Appendix H
Bus Stop Review Report

Ballymun / Finglas to City Centre Core Bus Corridor Scheme

Bus Stop Review

TABLE OF CONTENTS

1. INTRODUCTION

This report presents a summary of the Bus Stop Review process conducted for the Ballymun Finglas to City Centre Core Bus Corridor (CBC) Scheme, hereinafter referred to as “The Scheme”. The scheme is between the junction of the Ballymun road and St Margaret’s Road and the junction of Church St and Chancery St for the Ballymun Route, and between Prospect Road junction and St Margaret’s roundabout for the Finglas route.

The purpose of the Bus Stop Review process was to review the locations of the existing Dublin Bus Stops and to determine whether a stop should be removed, relocated, or remain in the existing location. This exercise was carried out in order to optimise the performance of the bus service along this route by reducing 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 the bus stops.

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

2. METHODOLOGY

2.1 Overview

The methodology used in this review is set out in the 'Bus Stop Review Methodology Report' (Appendix D). This methodology includes various considerations to be made when assessing a stop location, and the background reasoning for those considerations.

Figure 2.1 below presents a flowchart which outlines the methodology proposed.

Each of the study components as outlined below are discussed in further detail in the remainder if this report and applied to the Ballymun Finglas to City Centre Scheme.

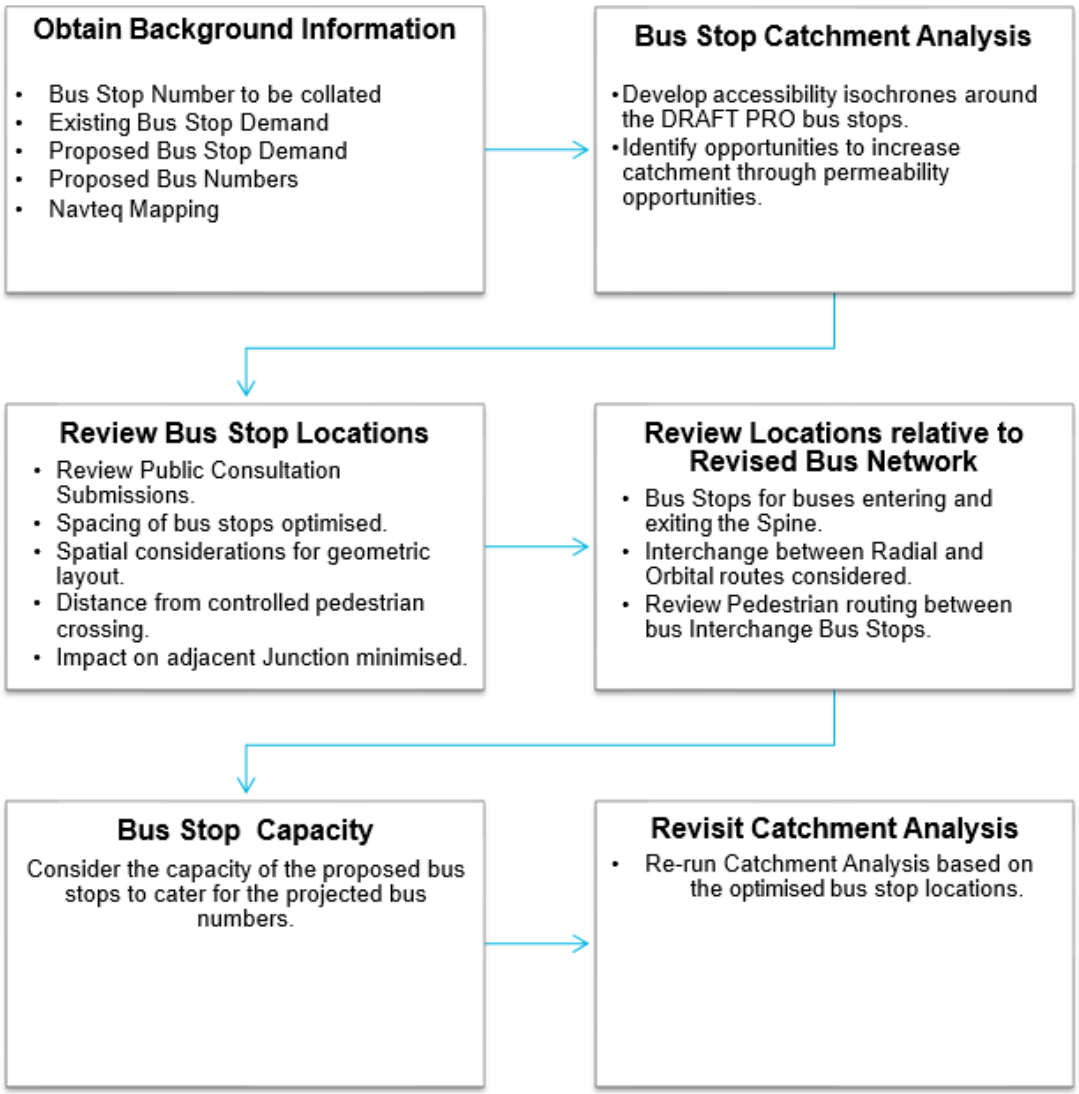


Figure 2.1 Bus Stop Review Flow Chart

3. BACKGROUND INFORMATION

To assess the bus stop locations, the following background information was gathered.

Table 1: Background information and sources

Information	Source
Stop numbers along route, inbound and outbound	Dublin Bus Automatic Vehicle Location (AVL) Data
Stop names	Dublin Bus AVL Data
Current Stop Location Coordinates	Google Maps
Existing distance between stops	Google Maps
Stop location as per PRO (relative to existing location)	PRO Design Drawings
PRO distance between stops	PRO Design Drawings & Google Maps
Peak boarding and alighting volumes & Times	NTA
Future Buses per Hour	SYSTRA
Existing Distance to junction/pedestrian crossing	Google Maps
PRO distance to junction/pedestrian crossing	PRO Design Drawings & Google Maps
Potential for interchanges with Orbital Routes	BusConnects Revised Network Layout

4. EXISTING BUS STOP CATCHMENT ANALYSIS

A catchment 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 catchment on both the inbound and the outbound bus stops at their existing locations are shown in 5-minute and 10-minute walking intervals.

4.1 Ballymun to City Centre

Figures 4.1, 4.2, 4.3, and 4.4 below show the catchments for the existing bus stop locations for the inbound and outbound directions in the Ballymun to City Centre section of the scheme.

4.1.1 Inbound

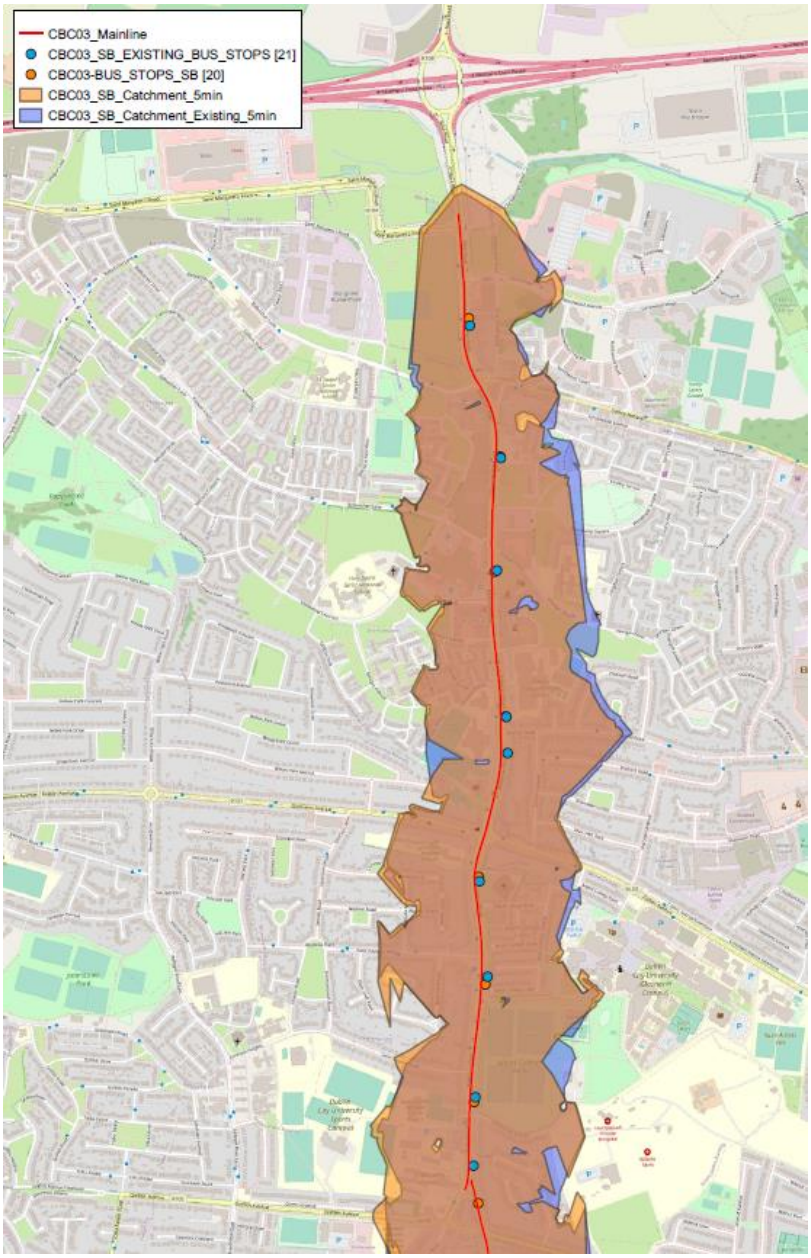


Figure 4.1 Existing Ballymun to City Centre Inbound Bus Stop Catchments (Between St Margaret's Road and Griffith Avenue)

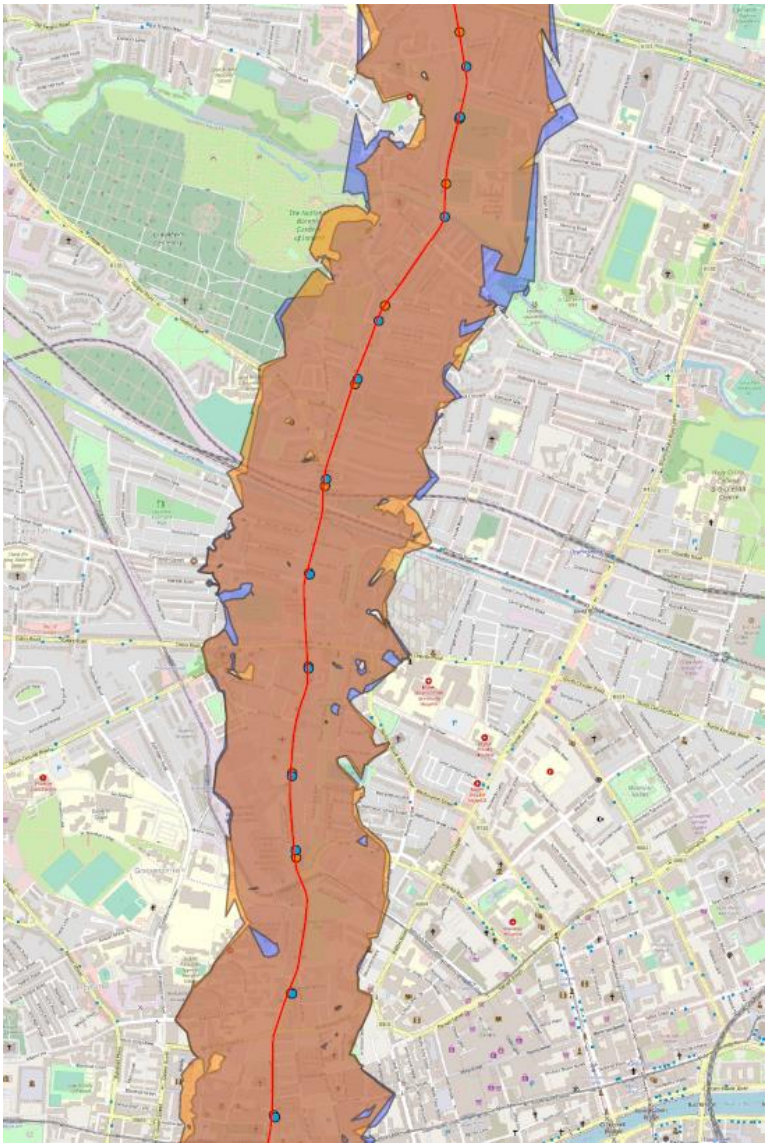


Figure 4.2 Existing Ballymun to City Centre Inbound Bus Stop Catchments (Between Griffith Avenue and Chancery Street)

4.1.2 Outbound

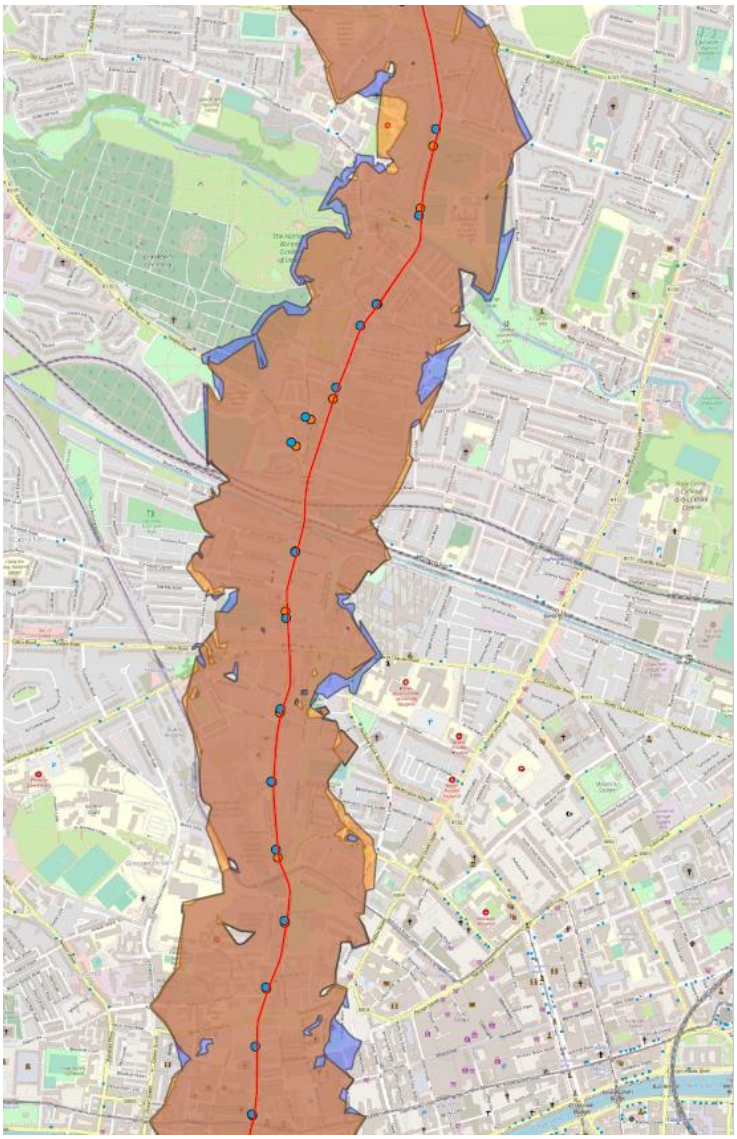


Figure 4.3 Existing Ballymun to City Centre Outbound Bus Stop Catchments (Between Chancery Street and Griffith Avenue)

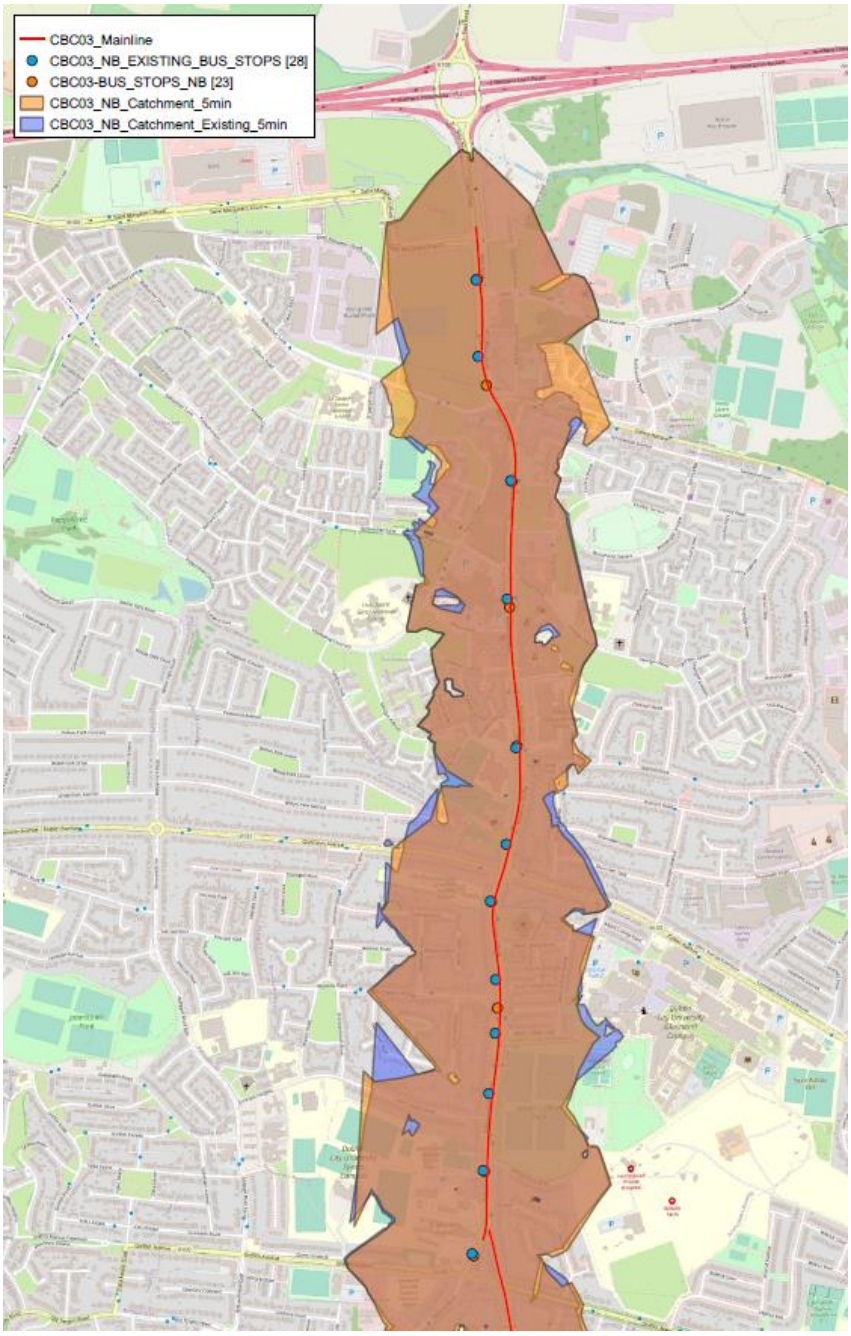


Figure 4.4 Existing Ballymun to City Centre Outbound Bus Stop Catchments (Between Griffith Avenue and St Margaret's Road)

4.2 Finglas to City Centre

Figures 4.5 and 4.6 below show the catchments for the existing bus stop locations for the inbound and outbound directions in the Finglas to City Centre section of the scheme.

