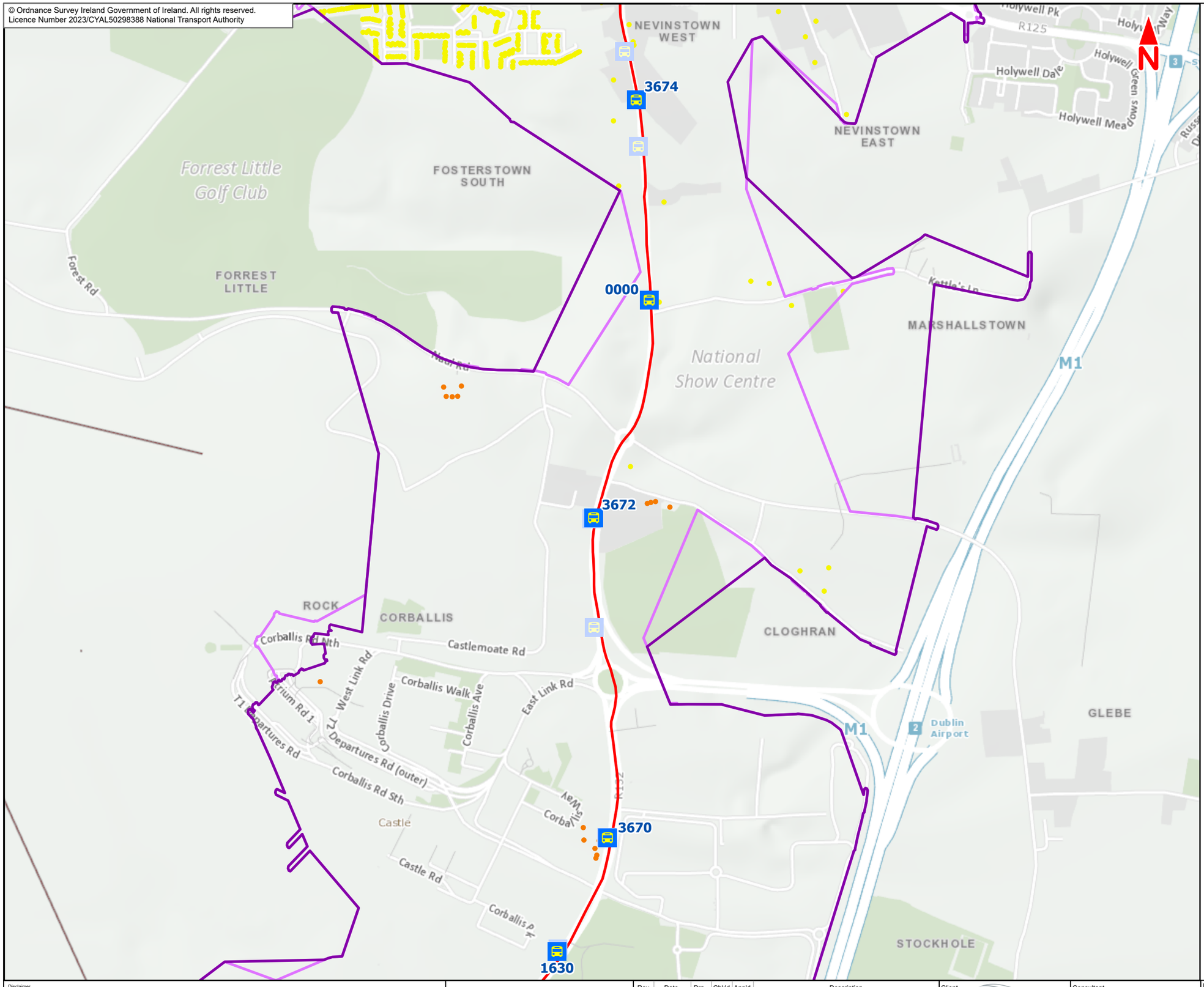

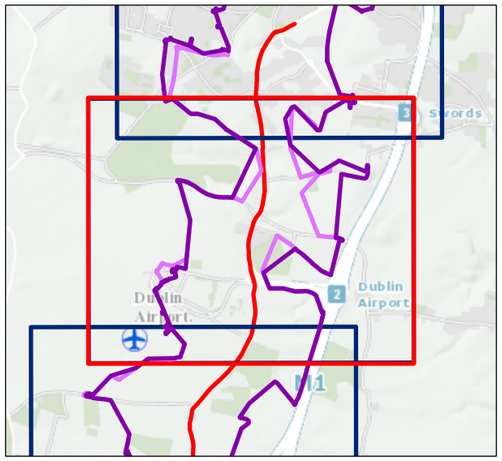

Legend

- Proposed Outbound Bus Stop
- Existing Outbound Bus Stop
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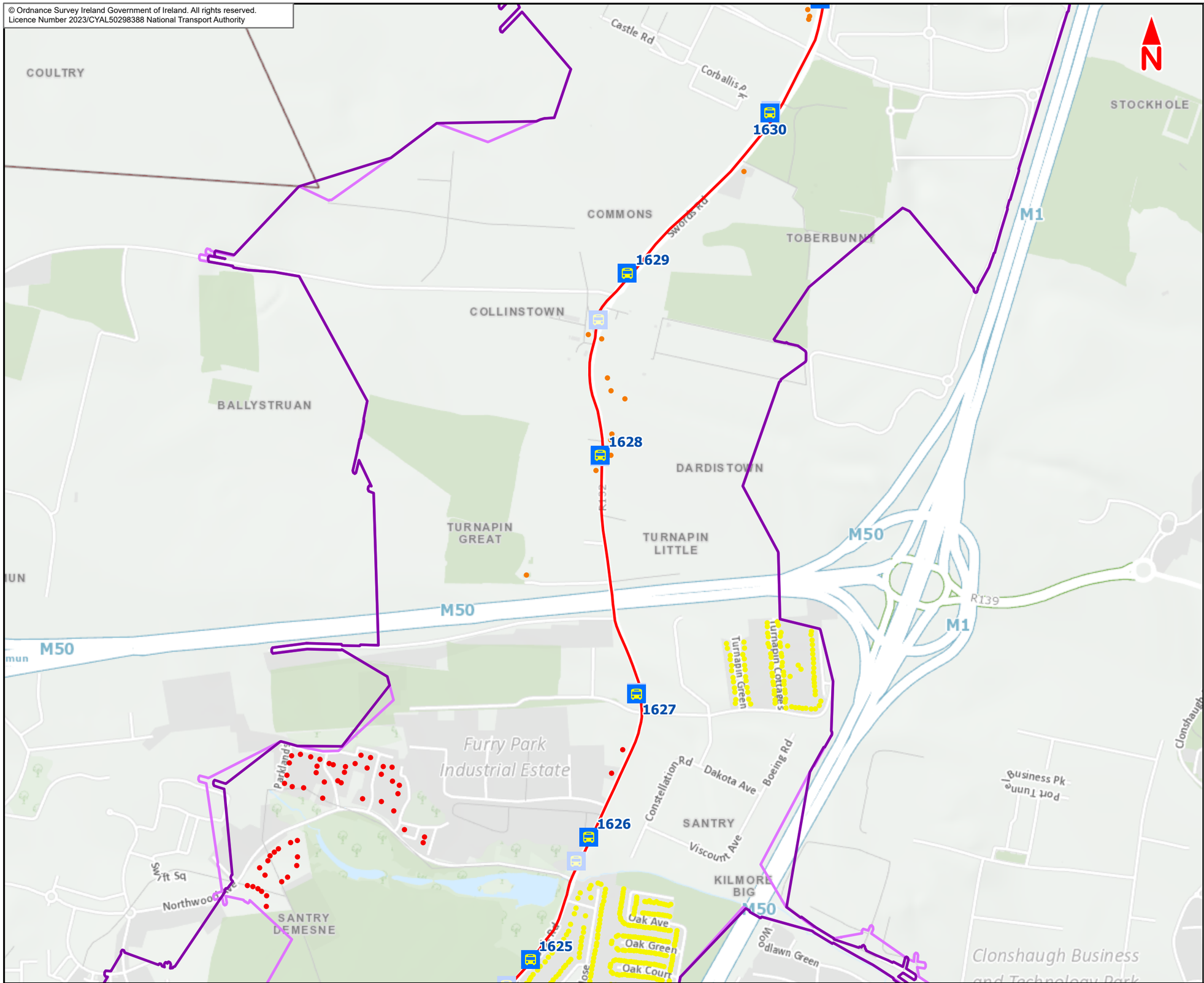

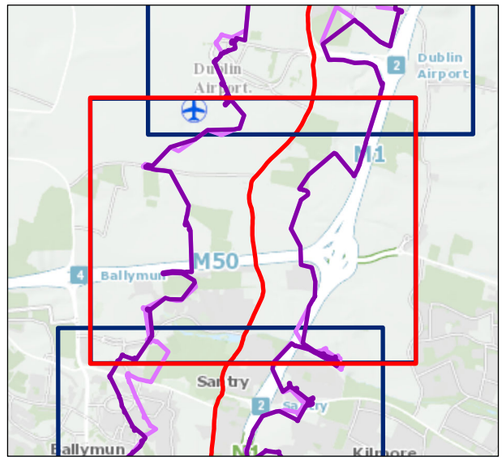

Legend

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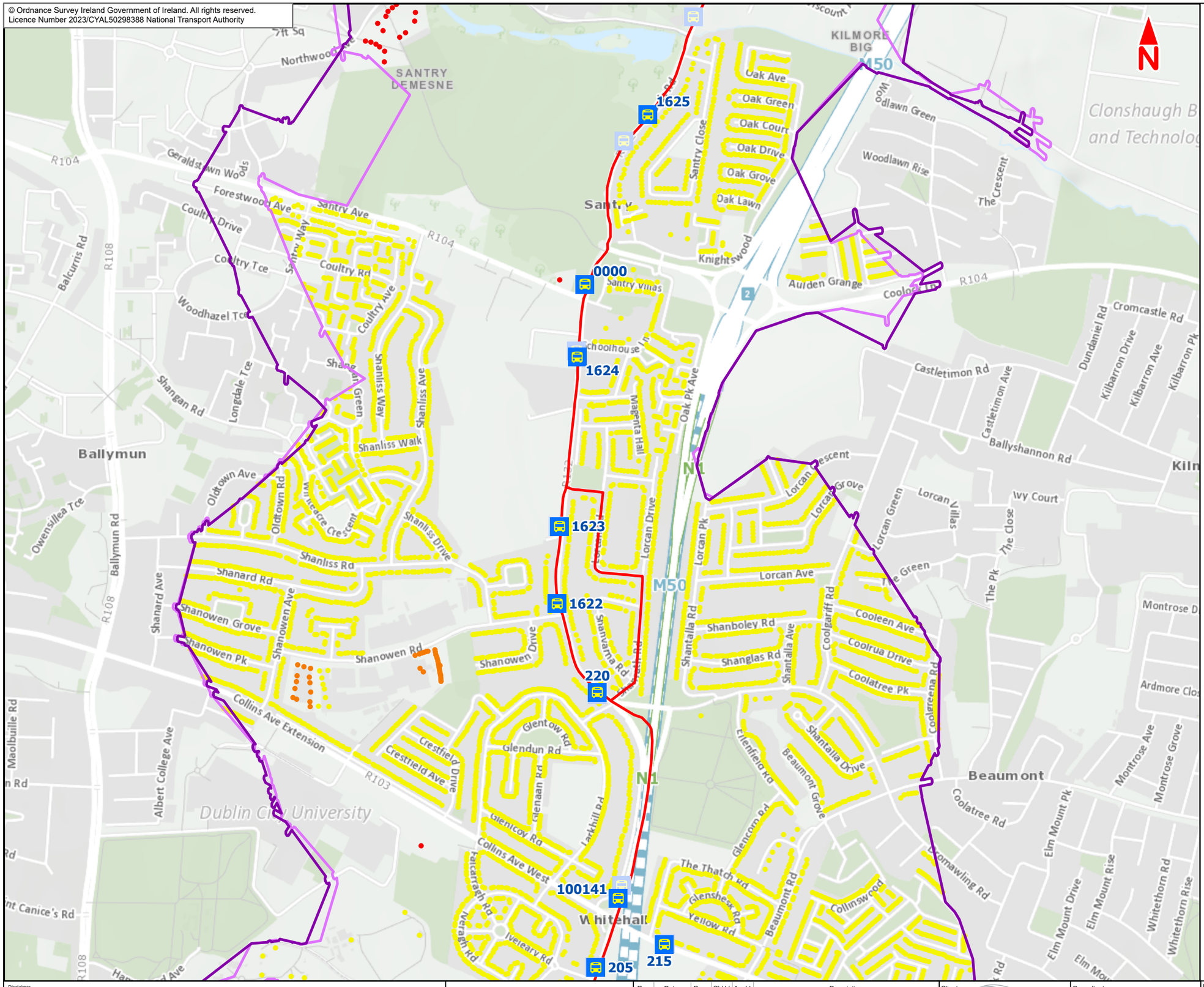