4.2.1 Inbound

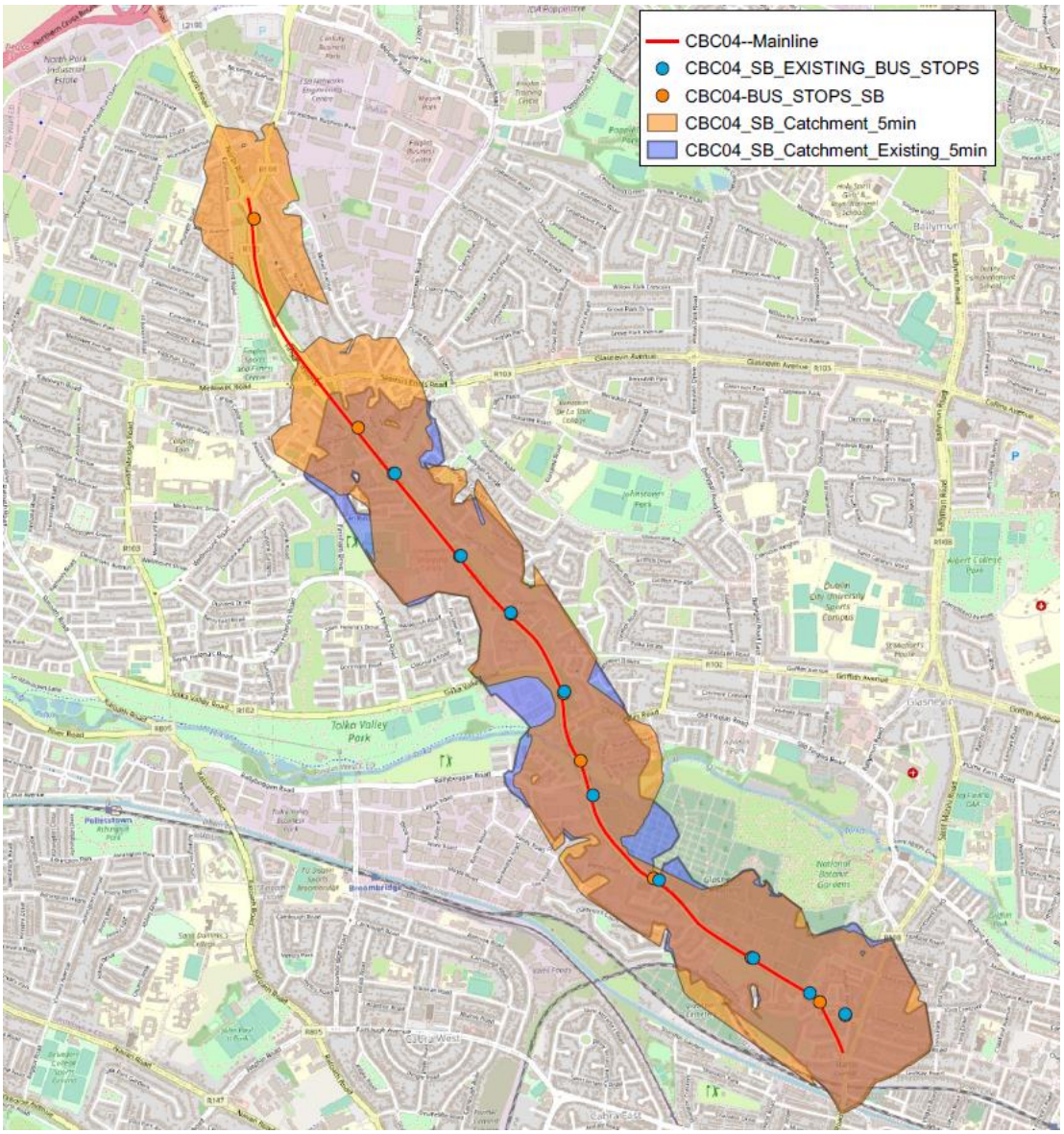


Figure 4.5 Existing Finglas to City Centre Inbound Bus Stop Catchments

4.2.2 Outbound

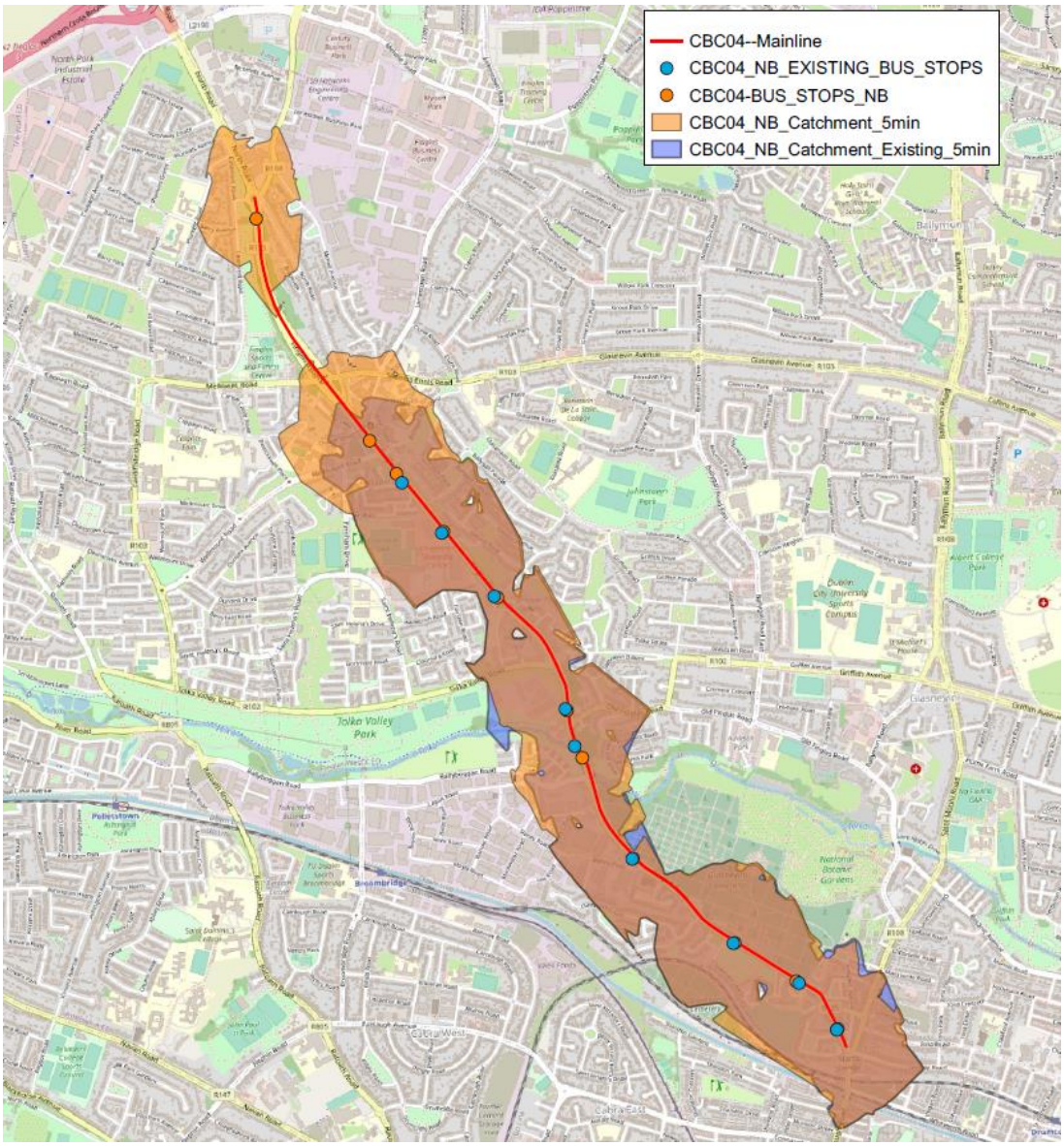


Figure 4.6 Existing Finglas to City Centre outbound Bus Stop Catchments

5. REVIEW BUS STOP LOCATIONS

The locations of the bus stops were reviewed in accordance with the 'Bus Stop Review Methodology Report'.

Appendix A includes a table of the bus stop review which was used when considering the possible relocation of each 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 bus 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; and
- Potential interchange orbital bus services proposed as part of BusConnects with revised network.

The above principles were considered in conjunction with the use of Google Maps to determine the location of the bus stop.

The following considerations below were also used to help determine the location of the bus stops.

Maintain existing location: existing bus stops that meet the following considerations will be maintained in its existing location; Bus stop spaced at acceptable intervals, located optimally in relation to distance to junctions or pedestrian crossings, frequently used, and serving key land uses sufficiently.

Relocation of Bus Stop: if it was found that access to a bus stop could be improved by relocating it to a better proximity in relation to local features, the decision was made to relocate it if feasible.

Removal of Bus Stops: in some cases, it was found that a bus stop were too close to the next or previous stop. In this case it was decided to join bus stops at a new location to obtain better spacing by removing one of the stops.

6. REVISITED CATCHMENT

Following the review of the bus stop locations, the catchment analysis was carried out again in order to understand the impact of the changes on the bus network. The results of the catchment analysis with the proposed bus stop locations for the Ballymun Finglas to City Centre route is presented below. The Figures below compare the catchments for 5minute and 10-minute walking distance for the existing and proposed bus stop locations.

6.1 Ballymun to City Centre

6.1.1 Inbound

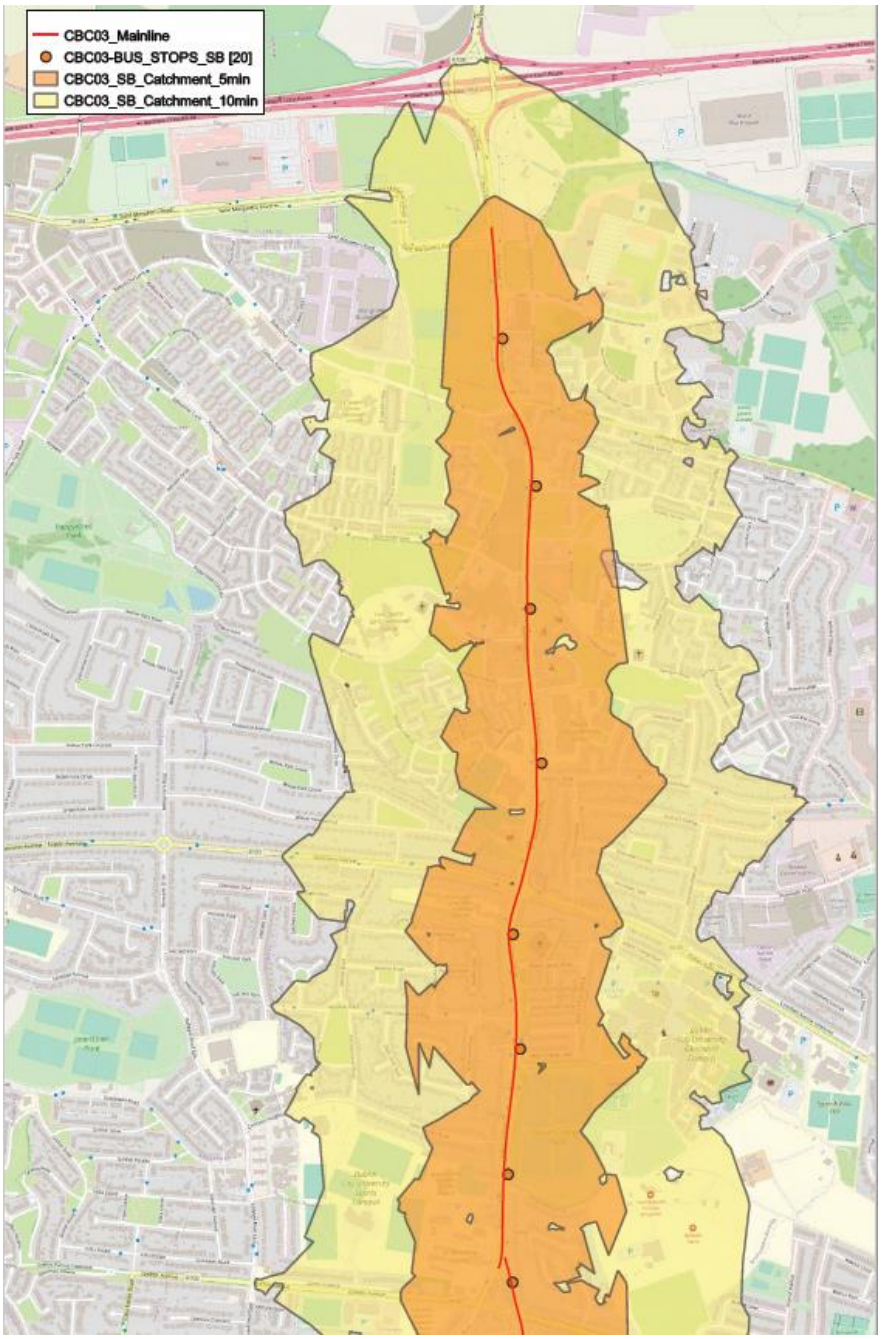


Figure 6.1 Proposed Ballymun inbound bus stop catchment – 5 & 10 minutes (Between St Margaret's Road and Griffith Avenue)

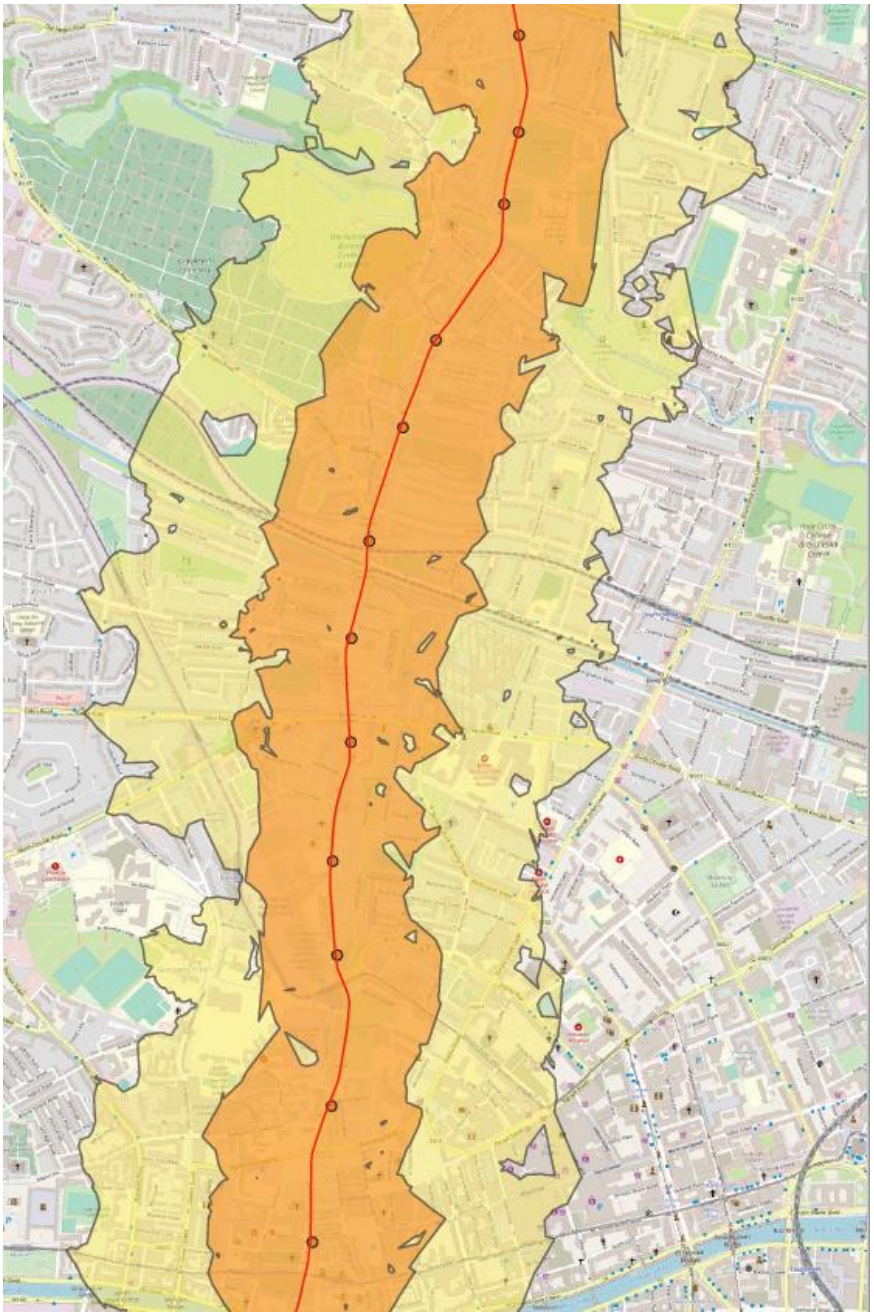


Figure 6.2 Proposed Ballymun inbound bus stop catchment – 5 & 10 minutes (Between Griffith Avenue and Chancery Street)