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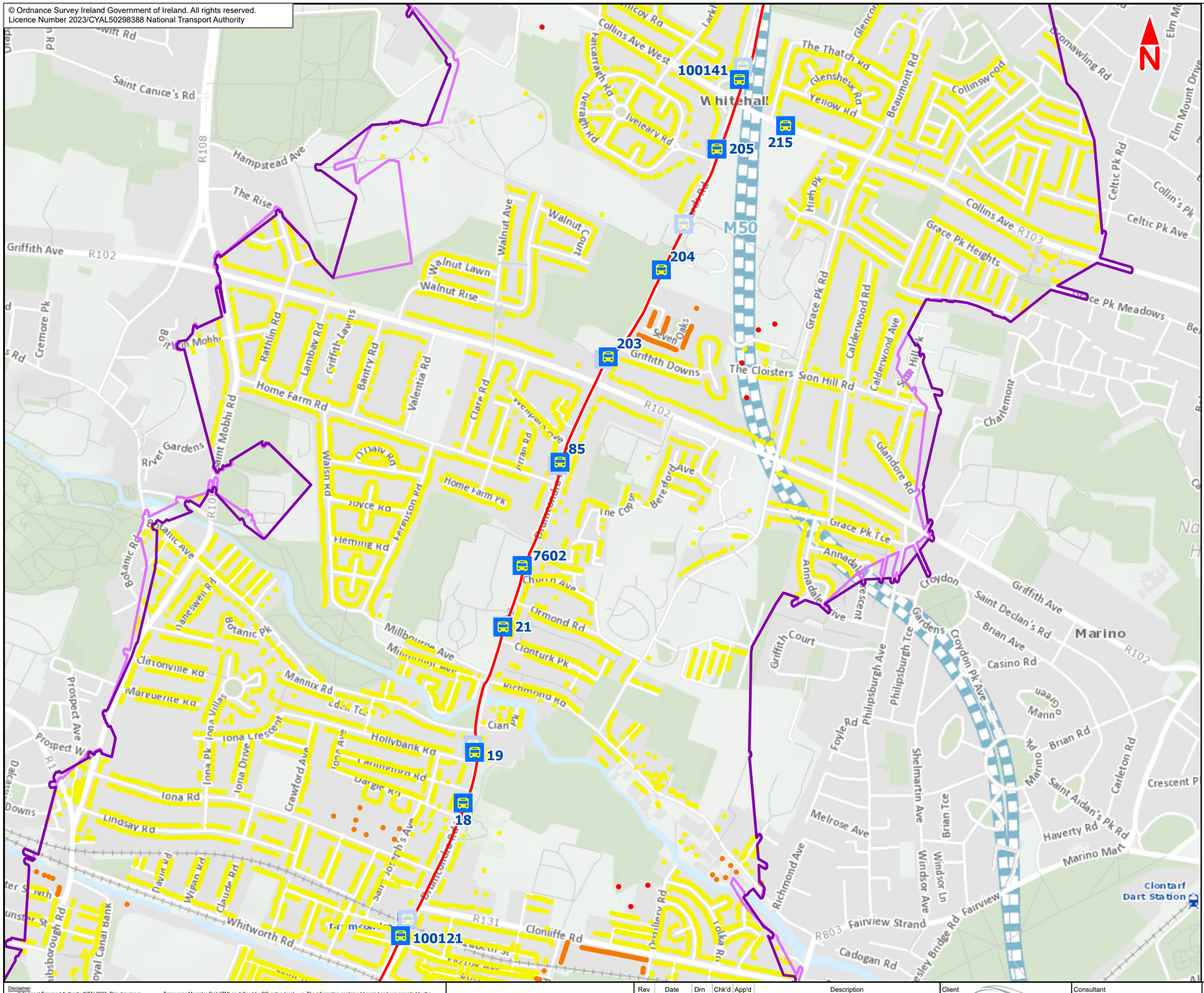

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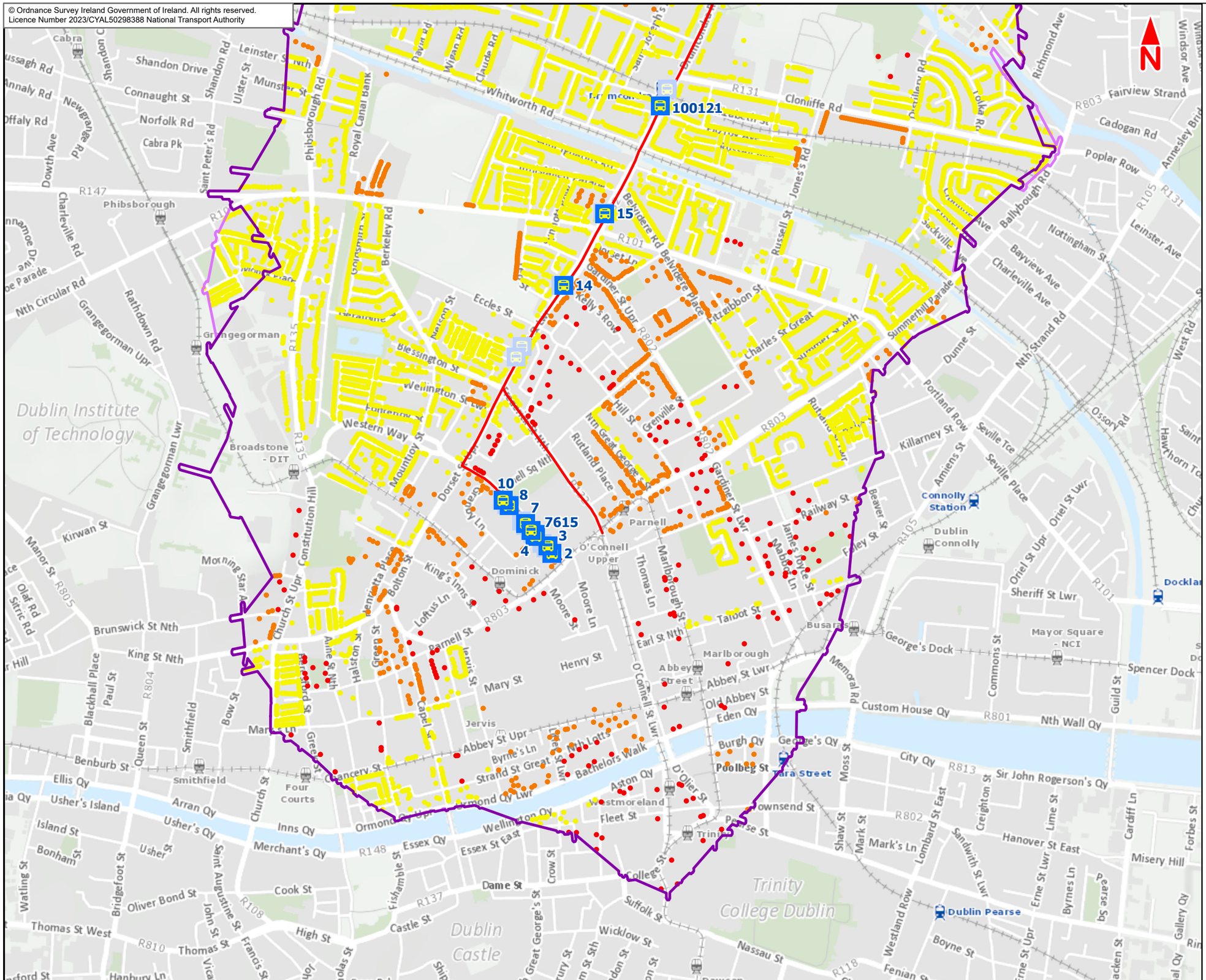

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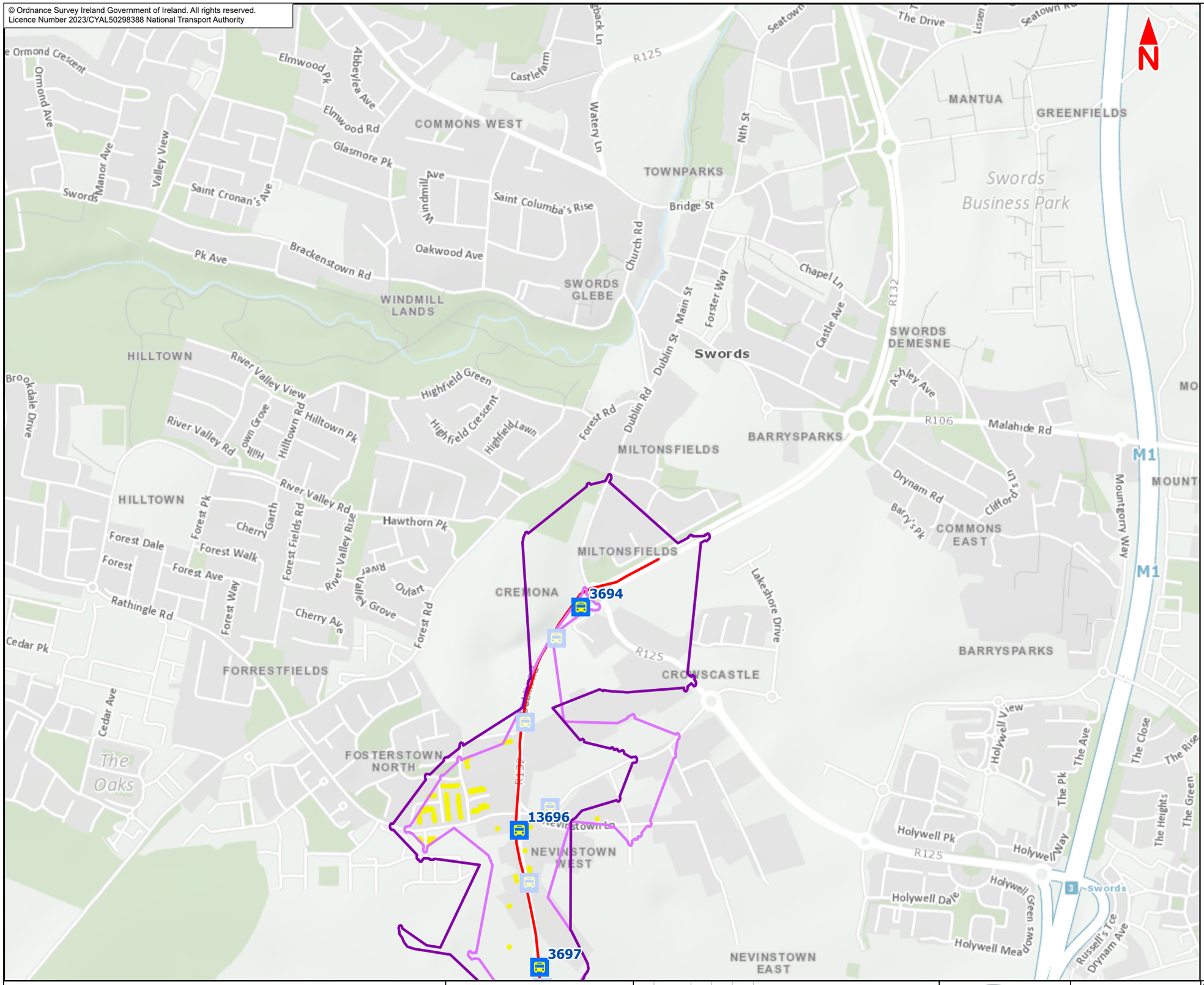

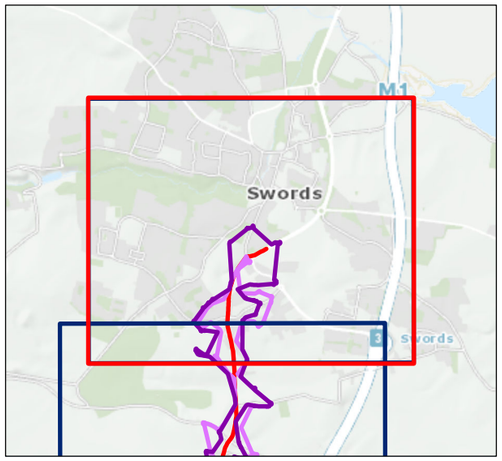

Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
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- Proposed Stops 5 min. Catchments Limit

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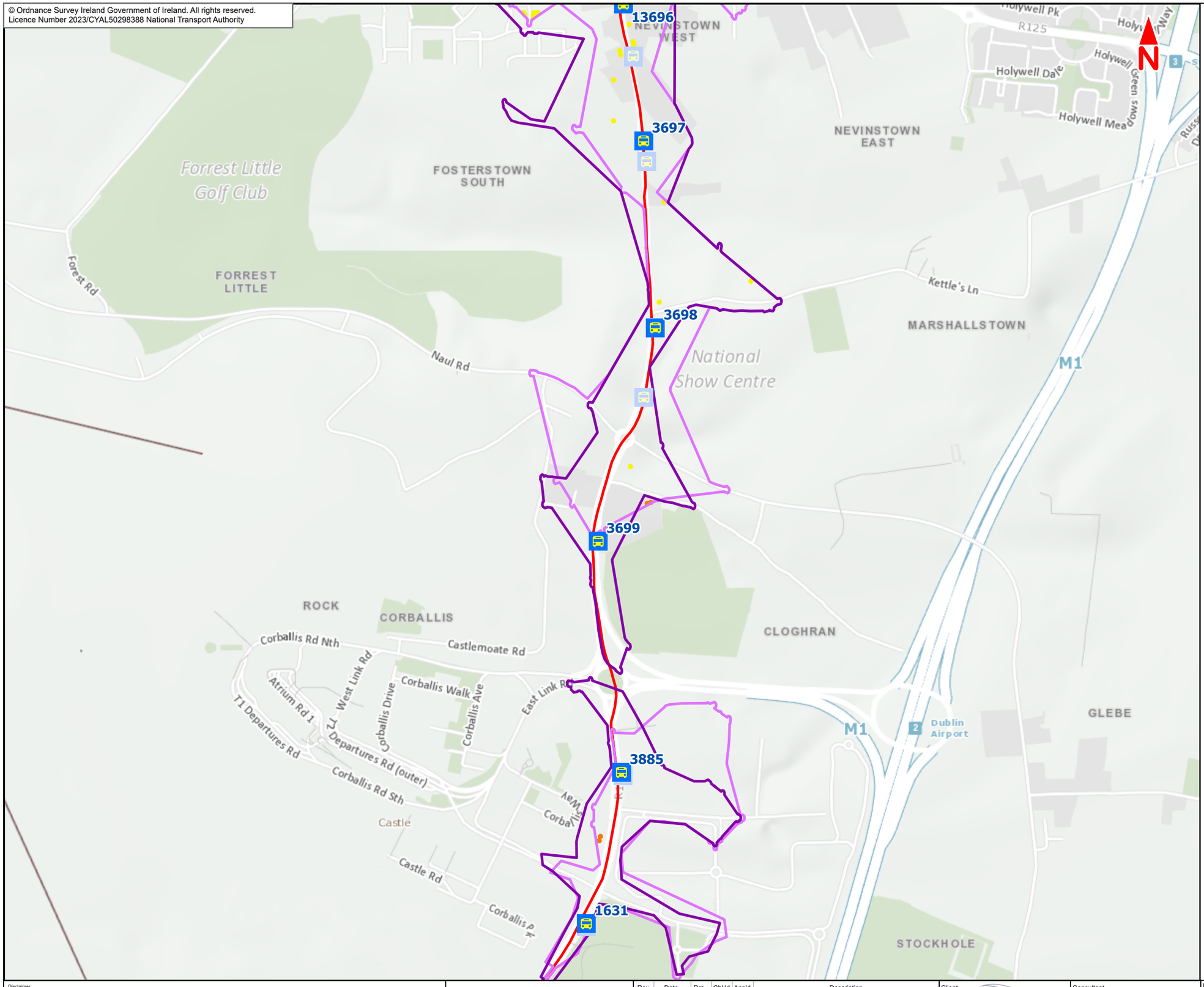

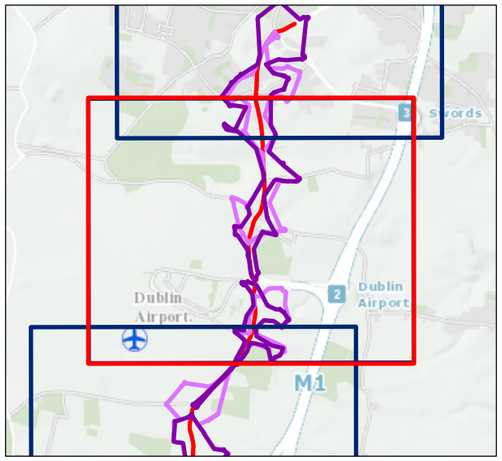

Legend

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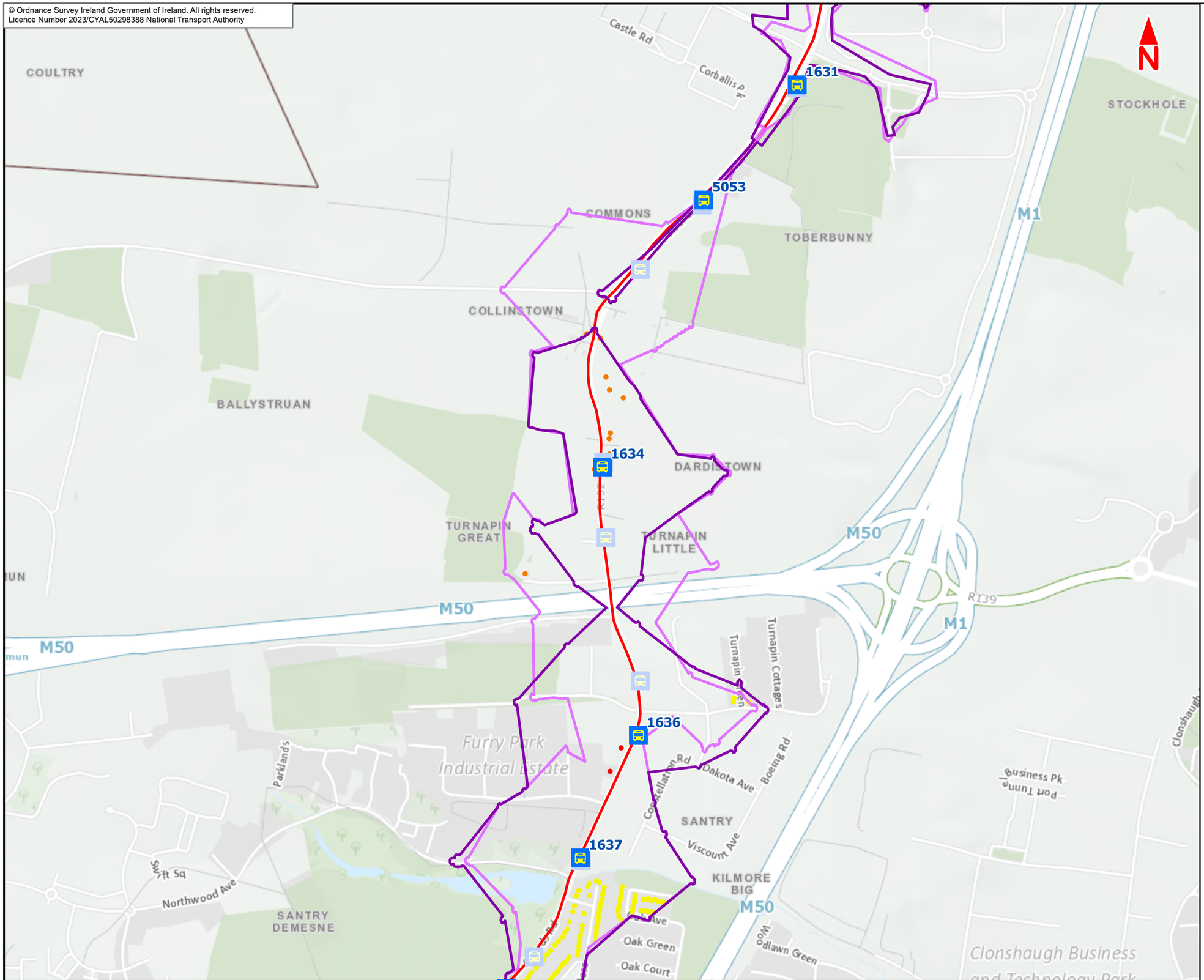

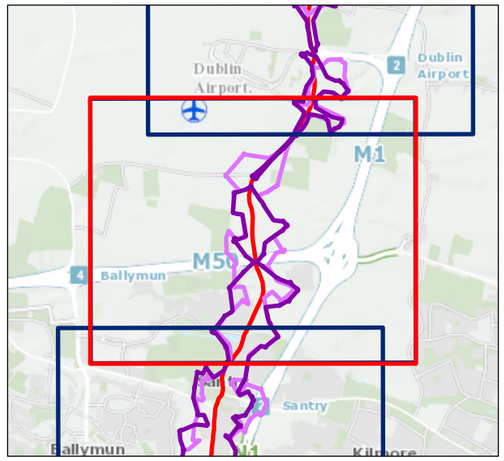

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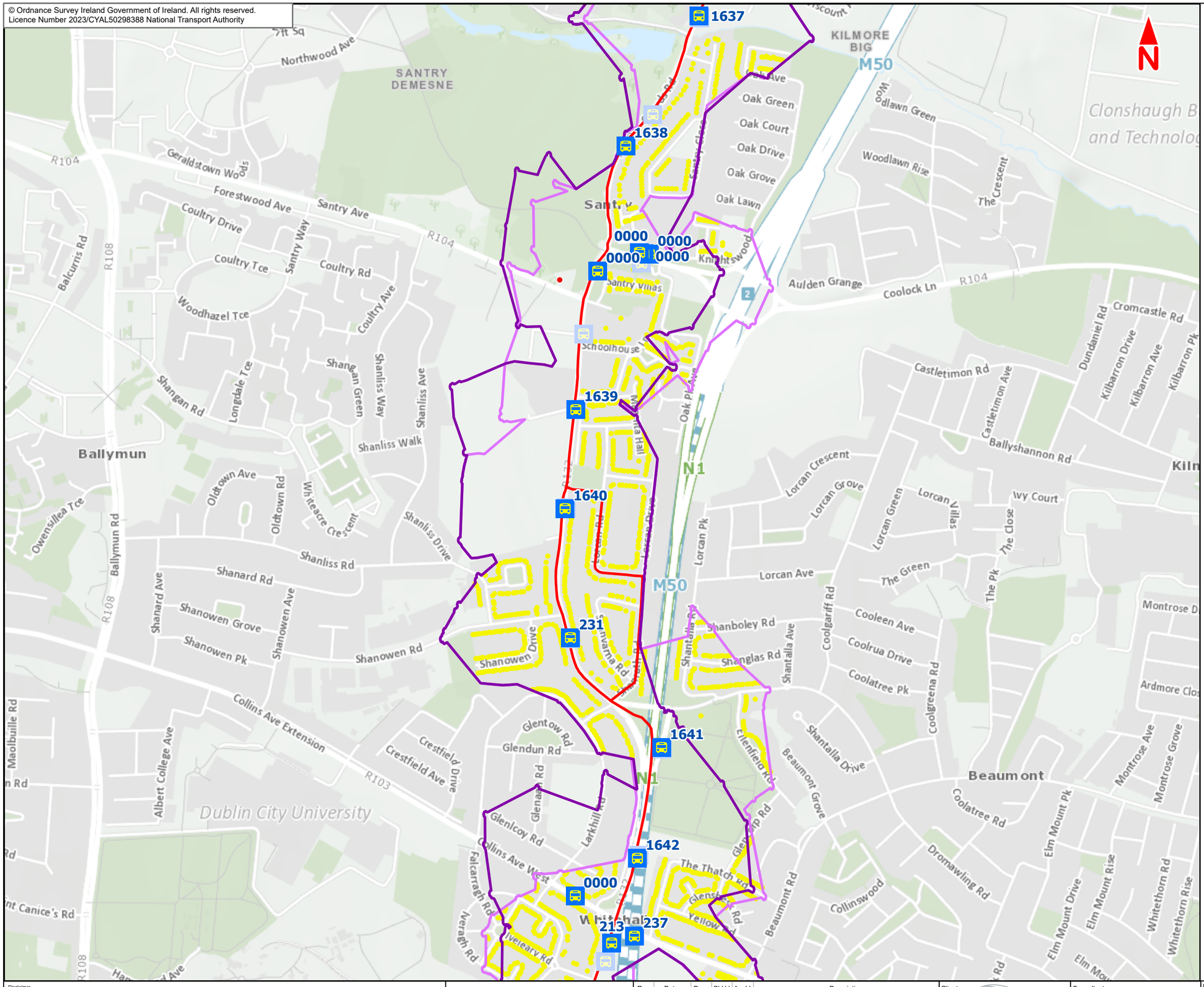