6.1.2 Outbound

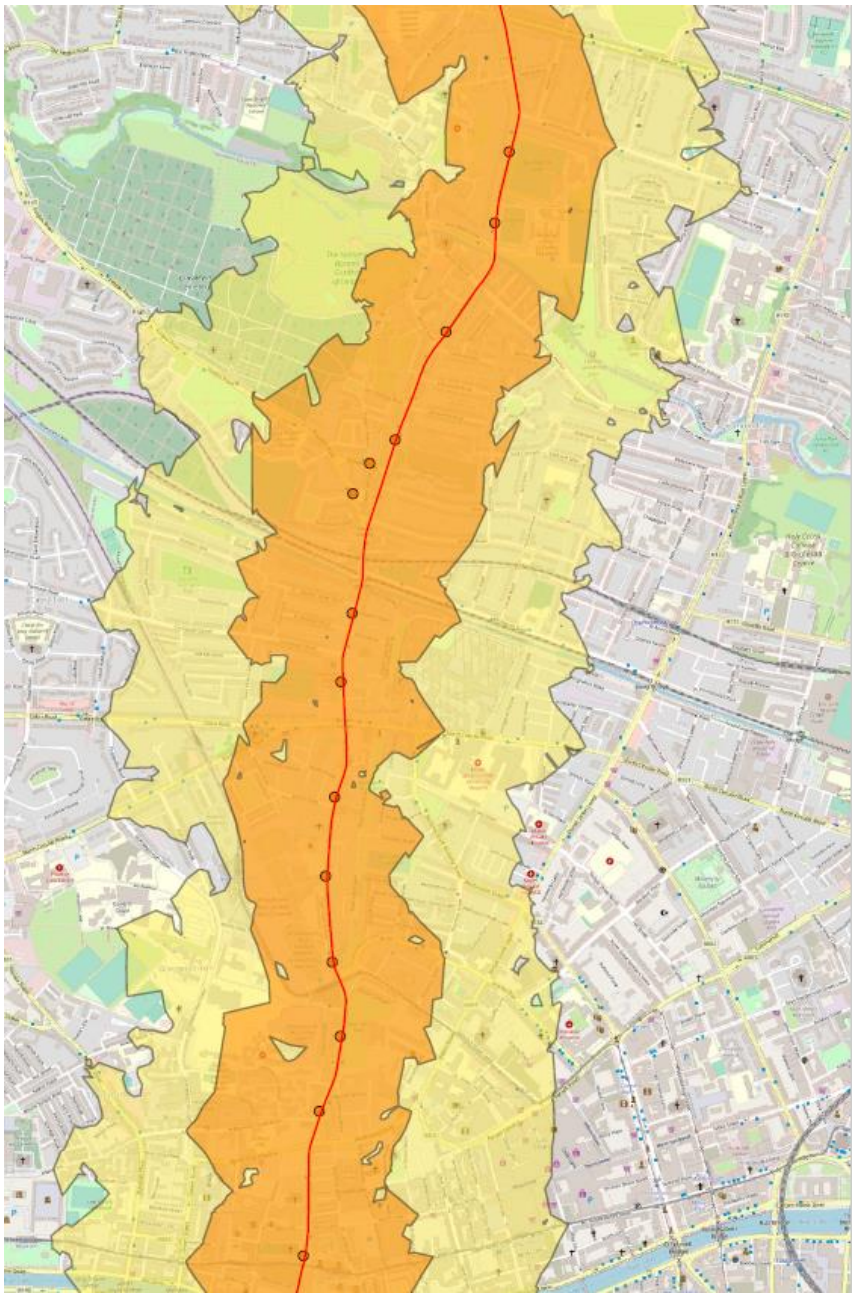


Figure 6.3 Proposed Ballymun outbound bus stop catchment – 5 & 10 minutes (Between Chancery Street and Griffith Avenue)

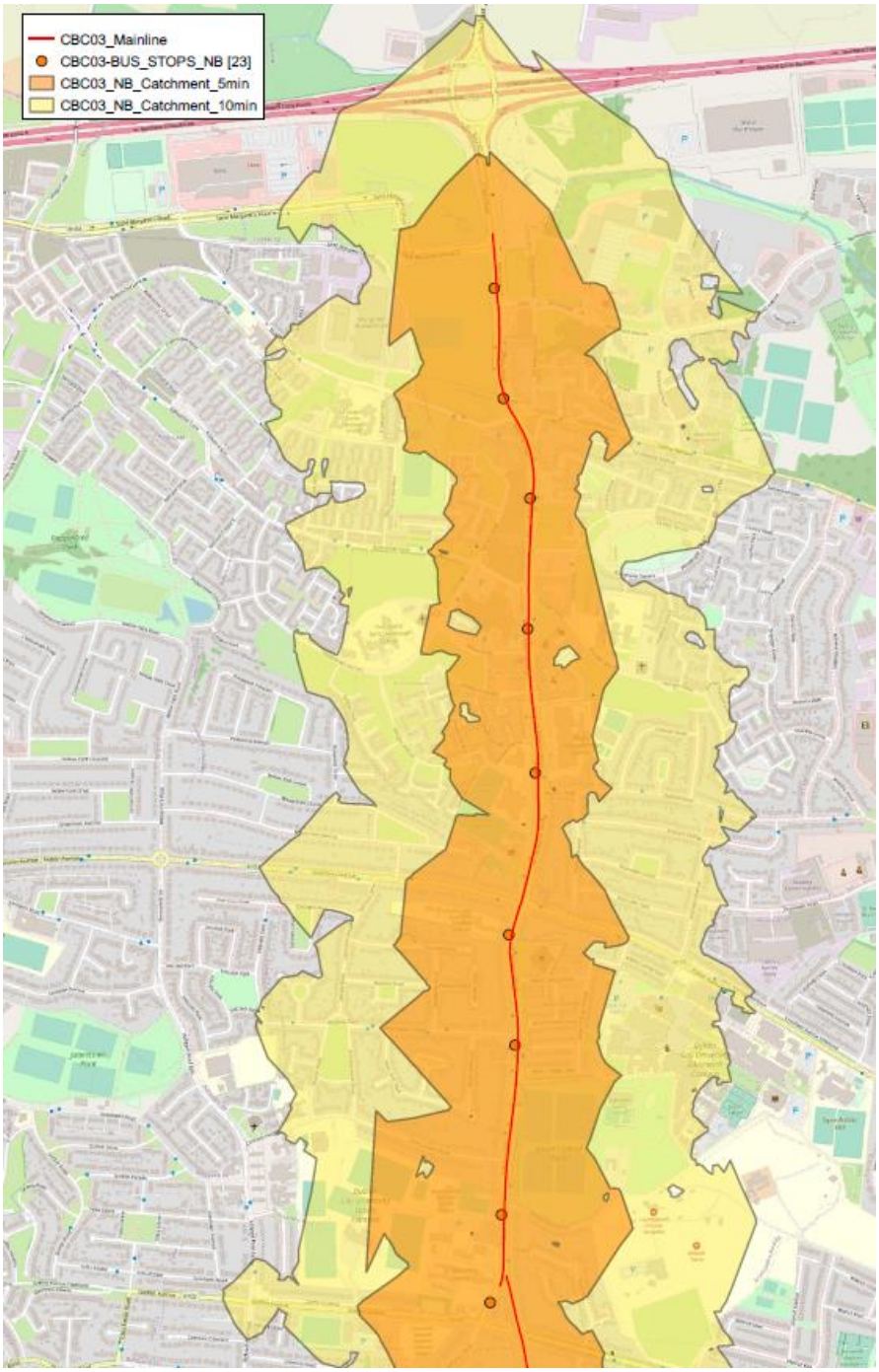


Figure 6.4 Proposed Ballymun outbound bus stop catchment – 5 & 10 minutes (Between Griffith Avenue and St Margaret's Road)

6.2 Finglas to City Centre

6.2.1 Inbound

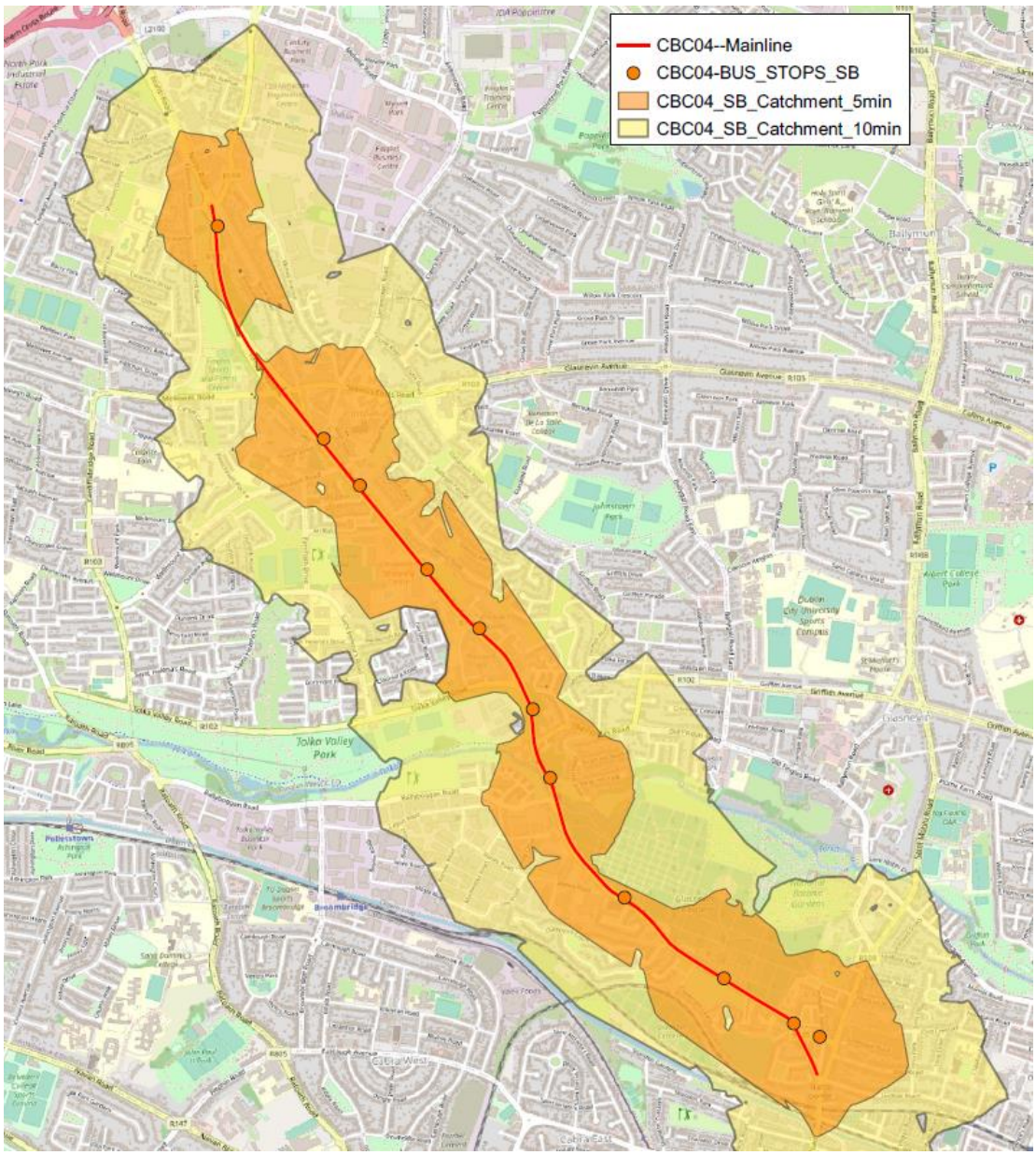


Figure 6.5 Proposed Finglas inbound bus stop catchment – 5 & 10 minutes

6.2.2 Outbound

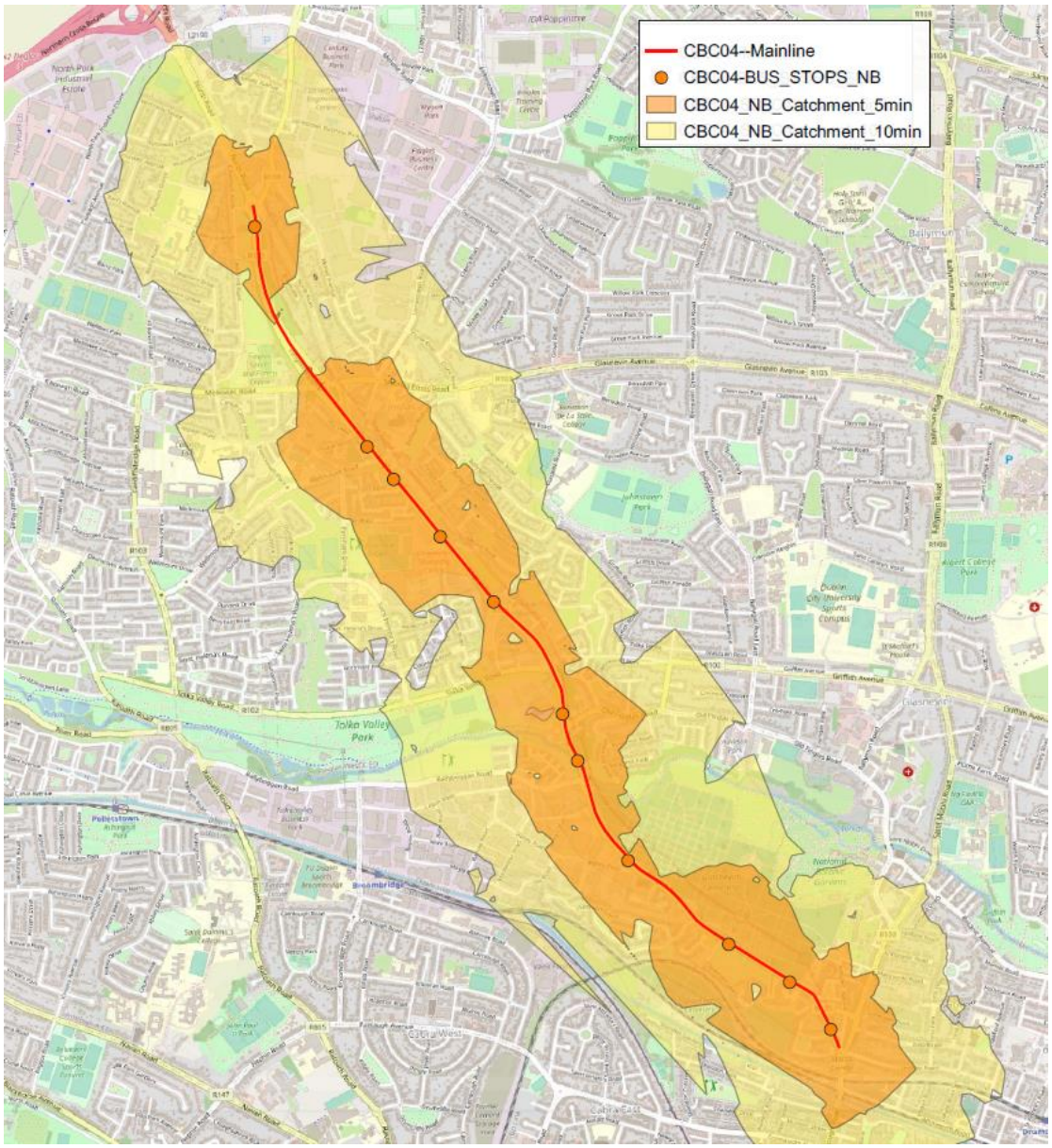


Figure 6.6 Proposed Finglas inbound bus stop catchment – 5 & 10 minutes

7. SCHEME SUMMARY

The tables below outline a summary of the outcome of the bus stop review process.

Table 7.1 Ballymun Inbound Bus Stop Summary

Ballymun Inbound	
Number of Existing Stops	21
Number of Stops Moved	9
Number of Stop Removed	1
Number of Stops Added	1

Table 7.2 Ballymun Outbound Bus Stop Summary

Ballymun Outbound	
Number of Existing Stops	26
Number of Stops Moved	8
Number of Stop Removed	5
Number of Stops Added	0

On the Ballymun inbound direction there are 21 existing bus stops. Nine (9) existing bus stop will be moved, one (1) bus stop is to be removed from the route and one (1) stop will be added. The total proposed number of bus stops for the inbound direction is 21.

On the Ballymun outbound direction there are 26 existing bus stops. Eight (8) bus stops will be moved, five (5) bus stop is to be removed, and no stops will be added. The total proposed number of bus stops for the outbound direction is 21.

Table 7.3 Finglas Inbound Bus Stop Summary

Finglas Inbound	
Number of Exisitng Stops	8
Number of Stops Moved	2
Number of Stop Removed	0
Number of Stops Added	2

Table 7.4 Finglas Outbound Bus Stop Summary

Finglas Outbound	
Number of Exisitng Stops	9
Number of Stops Moved	3
Number of Stop Removed	0
Number of Stops Added	2

On the Finglas inbound direction there are 8 existing bus stops. Two (2) existing bus stop will be moved, no stop will be removed from the route and two (2) stop will be added. The total proposed number of bus stops for the inbound direction is 10.

On the Finglas outbound direction there are 9 existing bus stops. Three (3) bus stops will be moved, no stop will be removed, and two (2) stops will be added. The total proposed number of bus stops for the outbound direction is 11.

8. CONCLUSION

A bus stop review was carried out for the Ballymun Finglas to City Centre CBC Scheme. The purpose of the exercise was to understand and rationalise the locations of bus stops to reduce the total journey time within the Scheme and to improve the catchment of the bus stops.

The study entailed reviewing key features of the inbound and outbound bus stops, namely location, proximity to junctions, pedestrian crossings, distance between bus stops and major land use attractions next to the route, local considerations such as existing shelters, waiting areas, footpaths and cycle routes and the space to provide these where there currently is none.

As part of the exercise, catchment analyses have been carried out to demonstrate the impact of the proposed scheme. The results show that the catchment footprints along the routes have increased to some extent this is largely due to improved spacing of the stops, negating some overlap and filling gaps where bus availability was limited. The stops are positioned closer to intersections allowing the catchment to spread farther along the orbital roads.