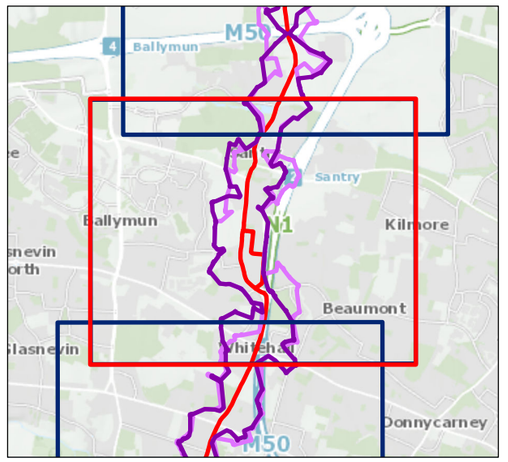

Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
- Existing Stops 5 min. Catchments Limit
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- 11 - 30
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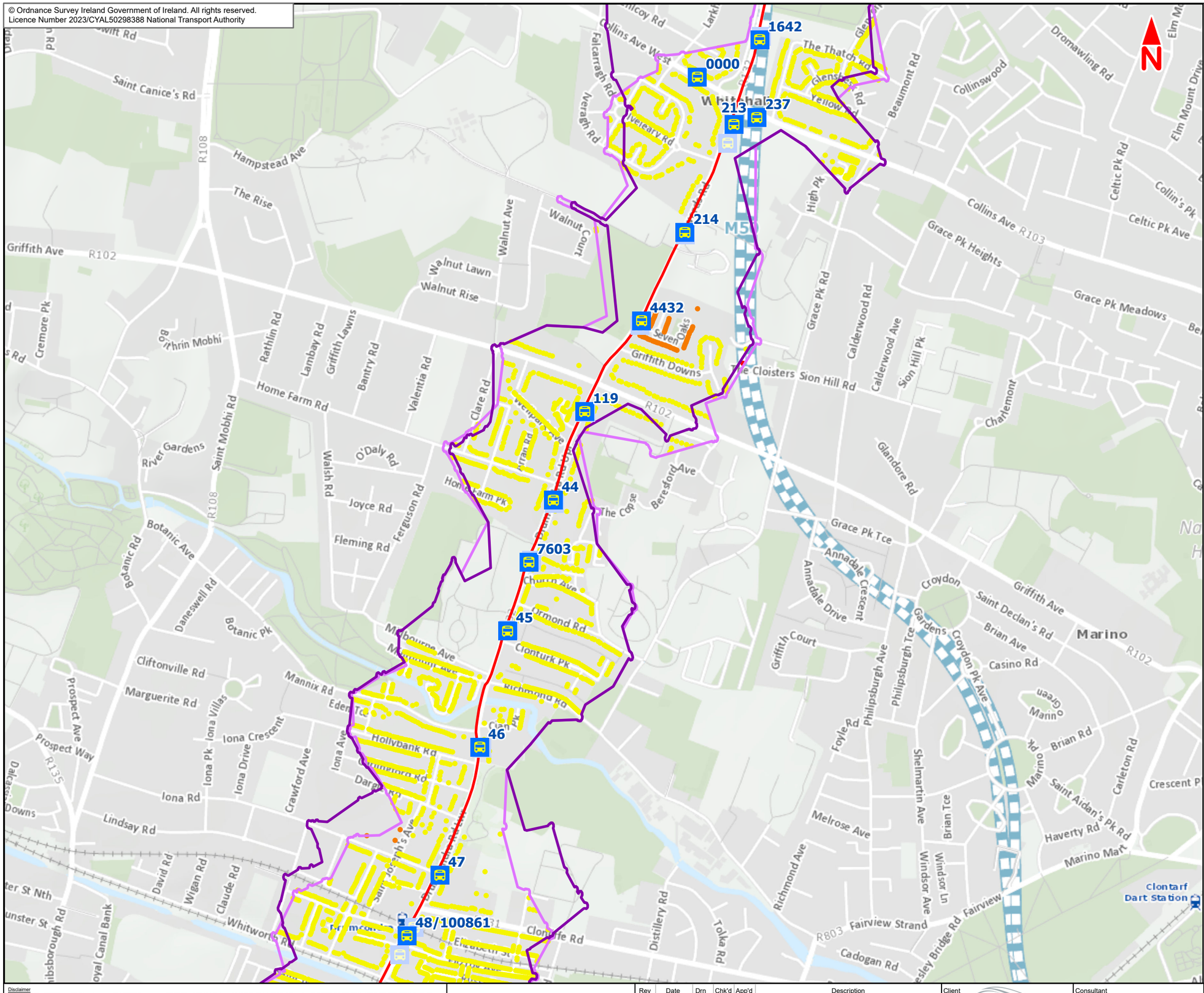

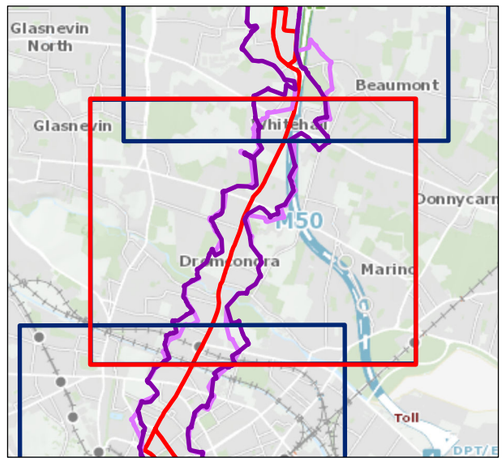

Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
- Existing Stops 5 min. Catchments Limit
- Proposed Stops 5 min. Catchments Limit

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- 2 - 10
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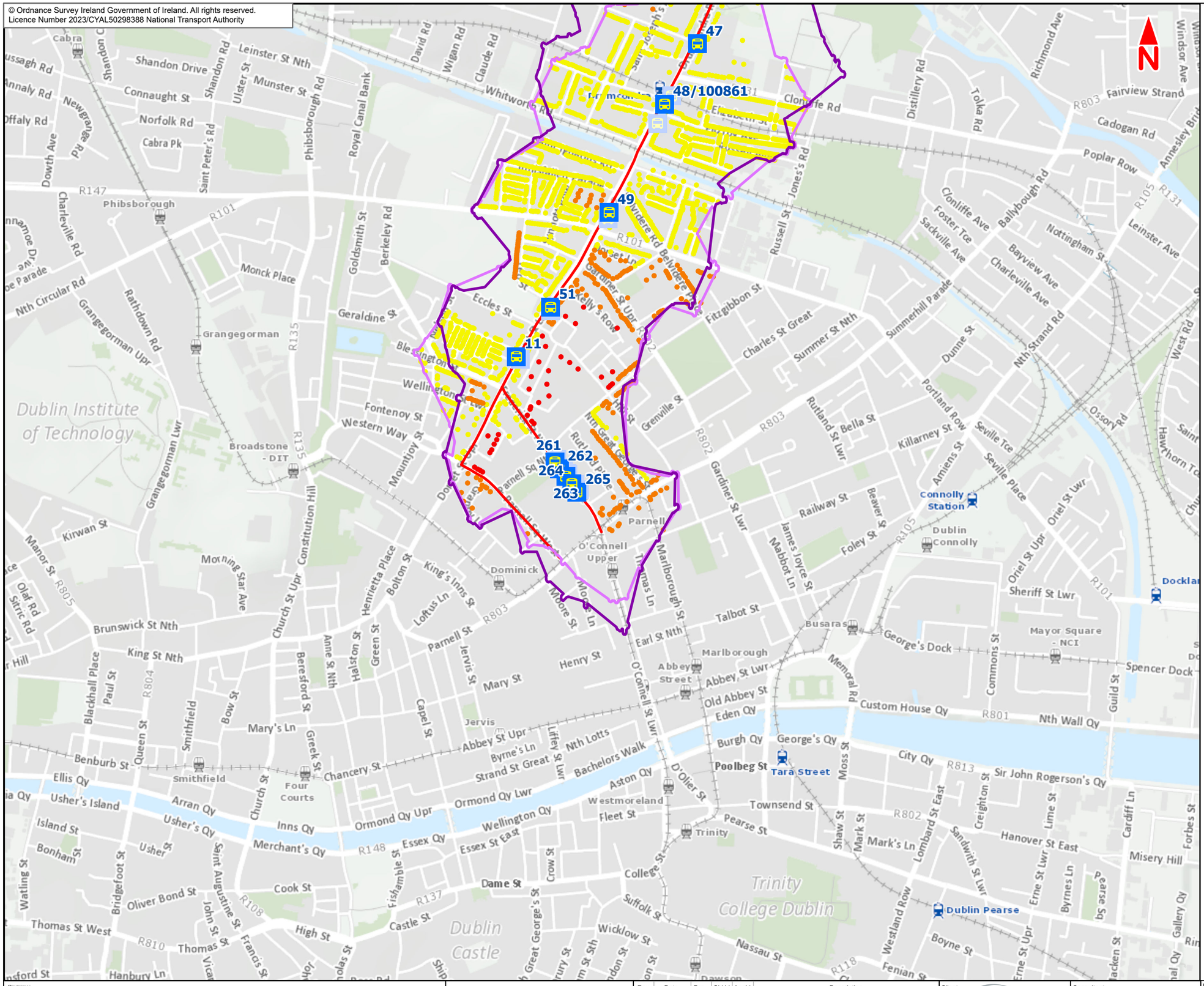

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- Proposed Inbound Bus Stop
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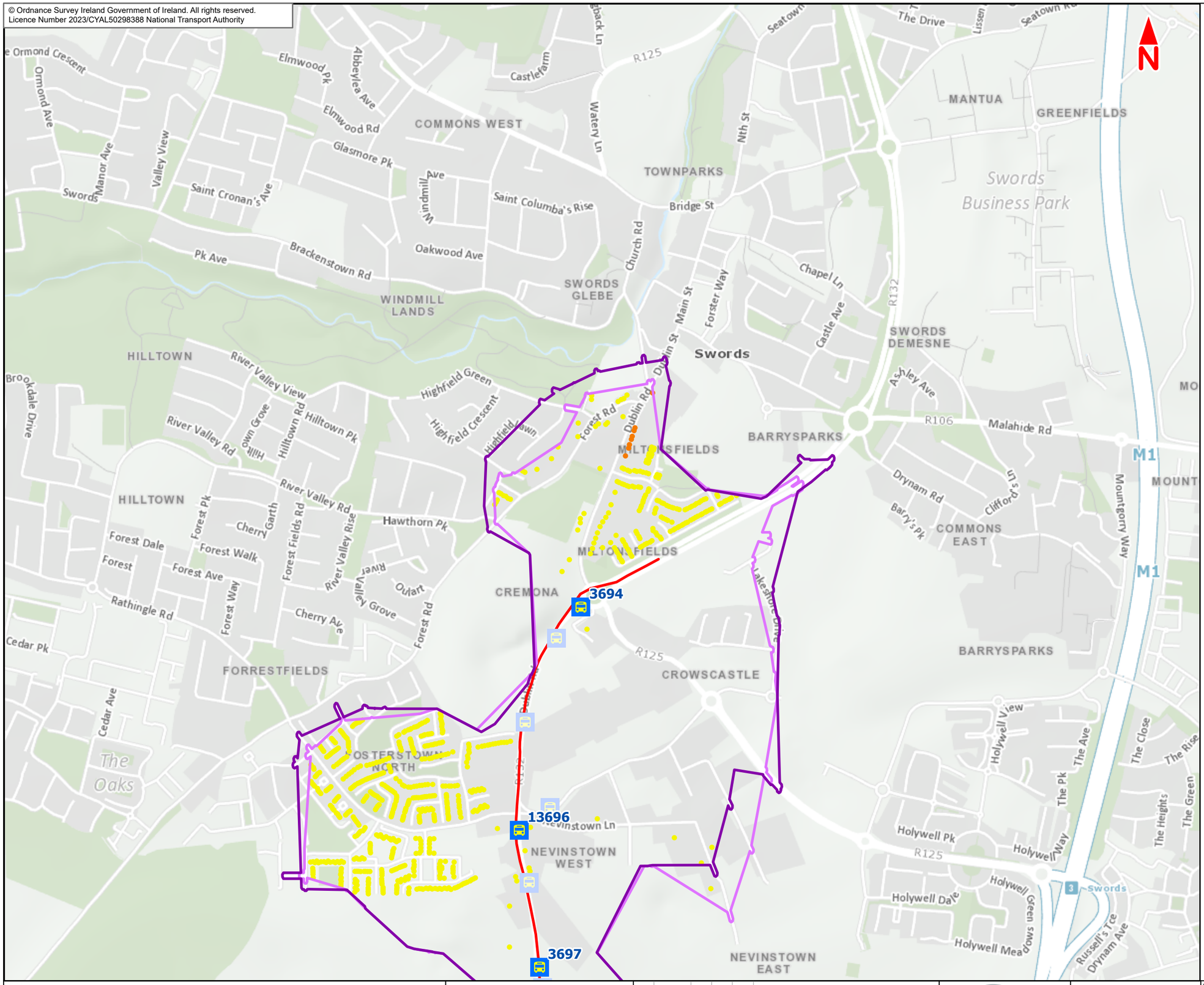

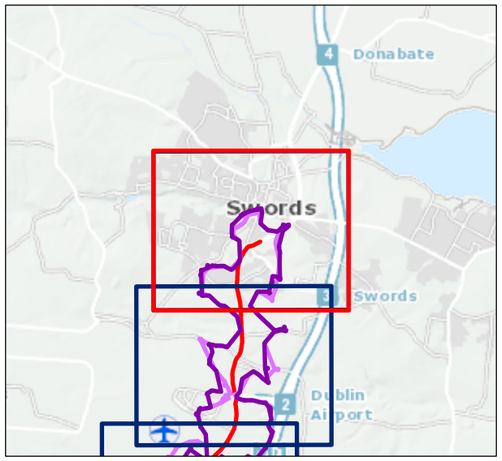

Legend

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- Existing Inbound Bus Stop
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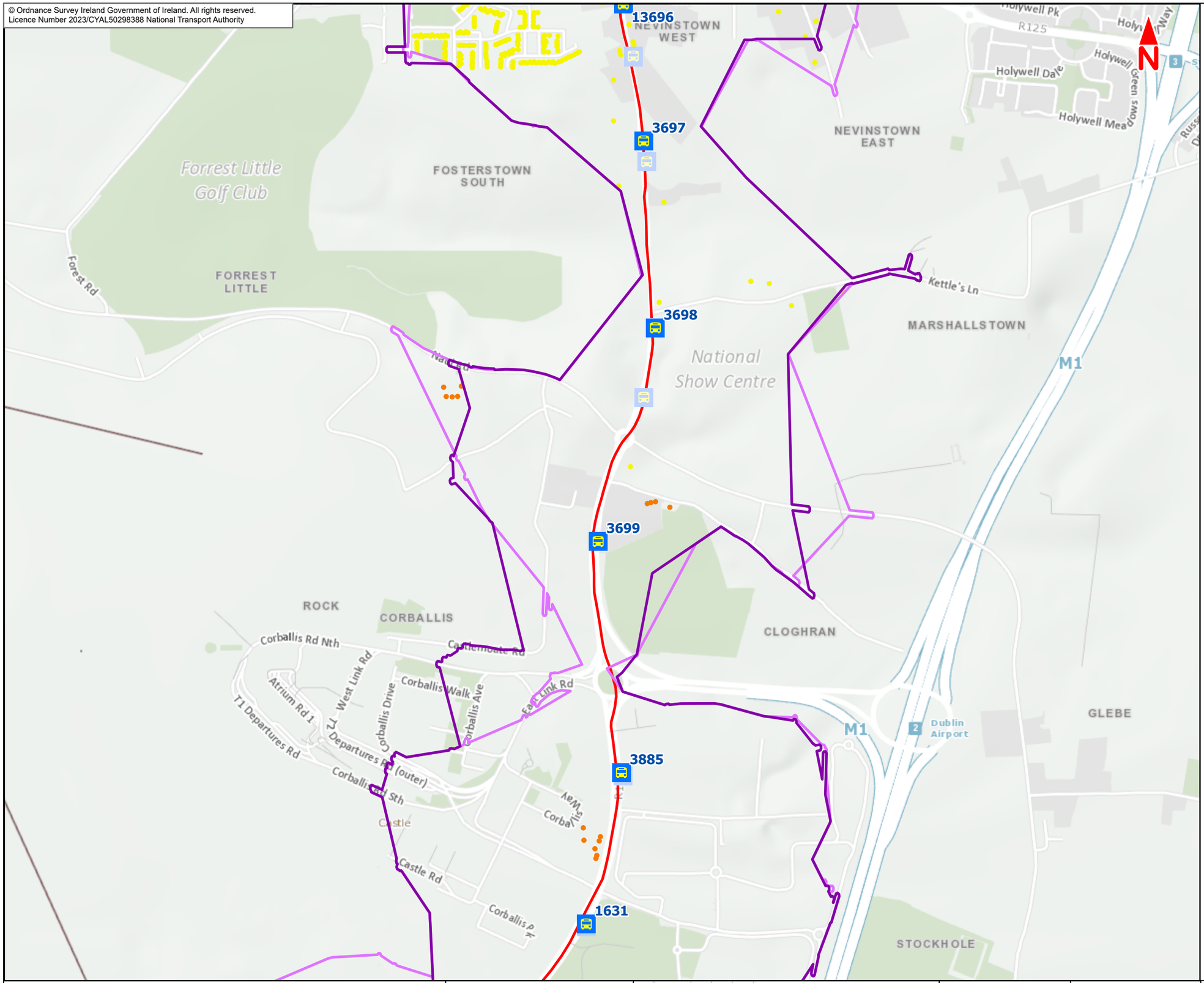

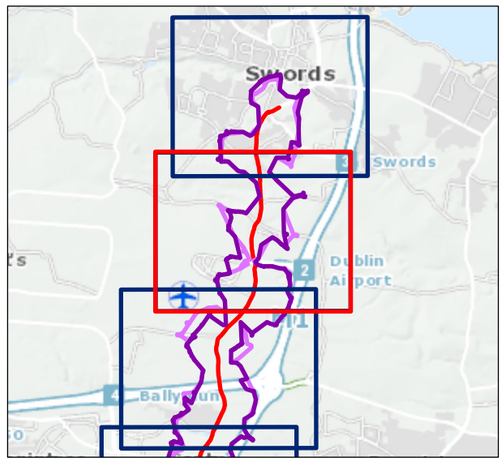

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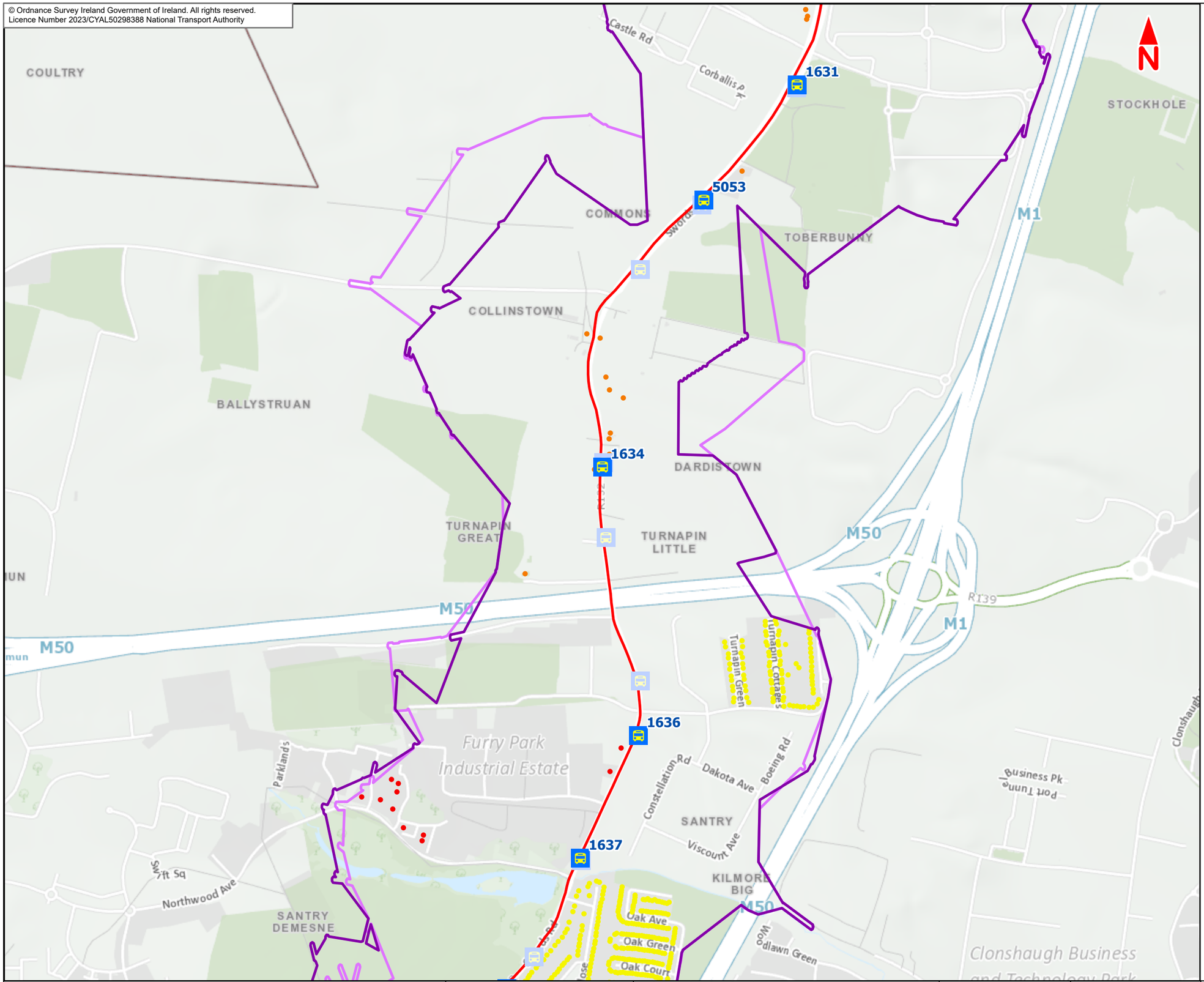