For the Ballymun section of the scheme, it recommended to relocate 9 stops in the inbound direction and 8 in the outbound direction. It is also recommended to remove a total of 6 stops from this route in the outbound direction. For the Finglas section of the scheme, it is recommended to relocate 2 stops in the inbound and 3 stops in the outbound direction. In Addition, it is also recommended to add 2 new stops in the inbound direction and 2 in the outbound direction

It is expected that 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 improvements such as the placement of stops after junctions should serve to reduce journey times.

APPENDIX A
BUS STOP REVIEW TABLE

Ballymun Inbound							
Existing				Proposed			
No.	Bus Stop No.	Chainage	Distance from Next Stop (m)	No.	Bus Stop No.	Chainage	Distance from Next Stop (m)
1	7113	A-375	355	1	7113	A-310	420
2	127	A-730	335	2	127	A-730	335
3	112	A-1065	432	3	112	A-1065	432
4	113	A-1497	103	4	113	A-1497	483
5	114	A-1600	380	5	114	Removed	
6	115	A-1980	285	6	115	A-1980	310
7	37	A-2265	345	7	37	A-2290	350
8	38	A-2610	210	8	38	A-2640	300
9	39	A-2820	430	9	39	A-2940	200
10	40	A-3250	185	10	40	A-3140	295
11	146	A-3435	305	11	146	A-3435	200
12	147	A-3740	360	12	147	A-3635	420
13	184	A-4100	190	13	184	A-4055	245
14	185	A-4290	315	14	185	A-4300	305
15	186a	A-4605	F-Spine Stop	15	186a	A-4605	F-Spine Stop
16	186b	New		16	186b	A-4660	255
17	187	A-4915	290	17	187	A-4915	290
18	188	A-5205	335	18	188	A-5205	335
19	189	A-5540	230	19	189	A-5540	260
20	190	A-5770	455	20	190	A-5800	425
21	1614	A-6225	385	21	1614	A-6225	385
22	1615	A-6610	End of Route	22	1615	A-6610	End of Route
	Average Distance:		**312**		Average Distance:		**329**

Ballymun Outbound							
Existing				Proposed			
No.	Bus Stop No.	Chainage	Distance from Next Stop (m)	No.	Bus Stop No.	Chainage	Distance from Next Stop (m)
1	1616	A-6670	220	1	1616	A-6670	415
2	1617	A-6450	195	2	1617	Removed	
3	1618	A-6255	215	3	1618	A-6255	215
4	1619	A-6040	245	4	1619	A-6040	205
5	195	A-5795	220	5	195	A-5835	260
6	196	A-5575	225	6	196	A-5575	225
7	197	A-5350	300	7	197	A-5350	340
8	198	A-5050	230	8	198	A-5010	190
9	199	A-4820	550	9	199	A-4820	505
10	201	A-4270	190	10	201	A-4315	345
11	202	A-4080	110	11	202	Removed	
12	148	A-3970	320	12	148	A-3970	335
13	149	A-3650	275	13	149	A-3635	200
14	150	A-3375	495	14	150	A-3435	555
15	27	C-50	245	15	27	C-50	245
16	28	A-2705	215	16	28	A-2705	465
17	29	A-2490	170	17	29	Removed	
18	4680	A-2320	150	18	4680	A-2240	295
19	90	A-2170	225	19	90	Removed	
20	91	A-1945	170	20	91	A-1945	465
21	92	A-1775	295	21	92	Removed	
22	93	A-1480	385	22	93	A-1480	385
23	94	A-1095	350	23	94	A-1095	350
24	126	A-745	370	24	126	A-745	295
25	6182	A-375	225	25	6182	A-450	300
26	322	A-150	End of Route	26	322	A-150	End of Route
	Average Distance:		**264**		Average Distance:		**330**

		Ballymun Existing									
		Existing Information							Interaction with Junction and Ped Crossing		
New or Existing Bus Stop	Inbound/Outbound	Bus Stop Name	Bus Stop No.	Chainage	Distance from next stop (m)	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boadring + Alighting)	Before/After the junction (in the dierection of travel)	Bus Stop Distance from the nearest junction (m)	Distance to Pedestrian Crossing (m)
Existing	Inbound	Northwood Avenue	7113	A-375	355	30	1	31	After	142	130
Existing	Inbound	Nursing Home	127	A-730	335	28	1	29	After	215	43
Existing	Inbound	Ballymun Civil Centre	112	A-1065	432	22	1	23	After	55	34
Existing	Inbound	Trinity Comp School	113	A-1497	103	20	1	21	After	230	80
Existing	Inbound	Ballymun Road	114	A-1600	380	4	2	6	Before	250	240
Existing	Inbound	Ballymun Road Church	115	A-1980	285	27	1	28	After	124	36
Existing	Inbound	DCU Ballymun Road	37	A-2265	345	67	2	69	Before	60	50
Existing	Inbound	Hampstead Avenue	38	A-2610	210	13	1	14	Before	255	95
Existing	Inbound	The Rise	39	A-2820	430	5	3	8	before	65	55
Existing	Inbound	Stella Avenue	40	A-3250	185	13	1	14	After	220	220
Existing	Inbound	Na Fianna GAA Club	146	A-3435	305	55	1	56	Before	365	230
Existing	Inbound	Tolka Bridge	147	A-3740	360	12	2	14	Before	80	70
Existing	Inbound	Botanic Road	184	A-4100	190	25	1	26	After	75	85
Existing	Inbound	St Teresa's Place	185	A-4290	315	11	14	25	After	85	85
Existing	Inbound	Lindsay Grove	186a	A-4605	F-Spine Stop	14	3	17	After	70	50
New	Inbound		186b	New							
Existing	Inbound	Phibsborough Road	187	A-4915	290	5	10	15	Before	25	35
Existing	Inbound	North Circular Road	188	A-5205	335	14	4	18	After	75	65
Existing	Inbound	Fire Station	189	A-5540	230	1	6	7	After	170	180
Existing	Inbound	Broadstone	190	A-5770	455	8	4	12	Before	70	60
Existing	Inbound	Church Street Upper	1614	A-6225	385	4	8	12	Before	60	50
Existing	Inbound	Church Street Upper	1615	A-6610	End of Route	5	22	27	After	20	10

		Ballymun Inbound Bus Stop Review Outcome				
Inbound/Outbound	**Bus Stop Name**	**Bus Stop Treatment**	**No. Bus Bays**	**Bus Shelter**	**Type of Bus Stop Island or Shared Bus Stop Landing**	**Design Rational**
Inbound	Northwood Avenue	Relocated	Single	New Proposed Bus Shelter	Island Bus Stop	Stop moved closer to Northwood Avenue, Bus Route E1 joins CBC at Northwood Avenue
Inbound	Nursing Home	Retain	Single	Standard Bus Shelter	Island Bus Stop	No Issue with existing stop location
Inbound	Ballymun Civil Centre	Retain	Single	Standard Bus Shelter	Island Bus Stop	No Issue with existing stop location
Inbound	Trinity Comp School	Retain	Single	Standard Bus Shelter	Island Bus Stop	No Issue with existing stop location
Inbound	Ballymun Road	Removed	Single	Removed		Removed to improve spacing between stops
Inbound	Ballymun Road Church	Retain	Single	Standard Bus Shelter	Island Bus Stop	No Issue with existing stop location
Inbound	DCU Ballymun Road	Relocated	Single	Standard Bus Shelter	Island Bus Stop	Moved closer to DCU Entrance
Inbound	Hampstead Avenue	Relocated	Single	Standard Bus Shelter	Small Island	Moved 20m to the south, wider footpath
Inbound	The Rise	Relocated	Single	Standard Bus Shelter	Small Island	Moved 110m to the south for better spacing between stops
Inbound	Stella Avenue	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 110m to the north, closer to Griffith Avenue Junction
Inbound	Na Fianna GAA Club	Retain	Single	New Proposed Bus Shelter	Small Island	No Issue with existing stop location
Inbound	Tolka Bridge	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 100m north, closer to possible Metrolink Station
Inbound	Botanic Road	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 50m north closer to Botanic Road junction
Inbound	St Teresa's Place	Relocated	Single	Standard Bus Shelter	Shared Landing	Moved 10m south, wider footpath
Inbound	Lindsay Grove	Retain	Single	Standard Bus Shelter	Small Island	No Issue with existing stop location
Inbound		New	Single	New Proposed Bus Shelter	Island Bus Stop	Additional Stop, 1 for F spine Route and 1 for E spine Route
Inbound	Phibsborough Road	Retain	Single	Standard Bus Shelter	Shared Landing	No Issue with existing stop location
Inbound	North Circular Road	Retain	Single	New Proposed Bus Shelter	Shared Landing	No Issue with existing stop location
Inbound	Fire Station	Retain	Single	New Proposed Bus Shelter	Shared Landing	No Issue with existing stop location

Inbound	Broadstone	Relocated	Single	Standard Bus Shelter	Shared Landing	Moved 30m to the south, closer to Western Way junction
Inbound	Church Street Upper	Retain	Single	Standard Bus Shelter	Small Island	No Issue with existing stop location
Inbound	Church Street Upper	Retain	Single	Standard Bus Shelter	Shared Landing	No Issue with existing stop location

			Ballymun Proposed Inbound Bus Stops						
			Distance		Interaction with Junctions and Ped Crossing				
Inbound/Outbound	Bus Stop Name	New or Exsting Bus Stop	New Distance (Between Stops)	Chainage	Before/After the junction (in the direction of travel)	Bus Stop Distance from nearest junction (m)	Distance to Pedestrian Crossing (m)	Trip attractor	Lay-by or Onstreet Bus Stop
Inbound	Northwood Avenue	Existing	420	A-310	After	120	95	Gulliver's Retail Park	Onstreet
Inbound	Nursing Home	Existing	335	A-730	After	220	45	St. Pappins Silver Stream Nursing Home	Onsteet
Inbound	Ballymun Civil Centre	Existing	432	A-1065	After	75	40	Ballymun Shopping Centre	Onsteet
Inbound	Trinity Comp School	Existing	483	A-1497	Before	50	25		Onsteet
Inbound	Ballymun Road	Existing	Removed	Removed					
Inbound	Ballymun Road Church	Existing	310	A-1980	After	120	20		Onstreet
Inbound	DCU Ballymun Road	Existing	350	A-2290	Before	40	35	Dublin City University	Onstreet
Inbound	Hampstead Avenue	Existing	300	A-2640	After	85	75		Onstreet
Inbound	The Rise	Existing	200	A-2940	After	50	50		Onstreet
Inbound	Stella Avenue	Existing	295	A-3140	After	110	70		Onstreet
Inbound	Na Fianna GAA Club	Existing	200	A-3435	Before	140	40	Na Fianna GAA Club	Onstreet
Inbound	Tolka Bridge	Existing	420	A-3635	Before	60	45		Onstreet
Inbound	Botanic Road	Existing	245	A-4055	After	40	8	National Botanic Gardens	Lay-by
Inbound	St Teresa's Place	Existing	305	A-4300	Before	100	80		Onstreet
Inbound	Lindsay Grove	Existing	F-Spine Stop	A-4605	After	60	40		Onstreet
Inbound		New	255	A-4660	Before	30	20		Onstreet
Inbound	Phibsborough Road	Existing	290	A-4915	Before	25	15	Phibsborough Shopping Centre	Onstreet
Inbound	North Circular Road	Existing	335	A-5205	After	65	55		Onstreet
Inbound	Fire Station	Existing	260	A-5540	Before	320	60		Onstreet
Inbound	Broadstone	Existing	425	A-5800	Before	70	40	TU Dublin Grangegorman	Onstreet
Inbound	Church Street Upper	Existing	385	A-6225	Before	55	45		Onstreet
Inbound	Church Street Upper	Existing	End of Route	A-6610	After	15	5	Student Accommodation/Local Shops	Lay-by

		Ballymun Existing									
		Existing Information							Interaction with Junction and Ped Crossing		
New or Existing Bus Stop	Inbound/Outbound	Bus Stop Name	Bus Stop No.	Chainage	Distance from next stop (m)	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boadring + Alighting)	Before/After the junction (in the dierection of travel)	Bus Stop Distance from the nearest junction (m)	Distance to Pedestrian Crossing (m)
Existing	Outbound	St. Michan's Church	1616	A-6670	220	33	2	35	After	25	18
Existing	Outbound	Capuchin Church	1617	A-6450	195	5	1	6	Before	85	70
Existing	Outbound	Church Street Upper	1618	A-6255	215	11	2	13	After	25	15
Existing	Outbound	Constitution Hill	1619	A-6040	245	3	1	4	Before	65	50
Existing	Outbound	Broadstone	195	A-5795	220	9	3	12	After	90	50
Existing	Outbound	Fire Station	196	A-5575	225	3	4	7	Before	195	210
Existing	Outbound	Monck Place	197	A-5350	300	2	9	11	After	30	18
Existing	Outbound	Phibsborough Shopping Centre	198	A-5050	230	30	1	31	After	90	30
Existing	Outbound	Munster Street	199	A-4820	550	2	14	16	After	120	105
Existing	Outbound	Botanic Road	201	A-4270	190	2	5	7	After	120	70
Existing	Outbound	Fairfield Road	202	A-4080	110	15	2	17	Before	40	40
Existing	Outbound	Mobhi Road	148	A-3970	320	2	19	21	After	45	20
Existing	Outbound	Tolka Bridge	149	A-3650	275	21	4	25	After	155	15
Existing	Outbound	Na Fianna GAA Club	150	A-3375	495	24	2	26	Before	330	5
Existing	Outbound	Ballymun Road	27	C-50	245	27	4	31	After	60	50
Existing	Outbound	Hampstead Avenue	28	A-2705	215	2	9	11	After	190	30
Existing	Outbound	Albert College Park	29	A-2490	170	3	3	6	Before	170	150
Existing	Outbound	DCU	4680	A-2320	150	2	56	58	Before	100	20
Existing	Outbound	Albert College Court	90	A-2170	225	4	10	14	After	50	40
Existing	Outbound	Ballymun Road NS	91	A-1945	170	15	7	22	Before	90	15
Existing	Outbound	Ballymun Library	92	A-1775	295	1	9	10	After	95	55
Existing	Outbound	Gateway Avenue	93	A-1480	385	4	12	16	After	350	75
Existing	Outbound	Civic Centre	94	A-1095	350	21	14	35	Before	80	45

Existing	Outbound	Ballymun Nursing Home	126	A-745	370	1	23	24	Before	220	50
Existing	Outbound	Santry Cross	6182	A-375	225	3	30	33	After	140	155
Existing	Outbound	Gulliver's Retail Park	322	A-150	End of Route	0	13	13	Before	100	55

		Ballymun Outbound Bus Stop Review Outcome				
Inbound/Outbound	**Bus Stop Name**	**Bus Stop Treatment**	**No. Bus Bays**	**Bus Shelter**	**Type of Bus Stop Island or Shared Bus Stop Landing**	**Design Rational**
Outbound	St. Michan's Church	Retain	Single	Standard Bus Shelter	Shared landing	No issues with existing location
Outbound	Capuchin Church	Removed	Single			Removed to improve spacing between stops
Outbound	Church Street Upper	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Constitution Hill	Retain	Single	Standard Bus Shelter	Small Island	No issues with existing location
Outbound	Broadstone	Relocated	Single	New Proposed Bus Shelter	Shared landing	Moved 30m to the south, closer Luas Stop
Outbound	Fire Station	Retain	Single	Standard Bus Shelter	Shared landing	No issues with existing location
Outbound	Monck Place	Retain	Single	New Proposed Bus Shelter	Shared landing	No issues with existing location
Outbound	Phibsborough Shopping Centre	Relocated	Single	Standard Bus Shelter	Shared landing	Moved 40m to the north closer to pedestrian crossing
Outbound	Munster Street	Retain	Single	Standard Bus Shelter	Shared landing	No issues with existing location
Outbound	Botanic Road	Relocated	Single	New Proposed Bus Shelter	Shared landing	Moved 40m to the south closer to prospect way junction
Outbound	Fairfield Road	Removed	Single			Removed to improve spacing between stops
Outbound	Mobhi Road	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Tolka Bridge	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 30m to the north, closer to possible metro link station
Outbound	Na Fianna GAA Club	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 100m to the south to fit better between driveways
Outbound	Ballymun Road	Retain	Single	Standard Bus Shelter	Small Island	No issues with existing location
Outbound	Hampstead Avenue	Retain	Single	Standard Bus Shelter	Small Island	No issues with existing location
Outbound	Albert College Park	Removed	Single			Removed to improve spacing between stops

Outbound	DCU	Relocated	Single	New Proposed Bus Shelter	Small Island	Moved 70m to the north closer to St Pappin juction
Outbound	Albert College Court	Removed	Single			Removed to improve spacing between stops
Outbound	Ballymun Road NS	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Ballymun Library	Removed	Single			Removed to improve spacing between stops
Outbound	Gateway Avenue	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Civic Centre	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Ballymun Nursing Home	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Santry Cross	Relocated	Single	New Proposed Bus Shelter	Island Bus Stop	Moved 80m to the south closer to orbital interchange
Outbound	Gulliver's Retail Park	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location

			Ballymun Proposed Outbound Bus Stops						
			Distance		Interaction with Junctions and Ped Crossing				
Inbound/Outbound	Bus Stop Name	New or Exsting Bus Stop	New Distance (Between Stops)	Chainage	Before/After the junction (in the direction of travel)	Bus Stop Distance from nearest junction (m)	Distance to Pedestrian Crossing (m)	Trip attractor	Lay-by or Onstreet Bus Stop
Outbound	St. Michan's Church	Existing	415	A-6670	After	15	10	Student Accommodation/Local Shops	Onstreet
Outbound	Capuchin Church	Removed		Removed					
Outbound	Church Street Upper	Existing	215	A-6255	After	25	10		Onstreet
Outbound	Constitution Hill	Existing	205	A-6040	Before	75	60		Onstreet
Outbound	Broadstone	Existing	260	A-5835	After	60	20	TU Dublin Grangegorman	Onstreet
Outbound	Fire Station	Existing	225	A-5575	Before	195	30		Onstreet
Outbound	Monck Place	Existing	340	A-5350	before	215	10		
Outbound	Phibsborough Shopping Centre	Existing	190	A-5010	Before	65	30	Phibsborough Shopping Centre	Onstreet
Outbound	Munster Street	Existing	505	A-4820	After	120	15		Onstreet
Outbound	Botanic Road	Existing	345	A-4315	After	90	70		onstreet
Outbound	Fairfield Road	Removed		Removed					
Outbound	Mobhi Road	Existing	335	A-3970	After	40	30	National Botanic Garden	Onstreet
Outbound	Tolka Bridge	Existing	200	A-3635	After	170	45		Onstreet
Outbound	Na Fianna GAA Club	Existing	555	A-3435	Before	390	40	Na Fianna GAA Club	Onstreet
Outbound	Ballymun Road	Existing	245	C-50	After	50	35		Onstreet
Outbound	Hampstead Avenue	Existing	465	A-2705	After	190	30		Onstreet
Outbound	Albert College Park	Removed		Removed					
Outbound	DCU	Existing	295	A-2240	Before	35	10	Dublin City University	Onstreet
Outbound	Albert College Court	Removed		Removed					
Outbound	Ballymun Road NS	Existing	465	A-1945	Before	100	5		Onstreet
Outbound	Ballymun Library	Removed		Removed					
Outbound	Gateway Avenue	Existing	385	A-1480	Before	220	35		Onstreet
Outbound	Civic Centre	Existing	350	A-1095	Before	100	40	Ballymun Shopping Centre	Onstreet