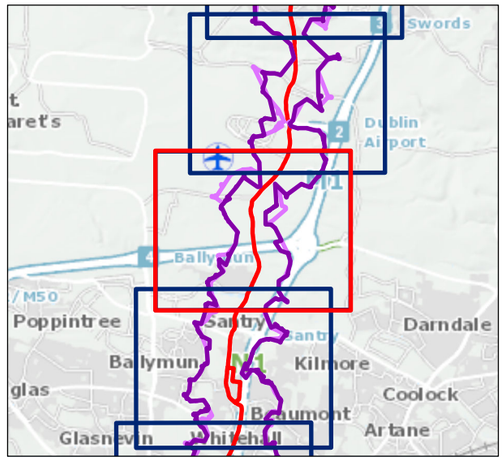

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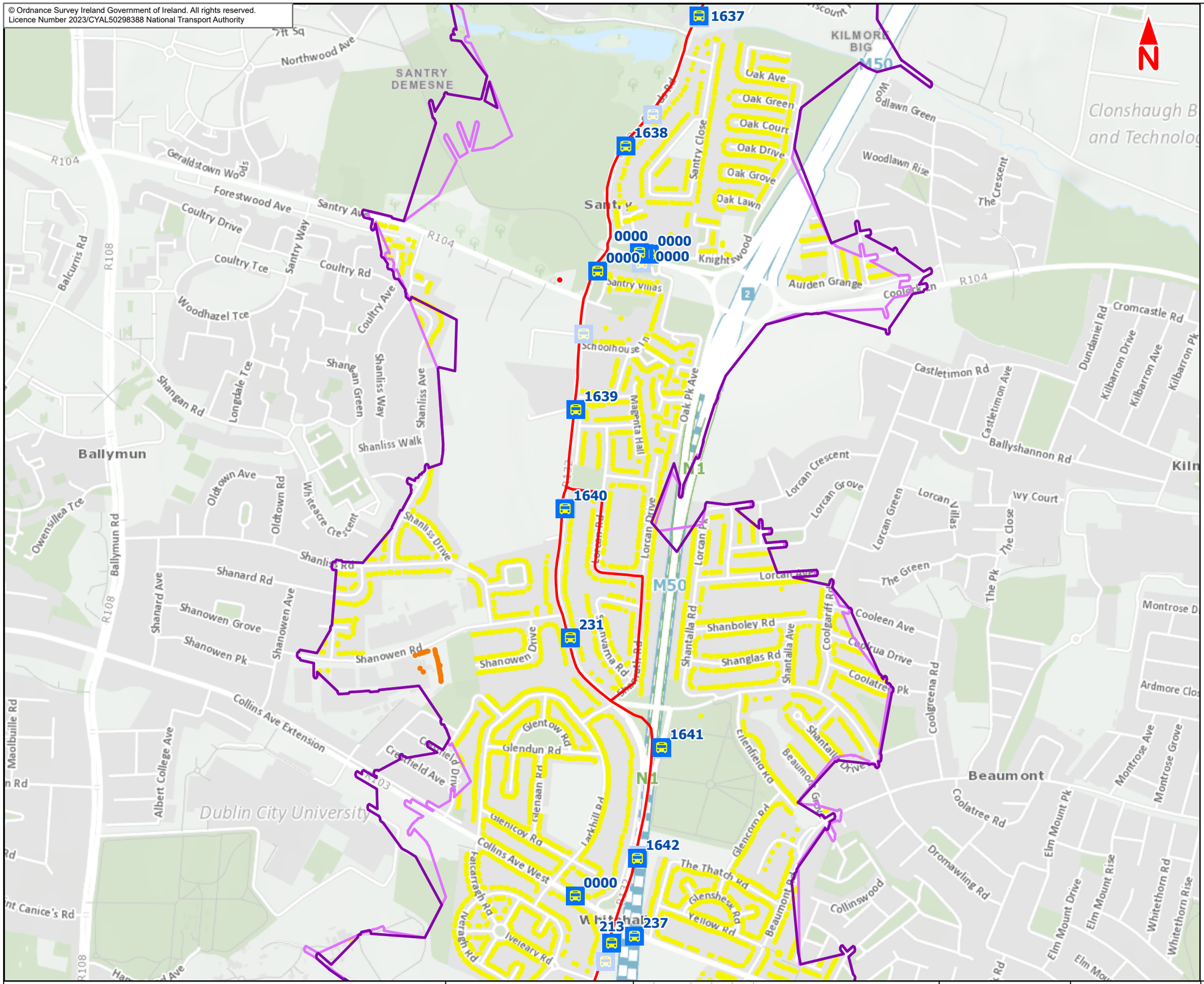

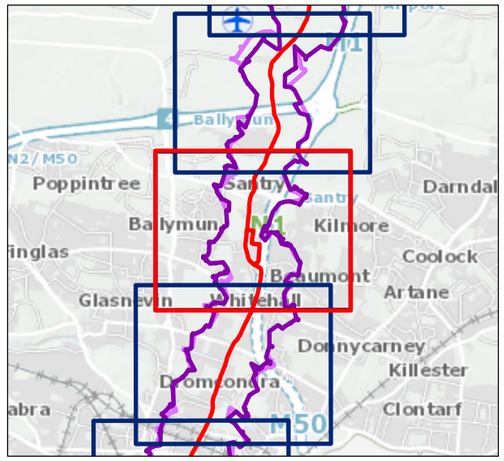

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Rev	Date	Drn	Chk'd	App'd	Description
M01	Apr 2023	LF	AR	HOS	ISSUE FOR PHASE 4: PLANNING

Client: NTA — Údarás Náisiúnta Iompair, National Transport Authority

Consultant: Jacobs

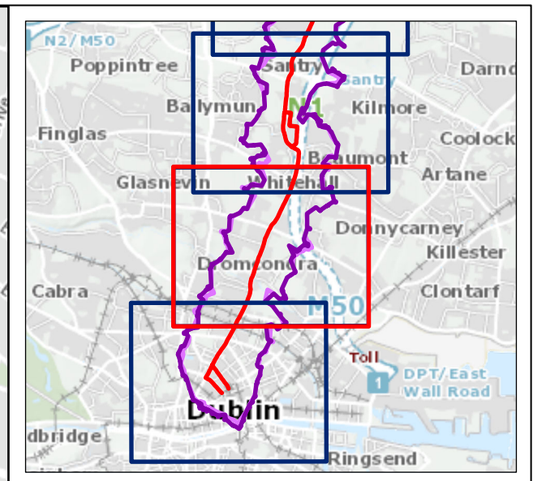
Date	Scale @ A3	Drawn	Checked	Approved
19/04/2023	1:10 000	LF	AR	HOS

Project Code	Originator Code	QMS Code
32110900	JAC	

Project Title: BUSCONNECTS Core Bus Corridors

Drawing Title: Proposed Inbound Stops 10min. Catchment

Drawing File Reference	Sheet Number	Draft	Rev
	4 of 6	FINAL	M01



Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
- Proposed Stops 10 min. Catchments Limit
- Existing Stops 10 min. Catchments Limit
- Proposed Core Bus Corridor

Estimated Population in Building

- 2 - 10
- 11 - 30
- >30

0 50 100 200 300 400 500 m

BAR SCALE

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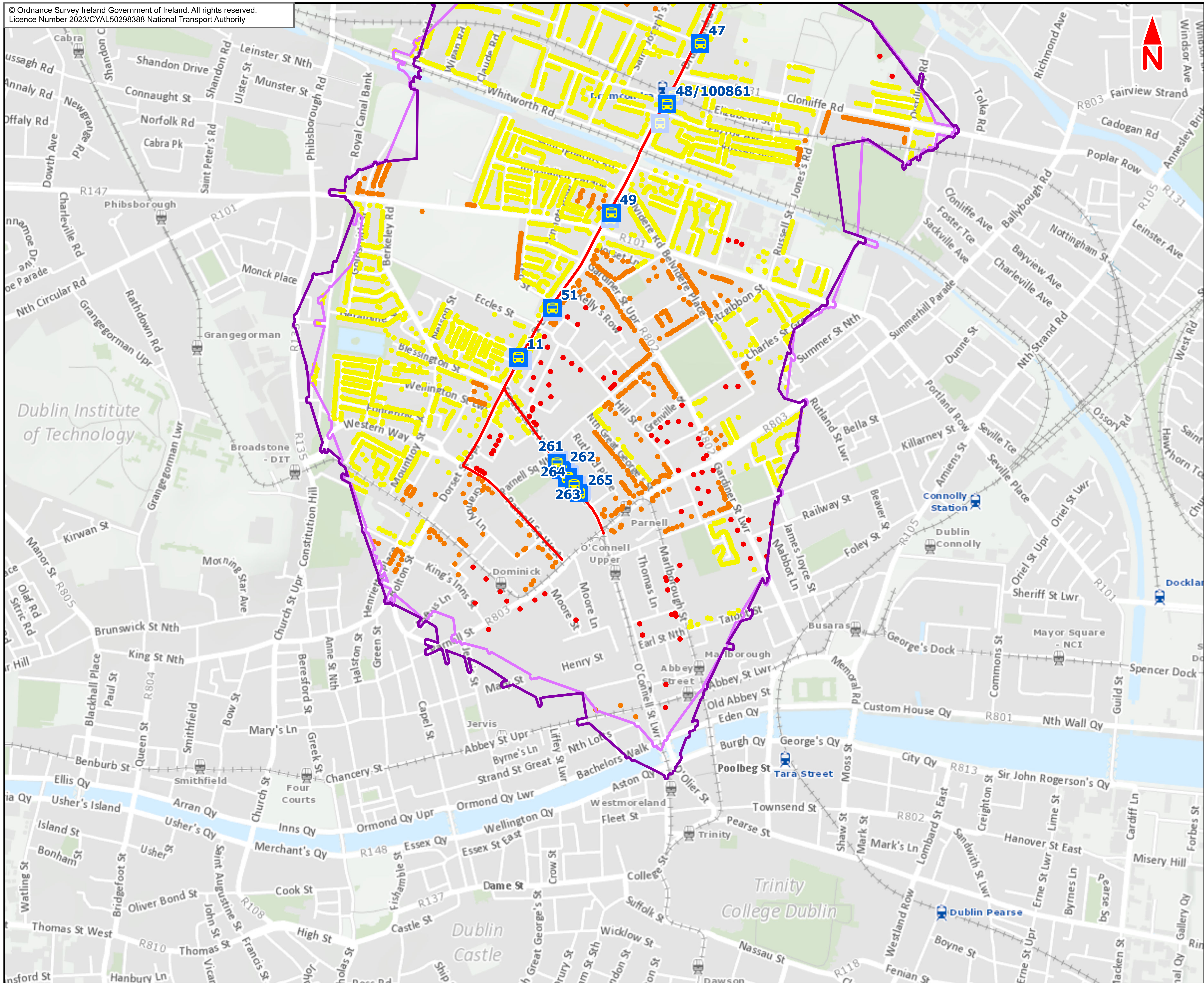

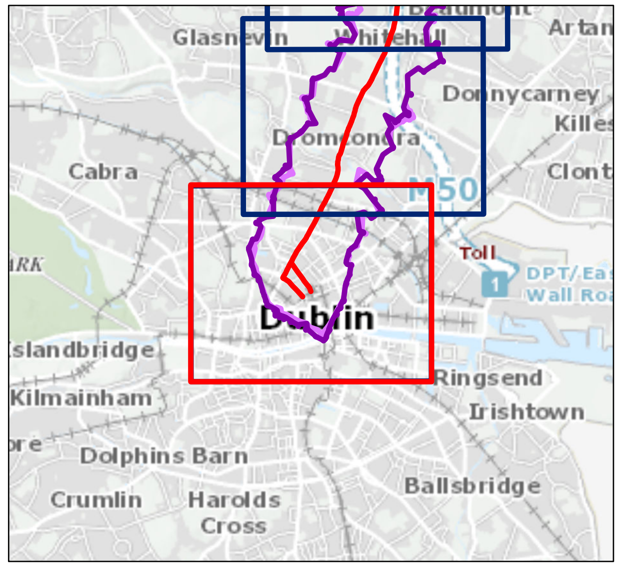

Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
- Proposed Stops 10 min. Catchments Limit
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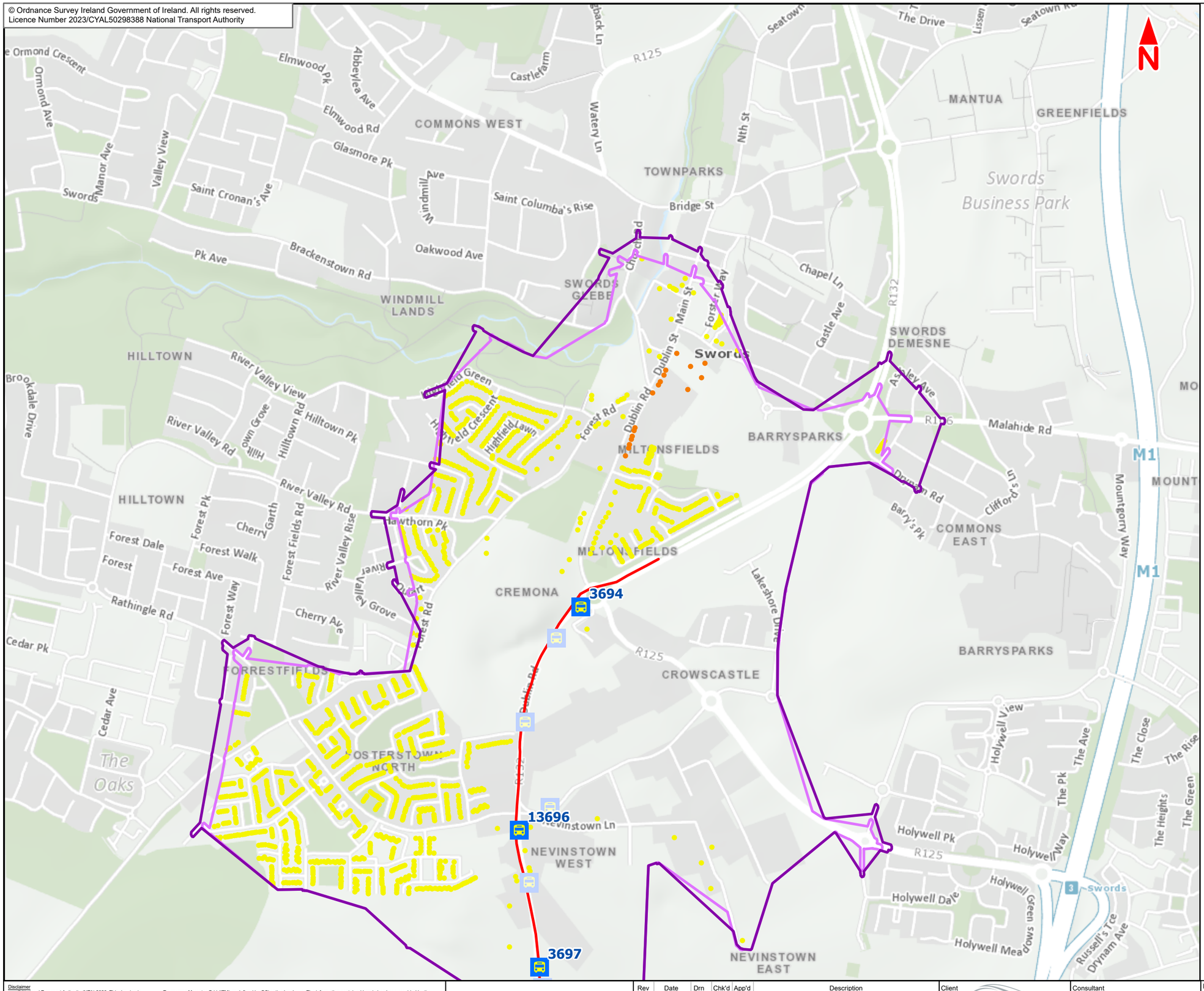

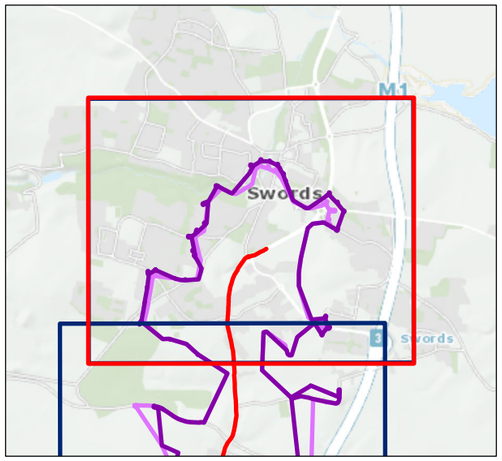

Legend

- Proposed Inbound Bus Stop
- Existing Inbound Bus Stop
- Proposed Stops 15 min. Catchments Limit
- Existing Stops 15 min. Catchments Limit
- Proposed Core Bus Corridor

Estimated Population in Building

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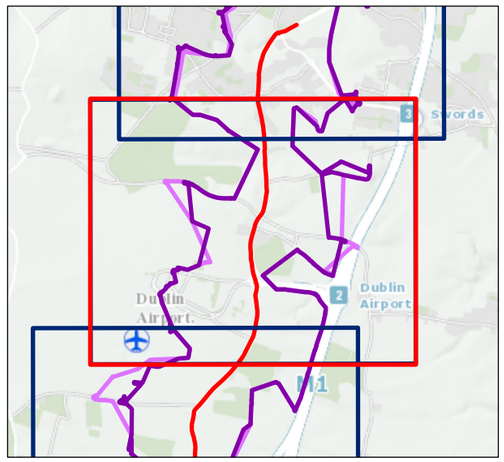
13696
3697
3698
3699
3885
1631

NEVINSTOWN WEST
NEVINSTOWN EAST
FOSTERSTOWN SOUTH
FORREST LITTLE
Forrest Little Golf Club
MARSHALLSTOWN
ROCK
CORBALLIS
CLOGHRAN
GLEBE
STOCKHOLE
Castle
National Show Centre
Holywell Pk
R125
Holywell Dale
Holywell Green
Holywell Mead
Forest Rd
Nevin Rd
Corballis Rd Nth
Castlemoate Rd
West Link Rd
Corballis Drive
Corballis Walk
Corballis Ave
East Link Rd
Atrium Rd 1
T1 Departures Rd
T2 Departures Rd (outer)
Corballis Rd Sth
Corballis Way
Castle Rd
Corballis Pk
M1
2 Dublin Airport
N



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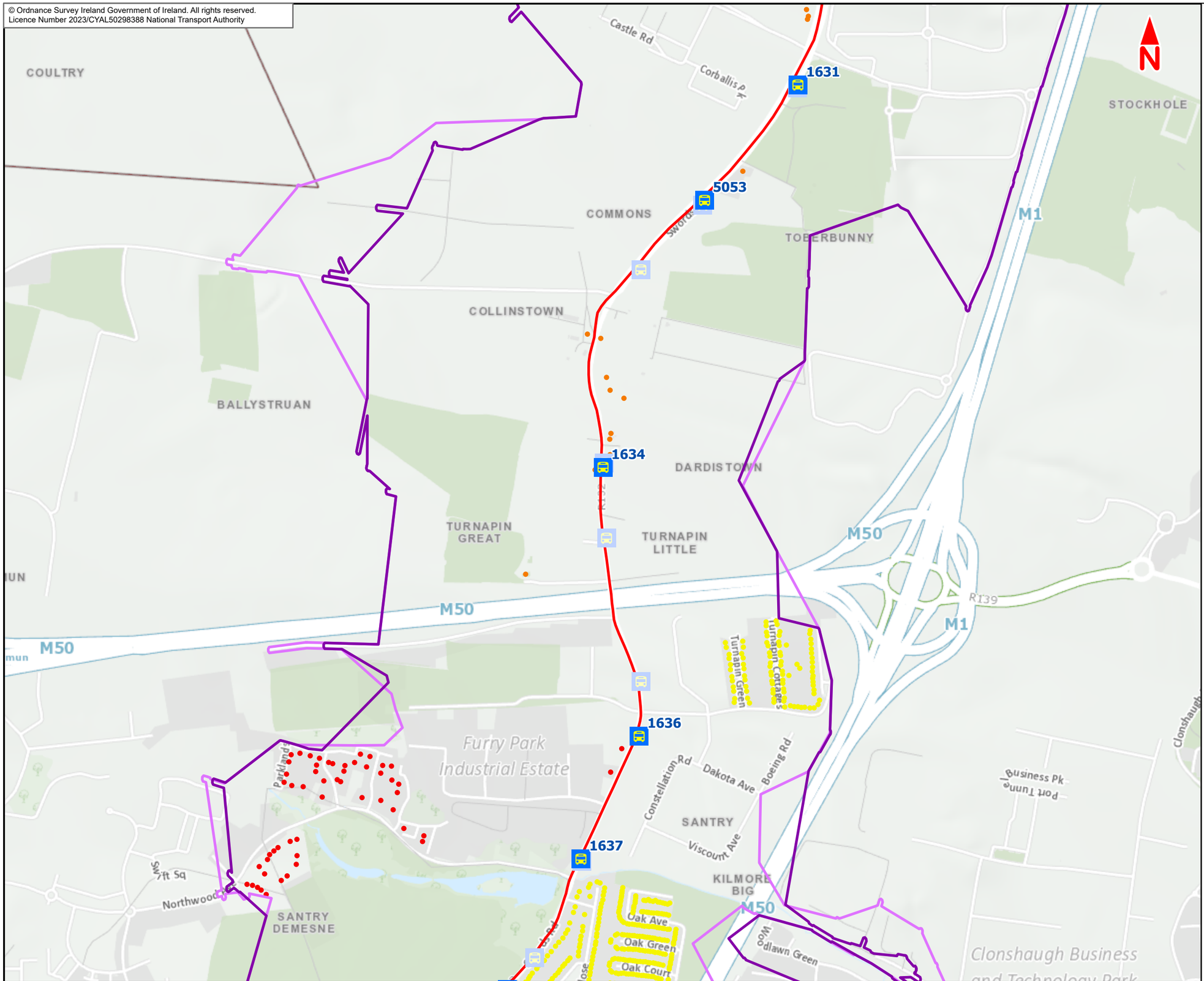