Outbound	Ballymun Nursing Home	Existing	295	A-745	Before	240	50	St. Pappins Silver Stream Nursing Home	Onstreet
Outbound	Santry Cross	Existing	300	A-450	After	50	25		Onstreet
Outbound	Gulliver's Retail Park	Existing	End of Route	A-150	After	30	15	Gulliver's Retail Park	Onstreet

Finglas Inbound							
Existing				Proposed			
No.	Bus Stop No.	Chainage	Distance from Next Stop (m)	No.	Bus Stop No.	Chainage	Distance from Next Stop (m)
1	New			1		B-85	905
2	New			2		B-990	255
3	4542	B-1245	415	3	4542	B-1245	415
4	1531	B-1660	300	4	1531	B-1660	300
5	1532	B-1960	375	5	1532	B-1960	375
6	1533	B-2335	405	6	1533	B-2335	275
7	1534	B-2740	430	7	1534	B-2610	560
8	1535	B-3170	490	8	1535	B-3170	490
10	1536	B-3660	300	10	1536	B-3660	325
11	1537	B-3960	End of Route	11	1537	B-3985	End of Route
	Average Distance		**388**		Average Distance		**433**

Finglas Outbound							
Existing				Proposed			
No.	Bus Stop No.	Chainage	Distance from Next Stop (m)	No.	Bus Stop No.	Chainage	Distance from Next Stop (m)
1	1506	B-4120	250	1	1506	B-4120	285
2	1507	B-3870	315	2	1507	B-3840	285
3	1508	B-3555	520	3	1508	B-3555	520
4	1509	B-3035	475	4	1509	B-3035	445
5	1510	B-2560	165	5	1510	B-2590	195
6	1511	B-2395	540	6	1511	B-2395	540
7	1512	B-1855	330	7	1512	B-1855	330
8	1538	B-1525	235	8	1538	B-1525	295
9	4543 (100891)	B-1290	End of Route	9	4543 (100891)	B-1230	160
10	New			10		B-1070	990
11	New			11		B-80	End of Route
	Average Distance		**354**		Average Distance		**405**

		Finglas Existing									
		Existing Information							Interaction with Junction and Ped Crossing		
New or Existing Bus Stop	Inbound/Outbound	Bus Stop Name	Bus Stop No.	Chainage	Distance from next stop (m)	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boadring + Alighting)	Before/After the junction (in the direction of travel)	Bus Stop Distance from the nearest junction (m)	Distance to Pedestrian Crossing (m)
New	Inbound										
New	Inbound										
Existing	Inbound	Finglas Road	4542	B-1245	415	37	2	39	After	30	10
Existing	Inbound	Clearwater SC	1531	B-1660	300	15	2	17	After	45	27
Existing	Inbound	Prospect Hill	1532	B-1960	375	20	2	22	After	48	32
Existing	Inbound	Tolka Valley	1533	B-2335	405	20	1	21	After	103	85
Existing	Inbound	Ballyboggan Road	1534	B-2740	430	8	2	10	After	50	36
Existing	Inbound	The Willows	1535	B-3170	490	12	1	13	Before	24	35
Existing	Inbound	Glasnevin Cemetery	1536	B-3660	300	17	1	18	After	110	37
Existing	Inbound	St Vincent's School	1537	B-3960	End of Route	11	12	23	Before	35	60

		Finglas Inbound Bus Stop Review Outcome				
Inbound/Outbound	**Bus Stop Name**	**Bus Stop Treatment**	**No. Bus Bays**	**Bus Shelter**	**Type of Bus Stop Island or Shared Bus Stop Landing**	**Design Rational**
Inbound		New	Single	New Proposed Bus Shelter	Shared Landing	Additional Stop
Inbound		New	Single	New Proposed Bus Shelter	Shared Landing	Additional Stop
Inbound	Finglas Road	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Inbound	Clearwater SC	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Inbound	Prospect Hill	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Inbound	Tolka Valley	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Inbound	Ballyboggan Road	Relocated	Single	New Proposed Bus Shelter	Island Bus Stop	Moved bus stop north to serve Orbital N2 route with walking for connection
Inbound	The Willows	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location
Inbound	Glasnevin Cemetery	Retain	Single	Standard Bus Shelter	Shared Landing	No issues with existing location
Inbound	St Vincent's School	Relocated	Single	New Proposed Bus Shelter	Small Island	Displaced to adapt to Island bus stop

			Finglas Proposed Inbound Bus Stops						
			Distance		Interaction with Junctions and Ped Crossing			Network Redesign	
Inbound/Outbound	Bus Stop Name	New or Exsting Bus Stop	New Distance (Between Stops)	Chainage	Before/After the junction (in the direction of travel)	Bus Stop Distance from nearest junction (m)	Distance to Pedestrian Crossing (m)	Trip attractor	Lay-by or Onstreet Bus Stop
Inbound		New	905	B-85	After	45	25		Onstreet
Inbound		New	255	B-990	Before	24	49	Finglas Shopping Centre	Onstreet
Inbound	Finglas Road	Existing	415	B-1245	After	30	10		Onstreet
Inbound	Clearwater SC	Existing	300	B-1660	After	45	27	Clearwater Shopping Centre	Onstreet
Inbound	Prospect Hill	Existing	375	B-1960	After	48	32		Onstreet
Inbound	Tolka Valley	Existing	275	B-2335	After	103	85		Onstreet
Inbound	Ballyboggan Road	Relocated	560	B-2610	Before	80	92	Tolka River	Onstreet
Inbound	The Willows	Existing	490	B-3170	Before	24	35		Onstreet
Inbound	Glasnevin	Removed							
Inbound	Glasnevin Cemetery	Existing	325	B-3660	After	110	37	Glasnevin Cemetery	Onstreet
Inbound	St Vincent's School	Relocated	115	B-3985	Before	13	37	St Vincent's Schools	Onstreet
Inbound	Glasnevin, Prospect Way	Existing	End of Route	B-4100	Before	10	2	Local Shops	Lay-by

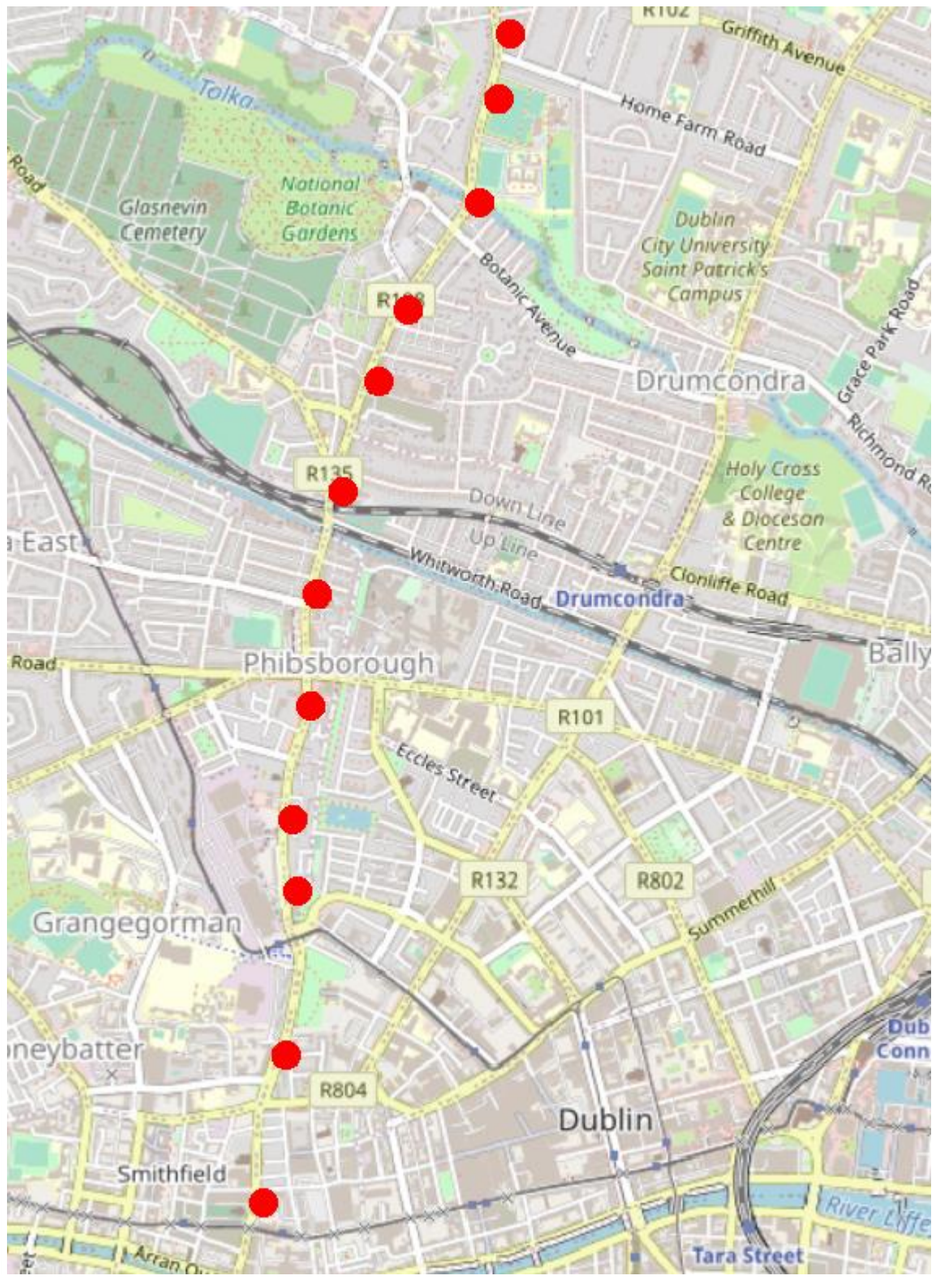
		Finglas Existing									
		Existing Information							Interaction with Junction and Ped Crossing		
New or Existing Bus Stop	Inbound/Outbound	Bus Stop Name	Bus Stop No.	Chainage	Distance from next stop (m)	Number of Passengers Boarding (Peak Hr)	Number of Passengers Alighting (Peak Hr)	Total (Boadring + Alighting)	Before/After the junction (in the direction of travel)	Bus Stop Distance from the nearest junction (m)	Distance to Pedestrian Crossing (m)
Existing	Outbound	Dalcassian Downs	1506	B-4120	250	23	5	28	After	15	3
Existing	Outbound	St Vincent's School	1507	B-3870	315	18	2	20	After	120	28
Existing	Outbound	Glasnevin Cemetery	1508	B-3555	520	28	1	29	Before	21	11
Existing	Outbound	Slaney Road	1509	B-3035	475	2	9	11	After	40	57
Existing	Outbound	Ballyboggan Road	1510	B-2560	165	10	3	13	Before	100	37
Existing	Outbound	Tolka Vale	1511	B-2395	540	5	9	14	After	40	19
Existing	Outbound	Prospect Hill	1512	B-1855	330	3	13	16	After	24	37
Existing	Outbound	Clearwater SC	1538	B-1525	235	15	3	18	After	55	37
Existing	Outbound	Bottom of the Hill	4543 (100891)	B-1290	End of Route	No data			Before	88	70
New	Outbound										
New	Outbound										

		Finglas Outbound Bus Stop Review Outcome				
Inbound/Outbound	**Bus Stop Name**	**Bus Stop Treatment**	**No. Bus Bays**	**Bus Shelter**	**Type of Bus Stop Island or Shared Bus Stop Landing**	**Design Rational**
Outbound	Dalcassian Downs	Retain	Single	Standard Bus Shelter	Small Island	No issues with existing location
Outbound	St Vincent's School	Relocated	Single	New Proposed Bus Shelter	Island Bus Stop	Displaced to adapt for Island bus stop
Outbound	Glasnevin Cemetery	Retain	Single	Standard Bus Shelter	Shared landing	No issues with existing location
Outbound	Slaney Road	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Ballyboggan Road	Relocated	Single	New Proposed Bus Shelter	Small Island	Little frontage catchment so longer spacing is OK & overlap with Orbital Route
Outbound	Tolka Vale	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Prospect Hill	Retain	Single	New Proposed Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Clearwater SC	Retain	Single	Standard Bus Shelter	Island Bus Stop	No issues with existing location
Outbound	Bottom of the Hill	Relocated	Single	New Proposed Bus Shelter	Small Island	Closer Spacing to Finglas Village is beneficial
Outbound		New	Single	New Proposed Bus Shelter	Small Island	Closer Spacing to Finglas Village is beneficial
Outbound		New	Single	New Proposed Bus Shelter	Shared landing	Additional Stop

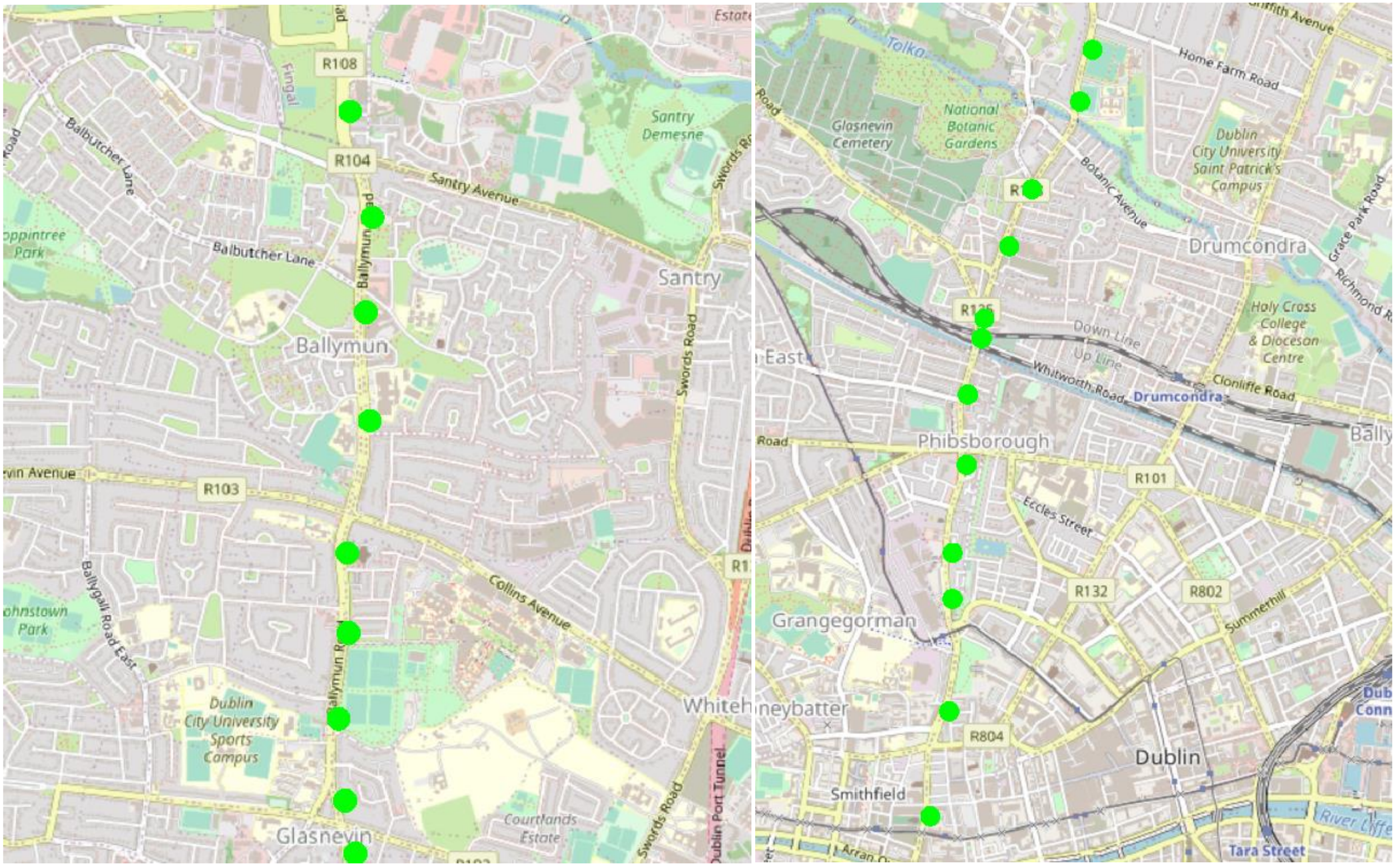
			Finglas Proposed Outbound Bus Stops						
			Distance		Interaction with Junctions and Ped Crossing			Network Redesign	
Inbound/Outbound	Bus Stop Name	New or Existing Bus Stop	New Distance (Between Stops)	Chainage	Before/After the junction (in the direction of travel)	Bus Stop Distance from nearest junction (m)	Distance to Pedestrian Crossing (m)	Trip attractor	Lay-by or Onstreet Bus Stop
Outbound	Dalcassian Downs	Existing	285	B-4120	After	15	3	Local Shops	Onstreet
Outbound	St Vincent's School	Existing	285	B-3840	After	120	28	St Vincent's Schools	Onstreet
Outbound	Glasnevin Cemetery	Existing	520	B-3555	Before	21	11	Glasnevin Cemetery	Onstreet
Outbound	Slaney Road	Existing	445	B-3035	After	40	57		Onstreet
Outbound	Ballyboggan Road	Relocated	195	B-2590	After	75	70	Tolka River	Onstreet
Outbound	Tolka Vale	Existing	540	B-2395	After	40	19		Onstreet
Outbound	Prospect Hill	Existing	330	B-1855	After	24	37	Ardmore Hotel	Onstreet
Outbound	Clearwater SC	Existing	295	B-1525	After	55	37	Clearwater Shopping Centre	Onstreet
Outbound	Bottom of the Hill	Relocated	160	B-1230	Before	28	10		Onstreet
Outbound		New	990	B-1070	Before	48	21	Finglas Shopping Centre	Onstreet
Outbound		New	End of Route	B-80	Before	50	27		Onstreet

APPENDIX B
BUS STOP LOCATIONS MAP

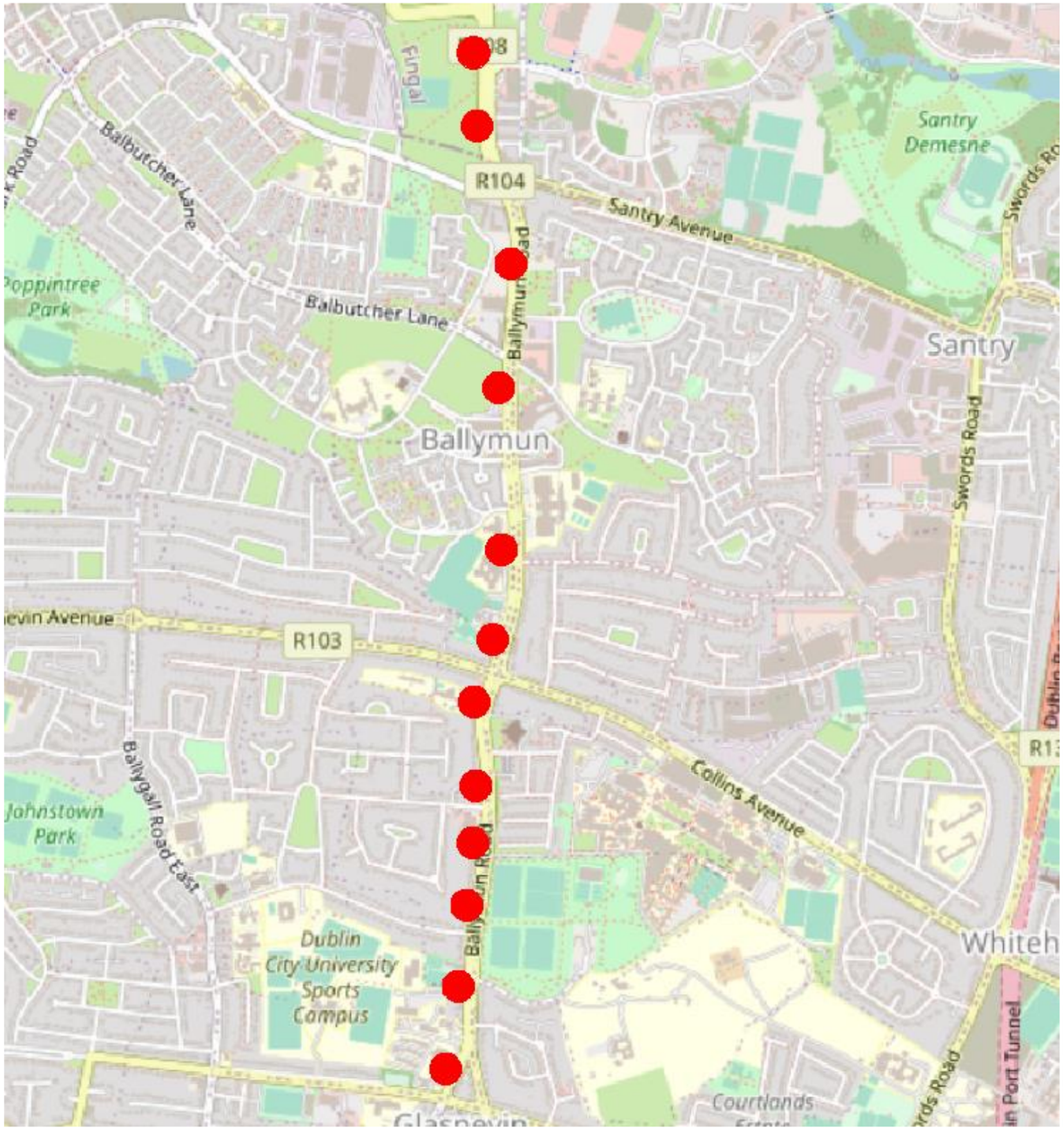
Ballymun Existing Inbound Stops

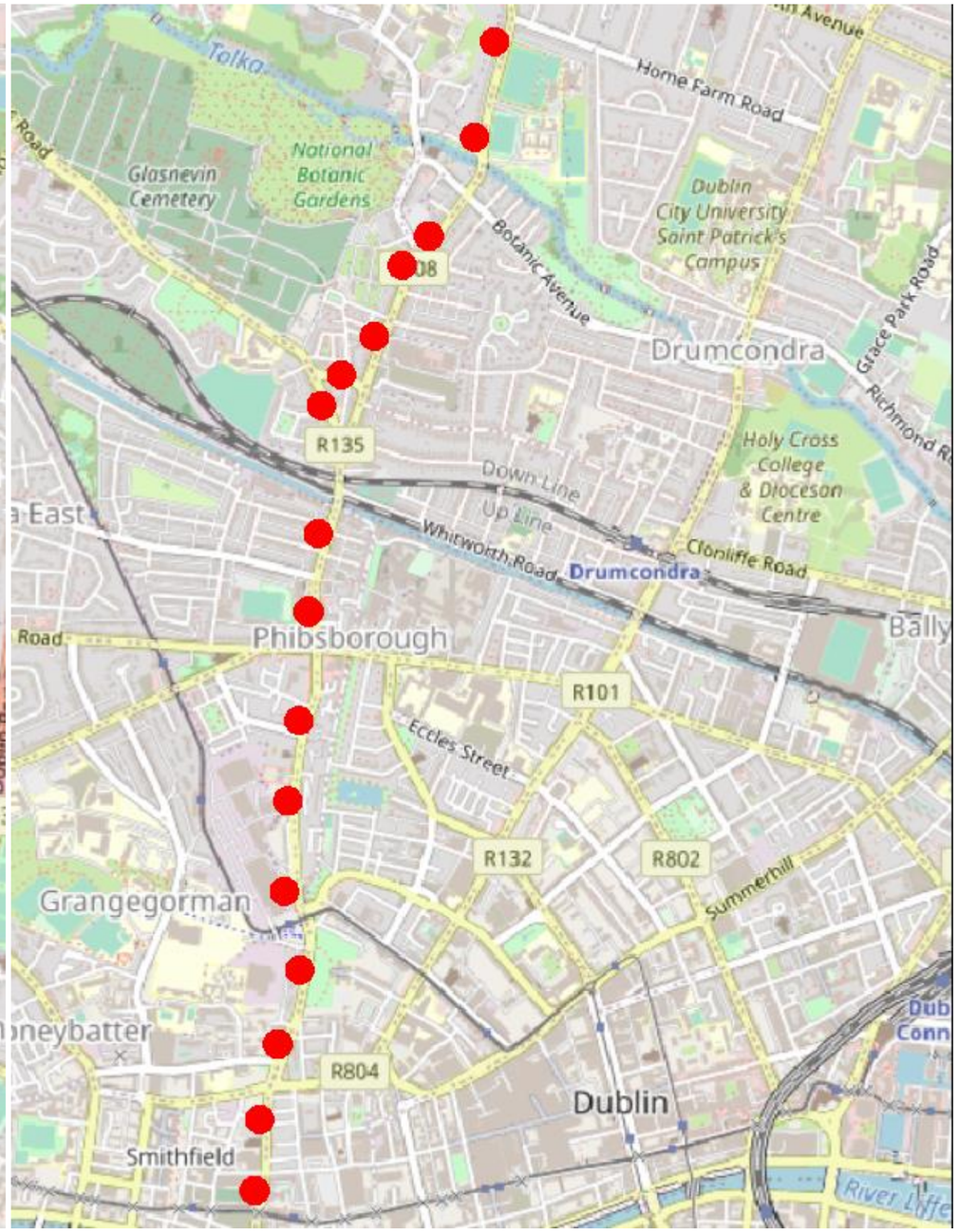


Ballymun Proposed Inbound Stops

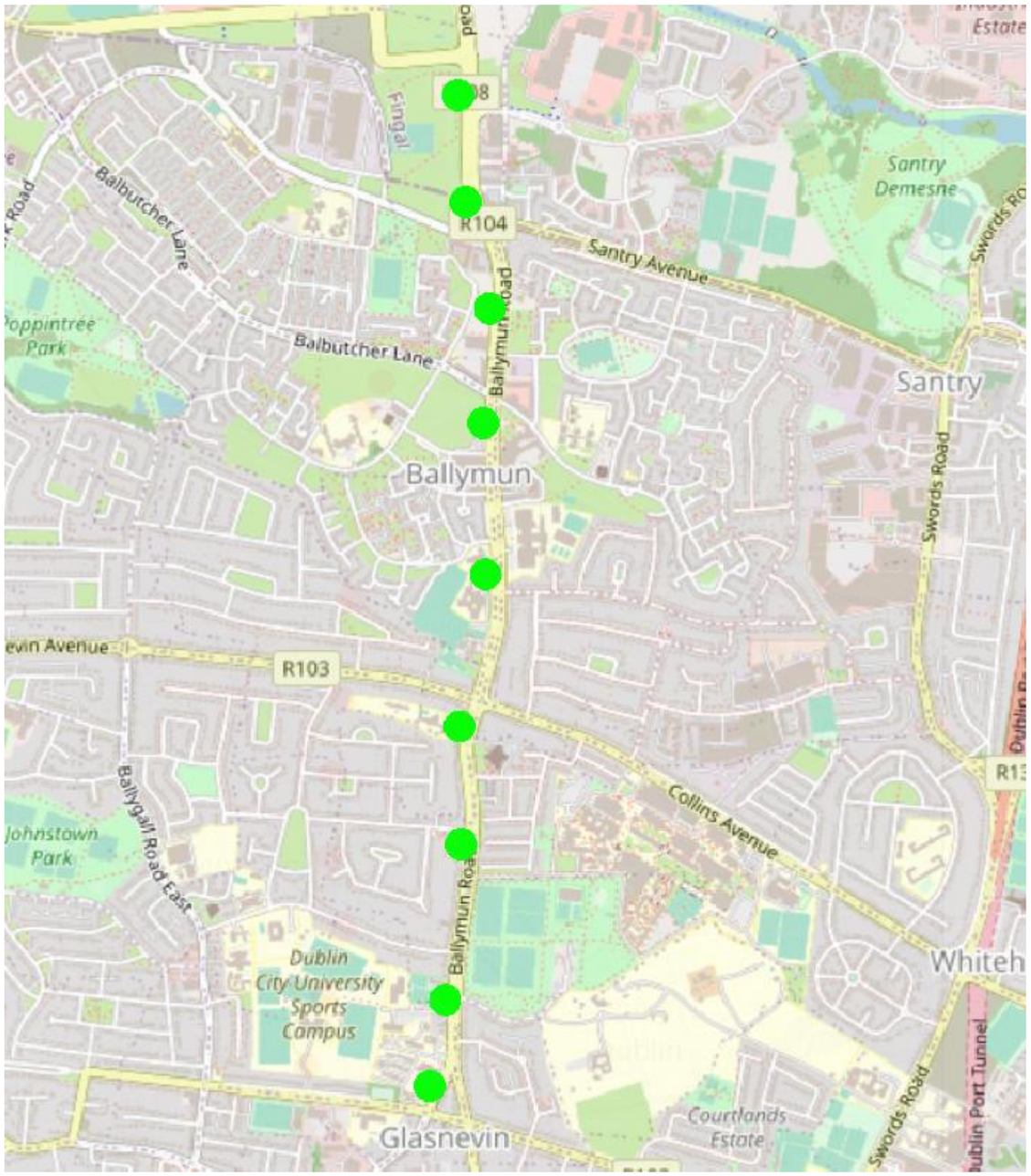


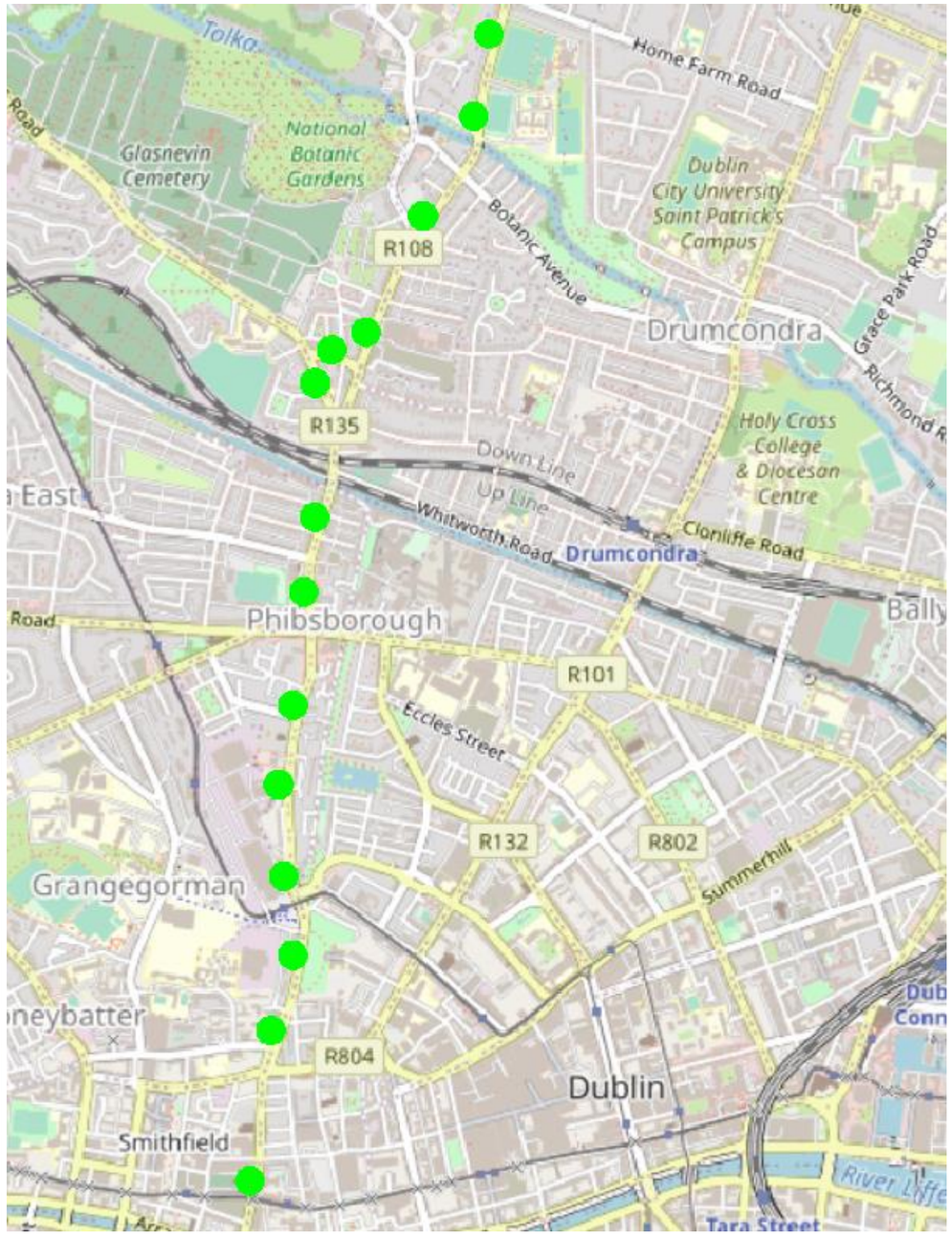
Ballymun Existing Outbound Stops



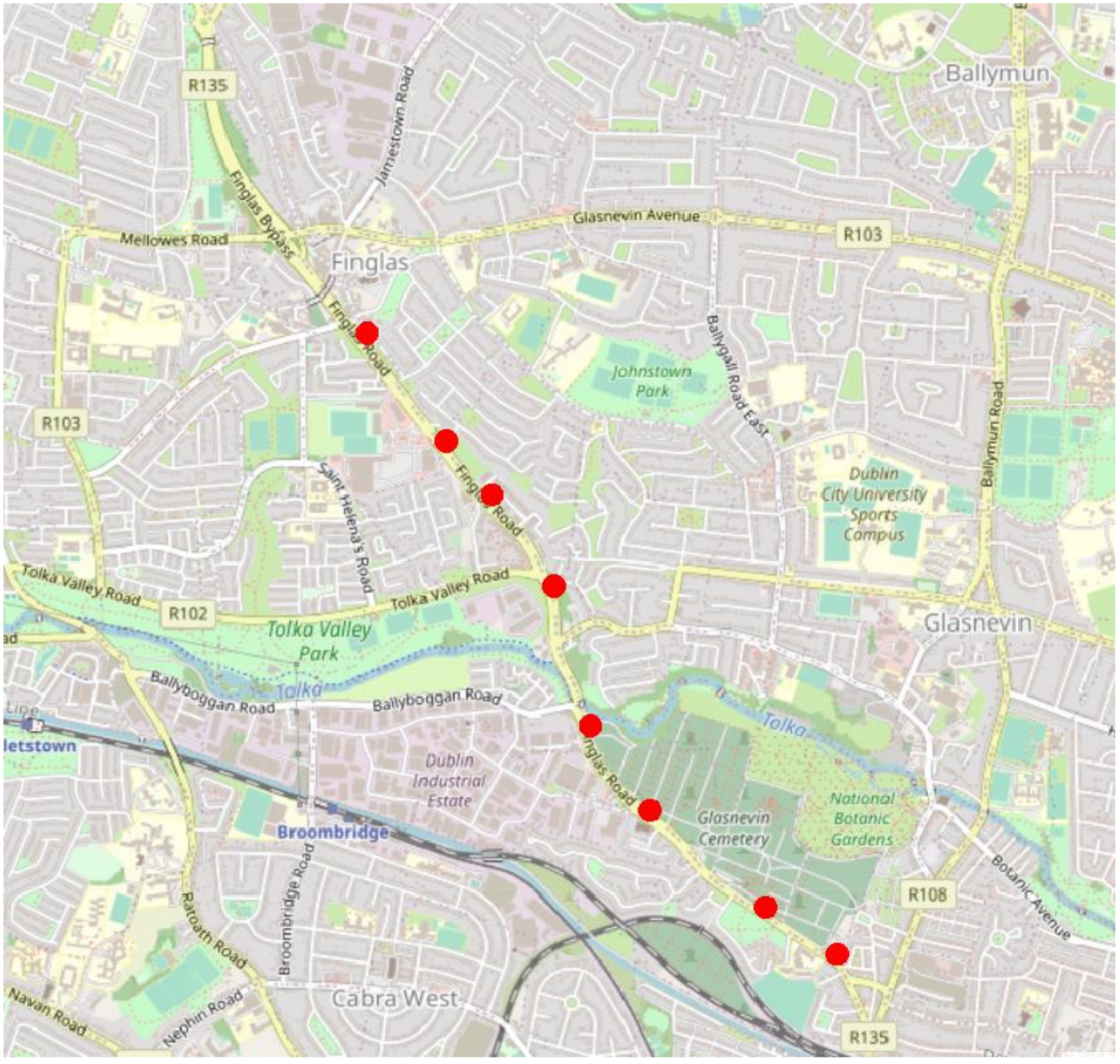


Ballymun Proposed Outbound Stops

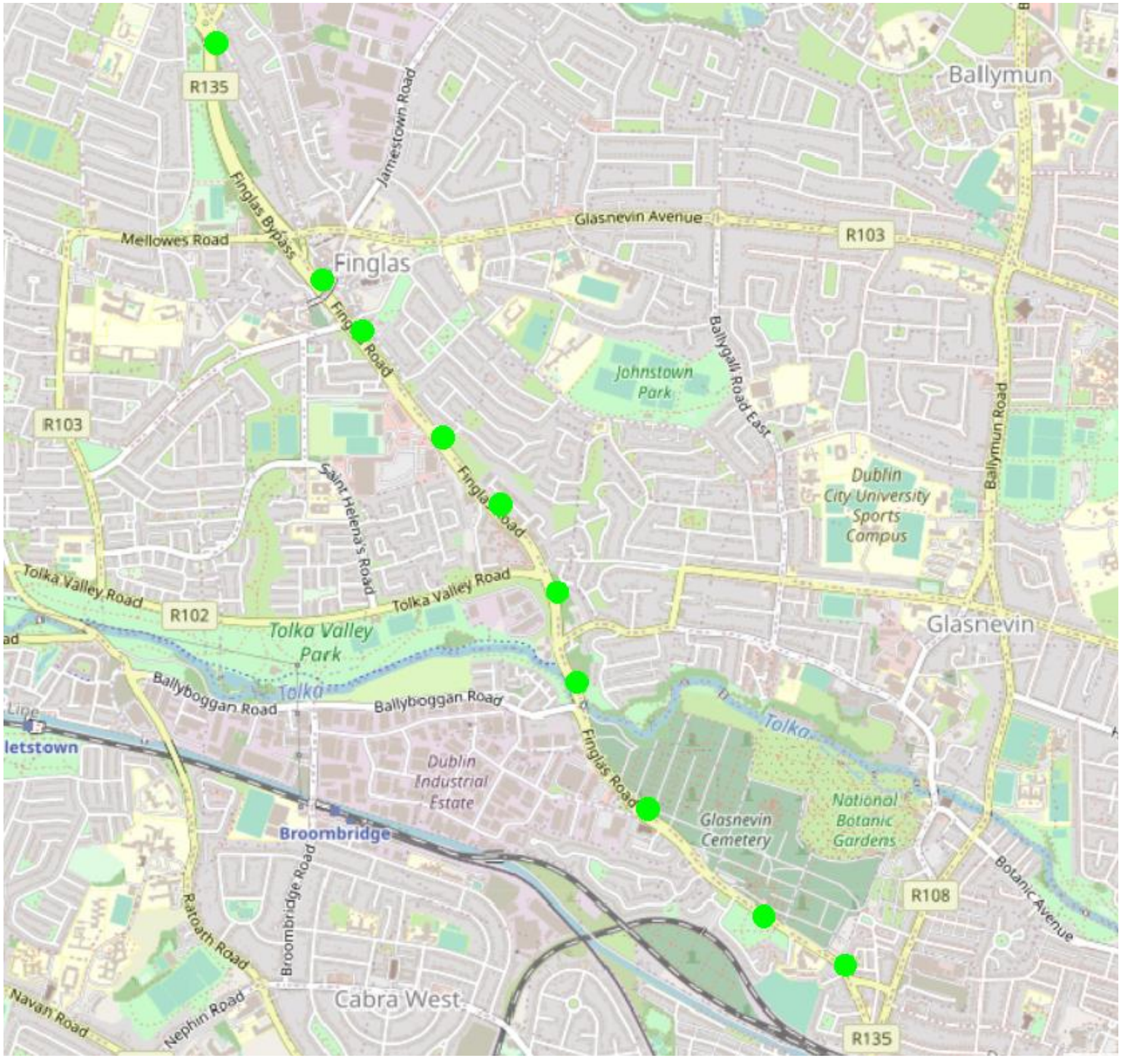