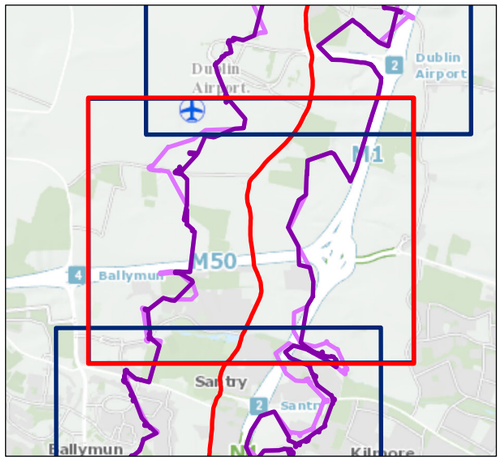

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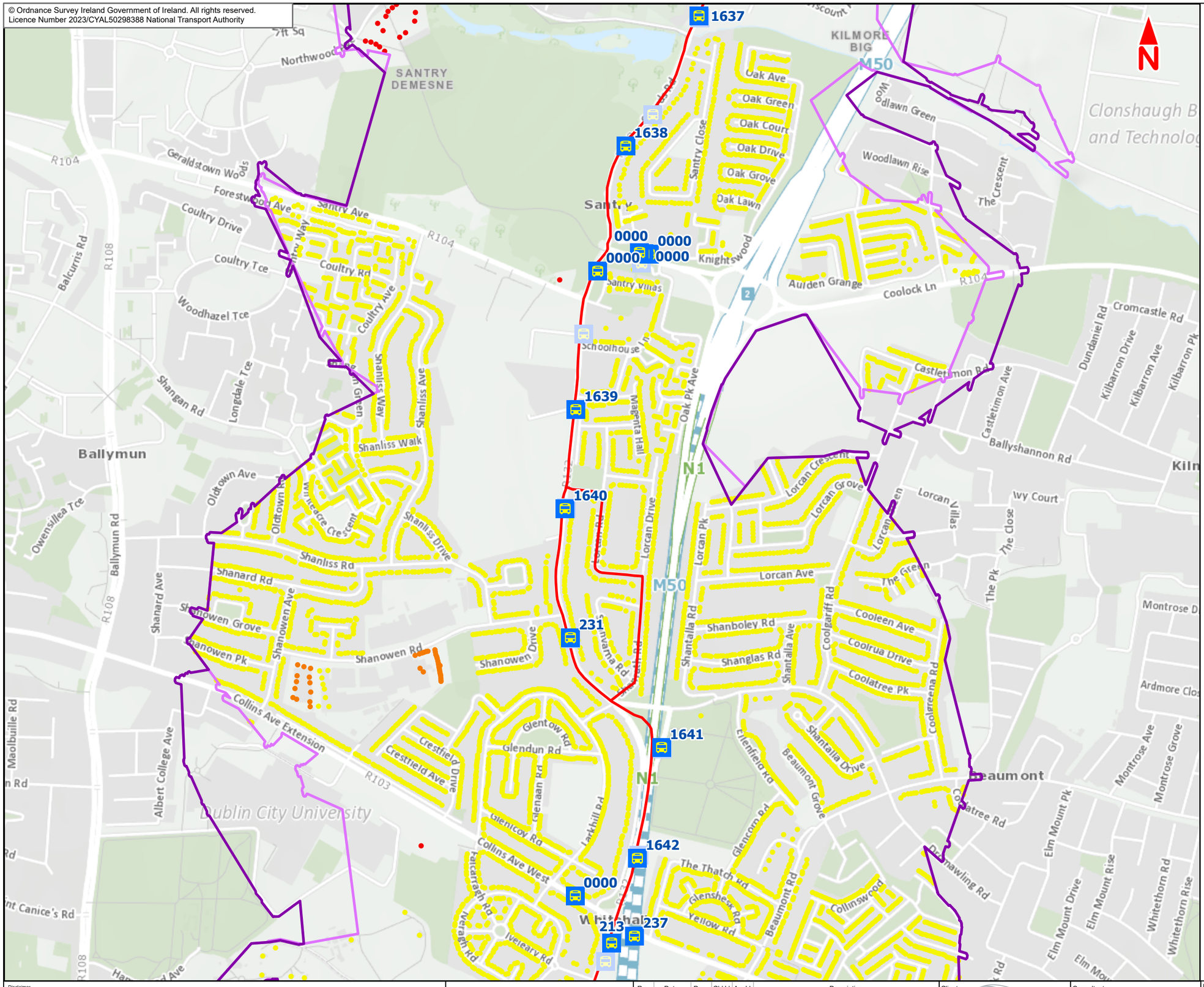

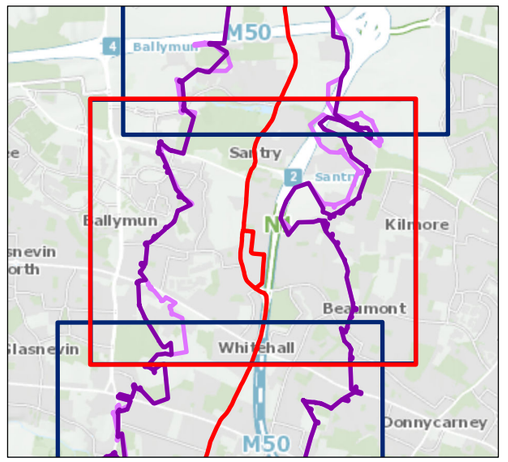

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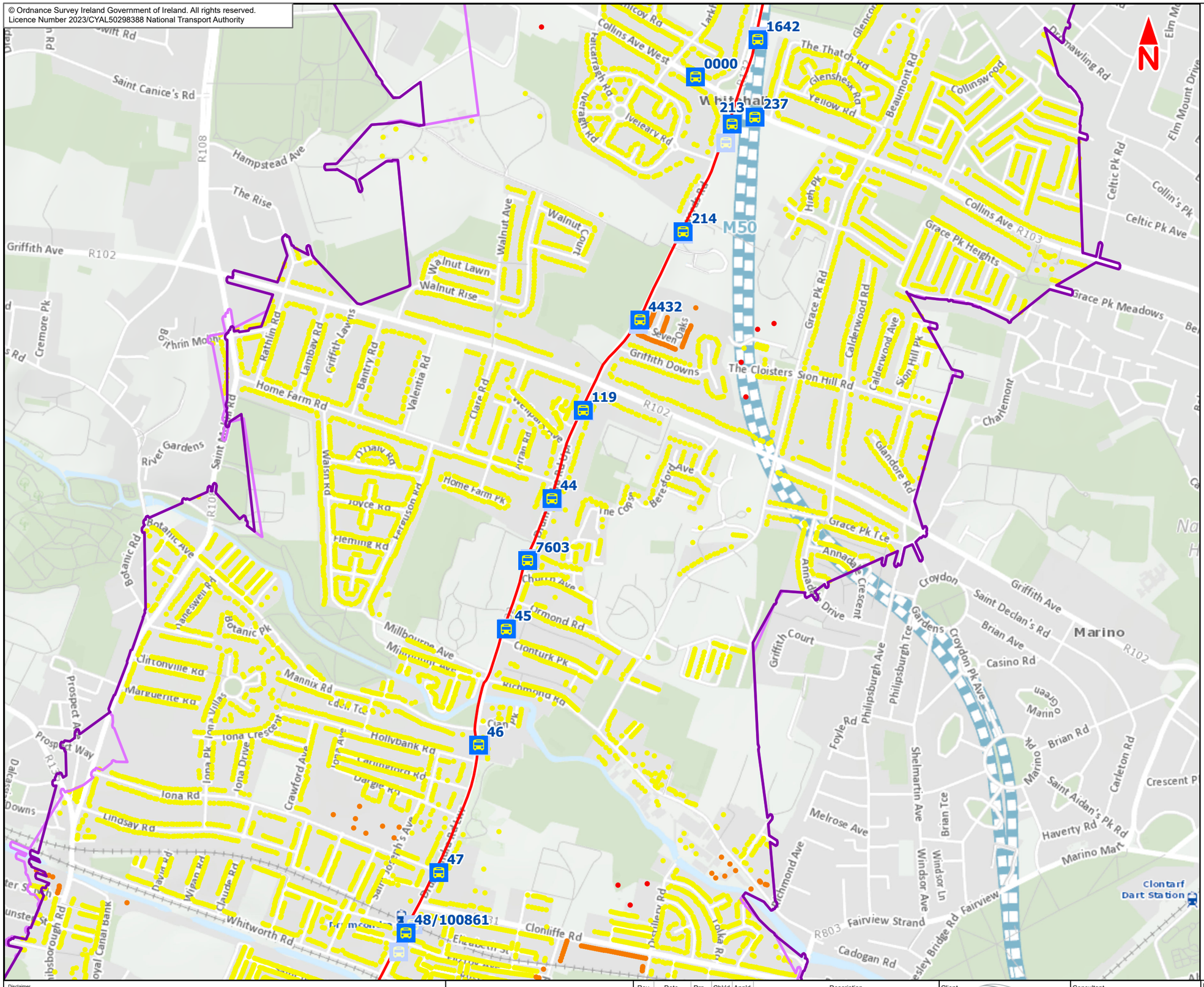

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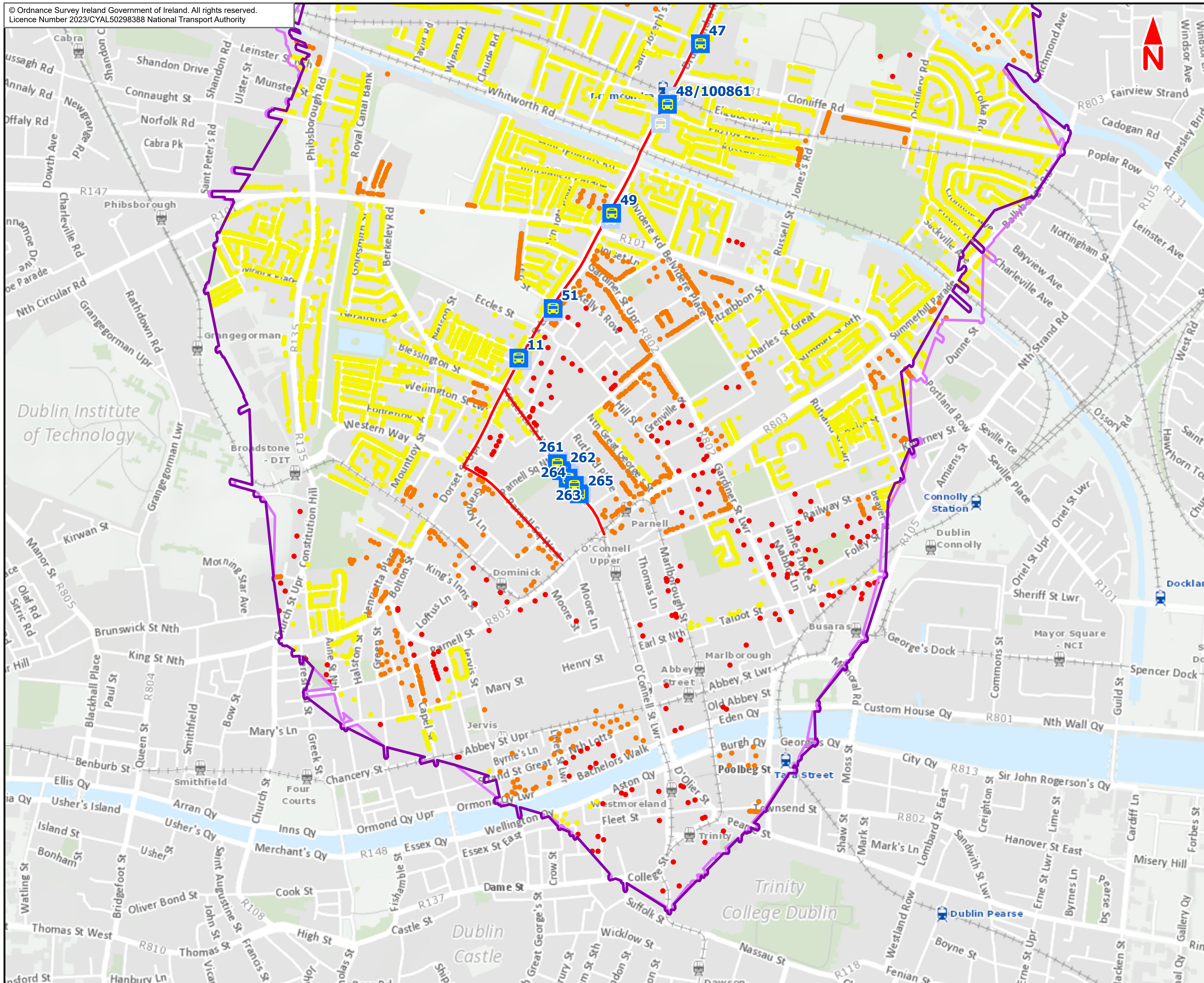

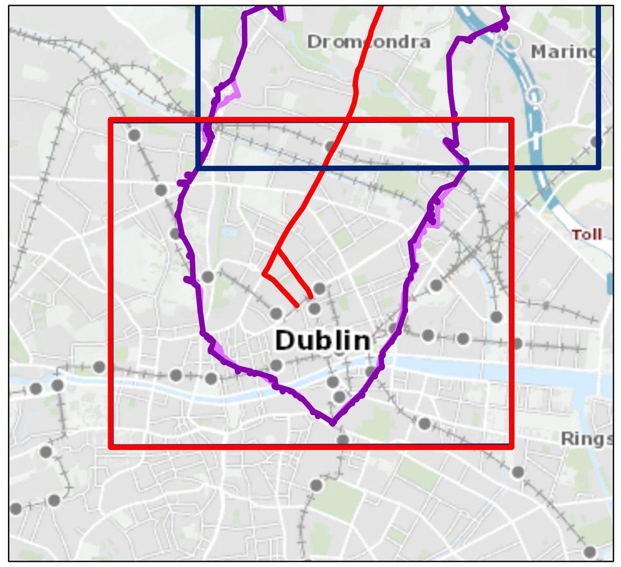

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