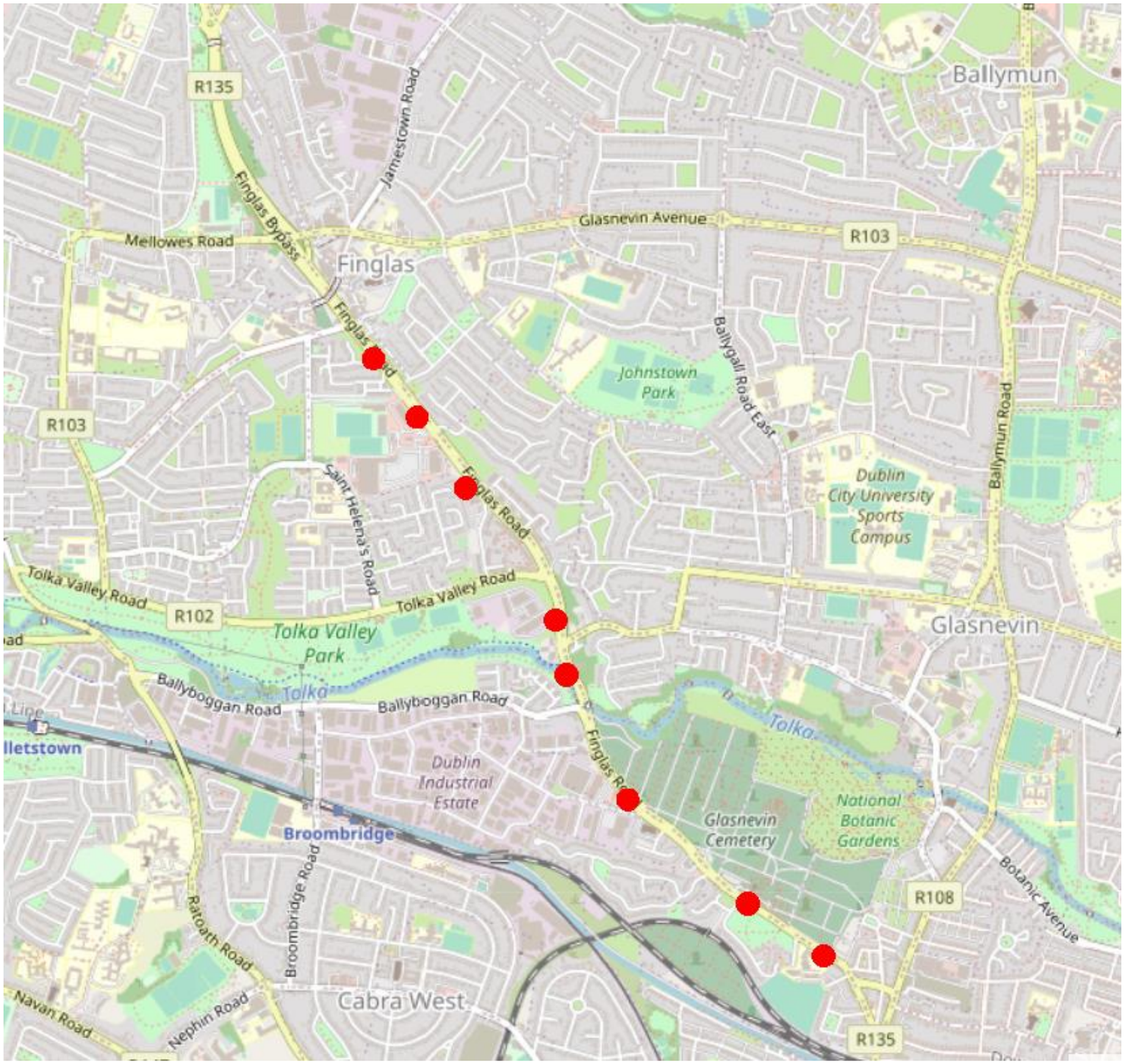
Finglas Existing Inbound Stops



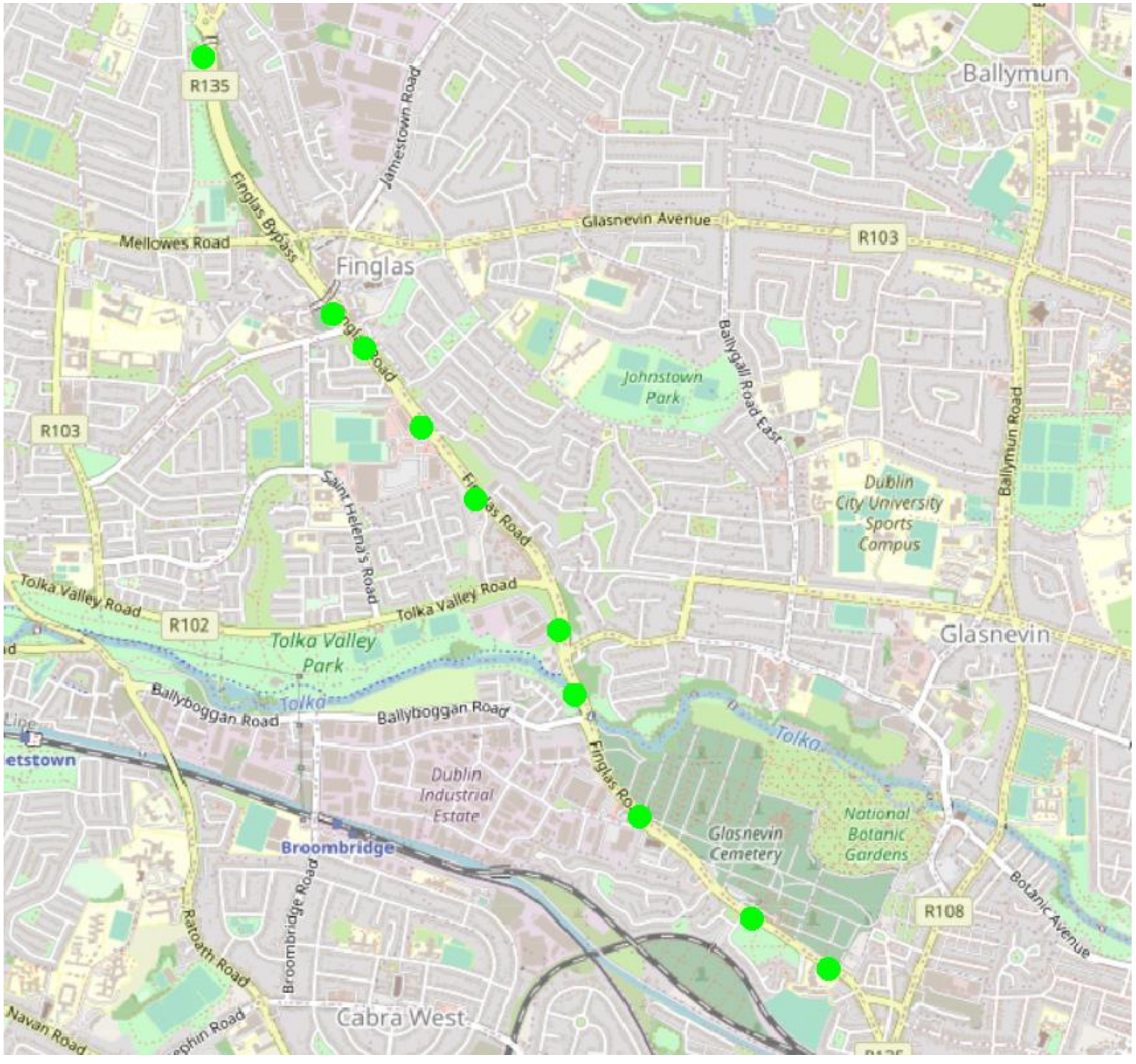
Finglas Proposed Inbound Stops



Finglas Existing Outbound Stops

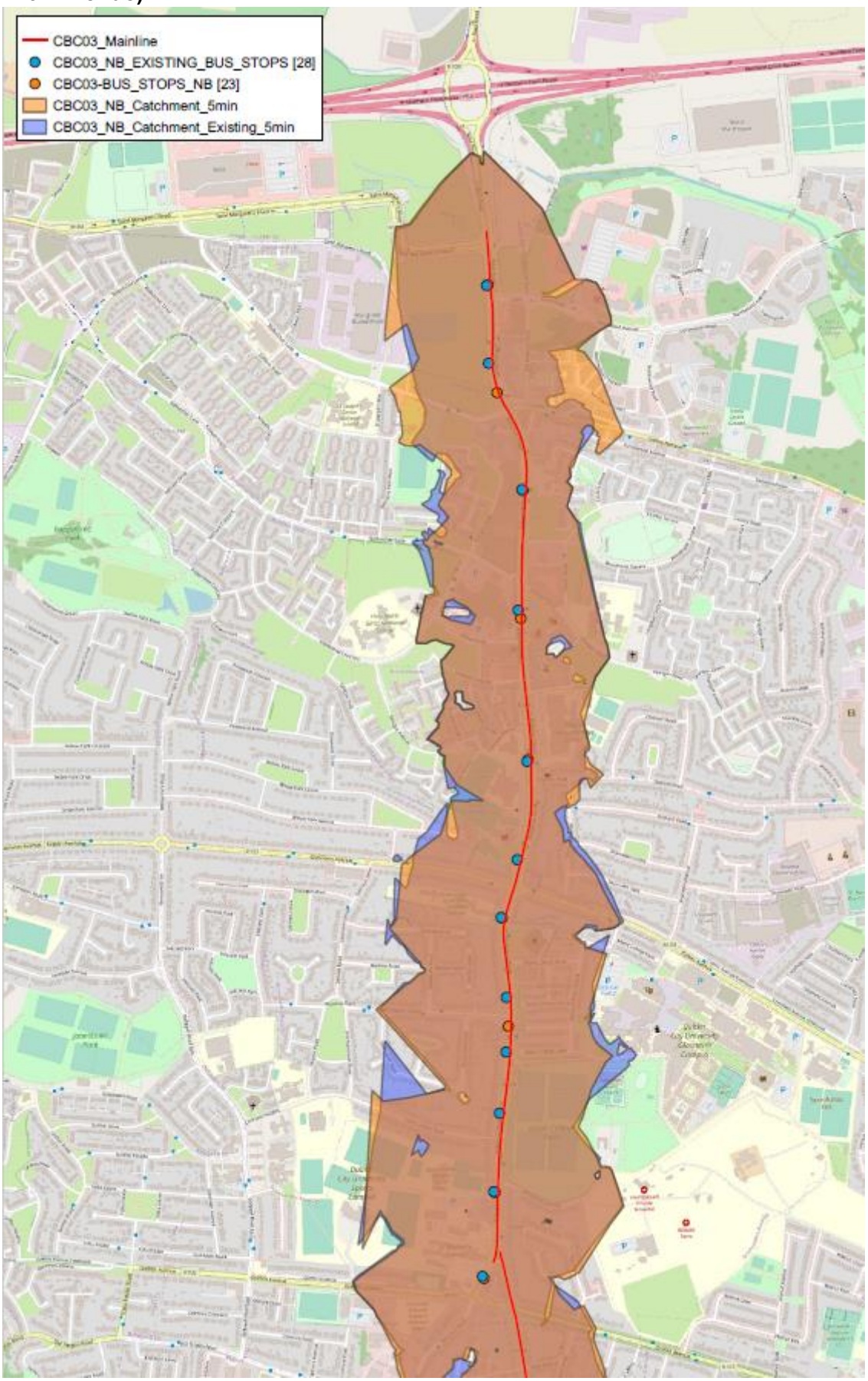


Finglas Proposed Outbound Stops

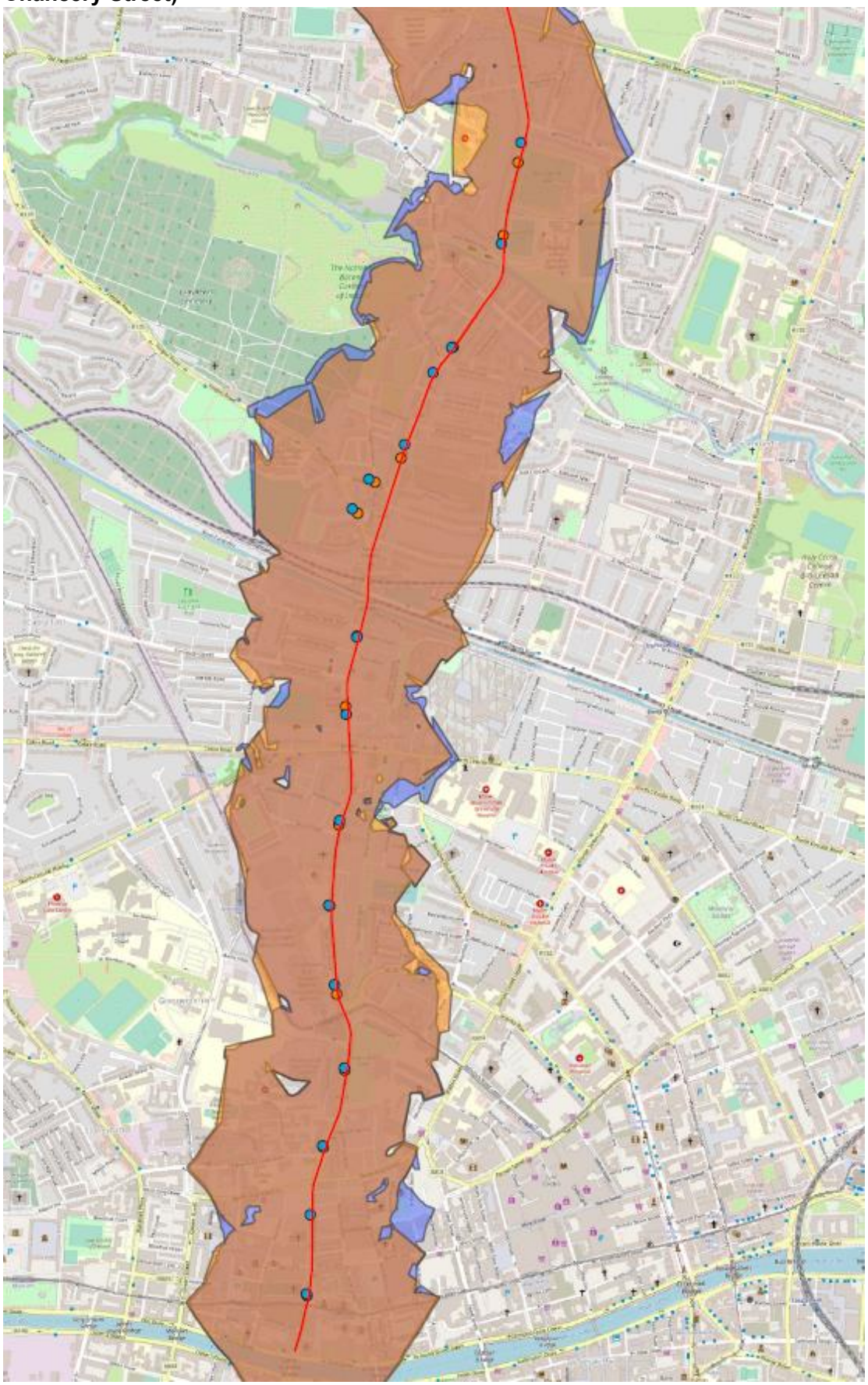


APPENDIX C
OVERLAP MAP

Ballymun 5-minute walking Catchment Outbound (Between St Margaret's Road and Griffith Avenue)

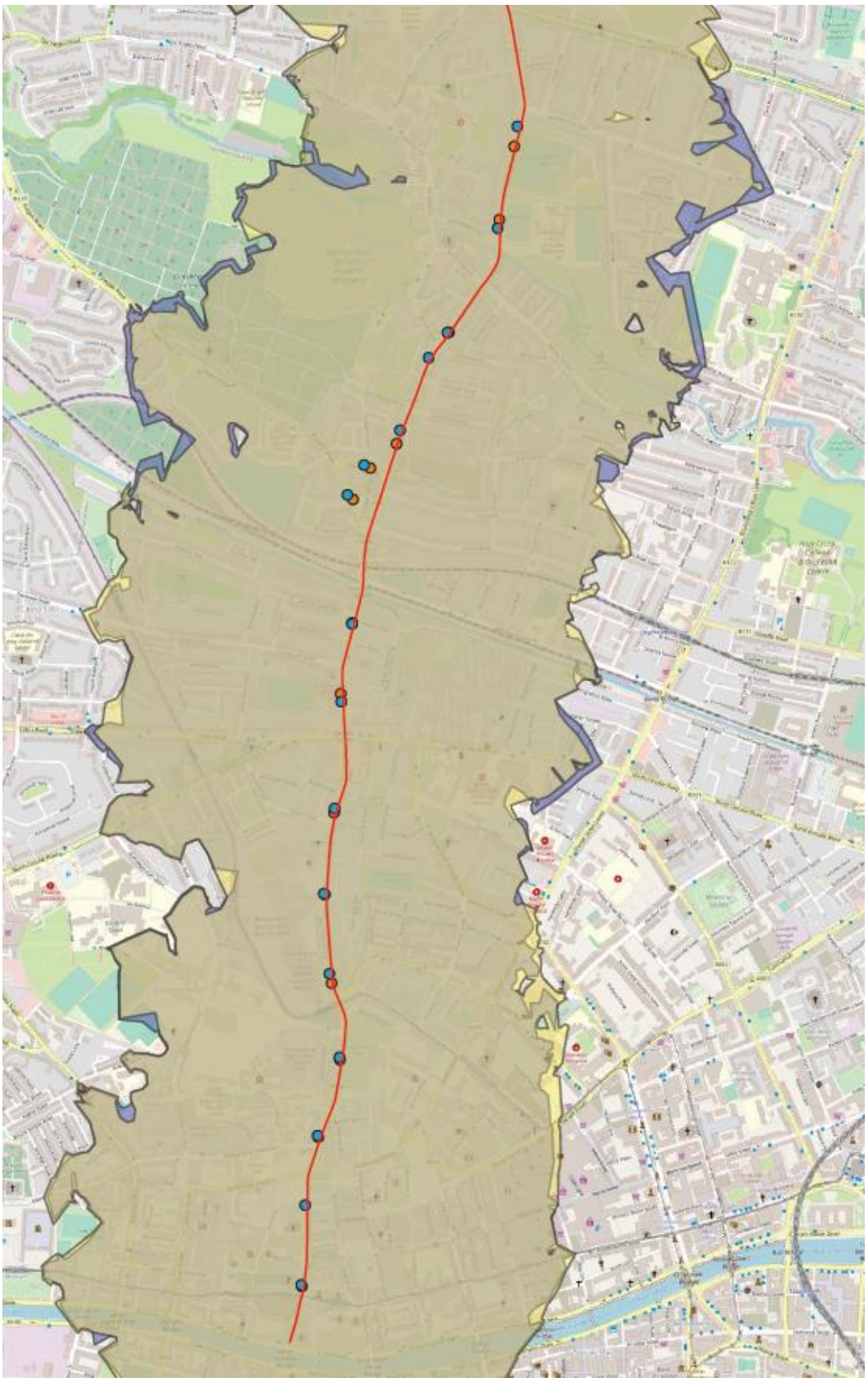


Ballymun 5-minute walking Catchment Outbound (Between Griffith Avenue and Chancery Street)

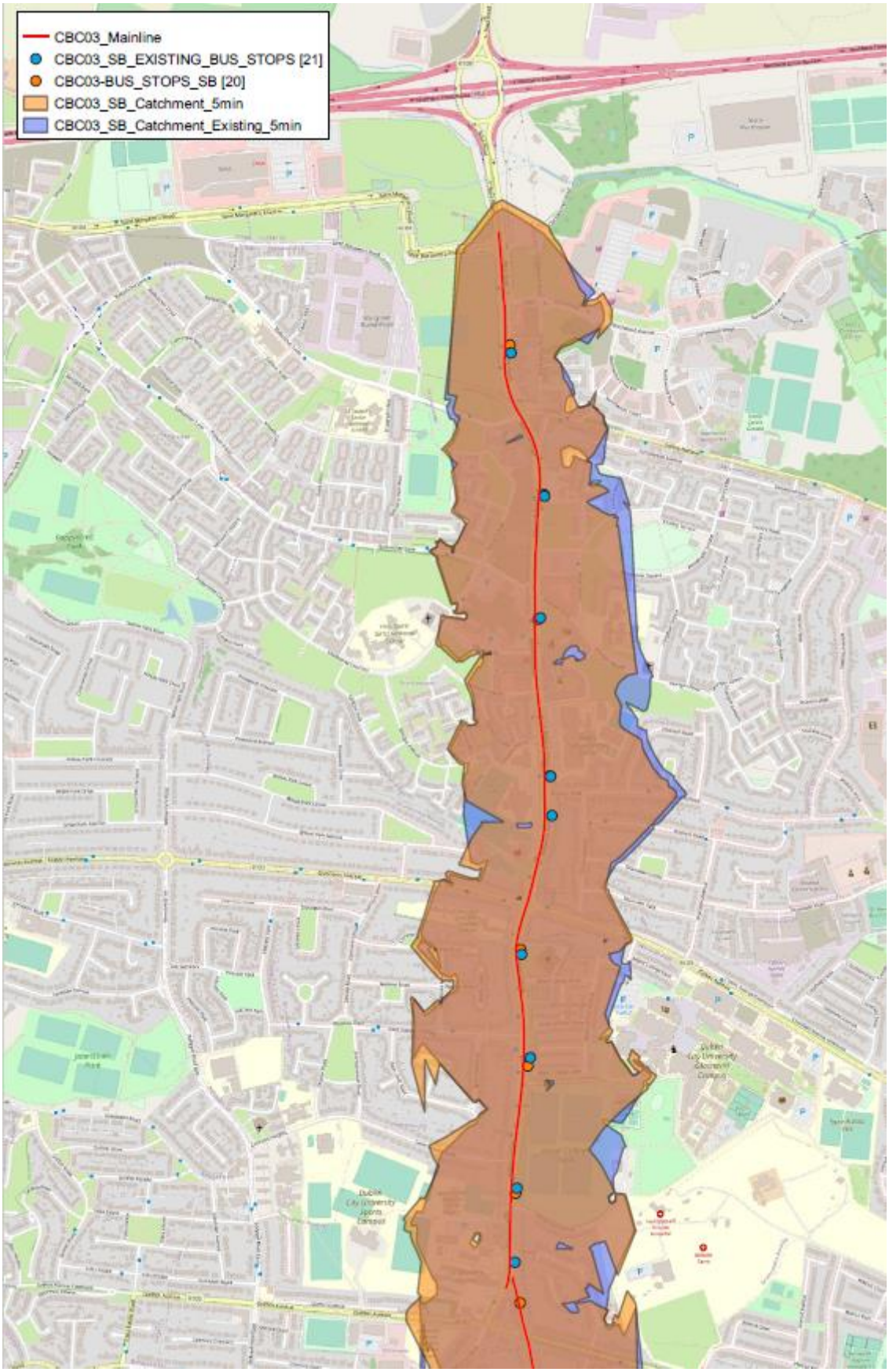


Ballymun 10-minute walking Catchment Outbound (Between St Margaret's Road and Griffith Avenue)

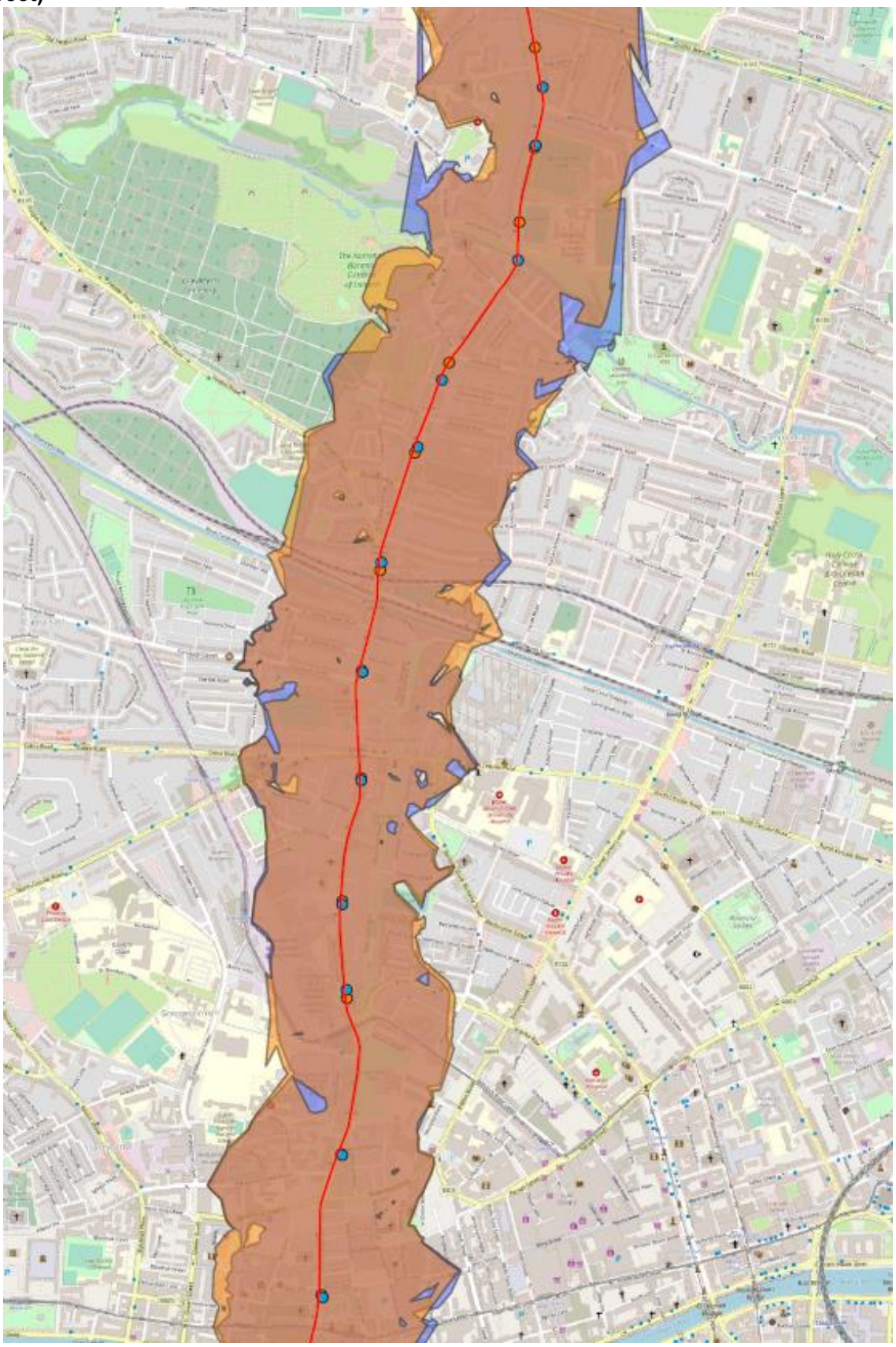
Ballymun 10-minute walking Catchment Outbound (Between Griffith Avenue and Chancery Street)



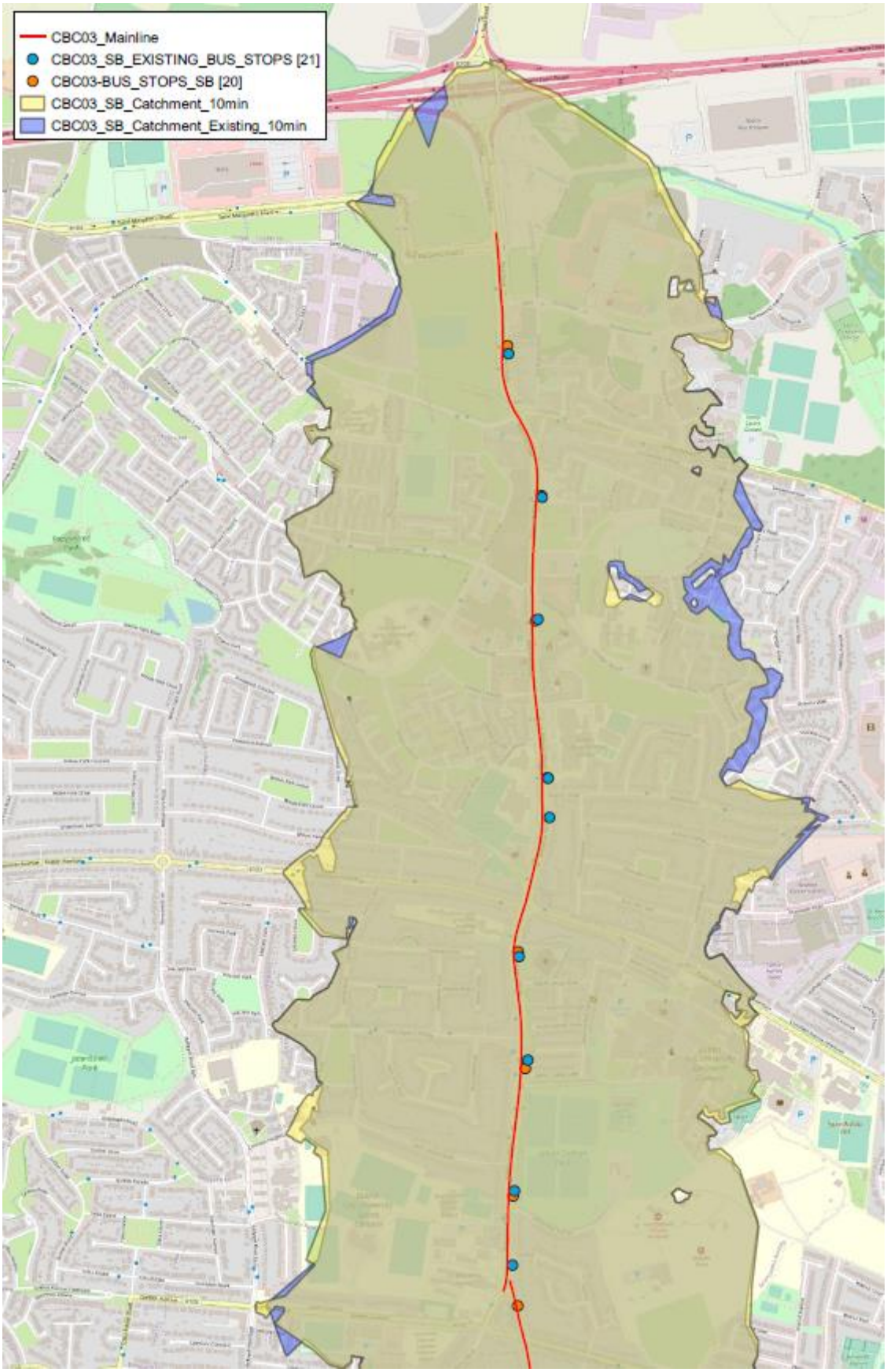
Ballymun 5-minute walking Catchment Inbound (Between St Margaret's Road and Griffith Avenue)



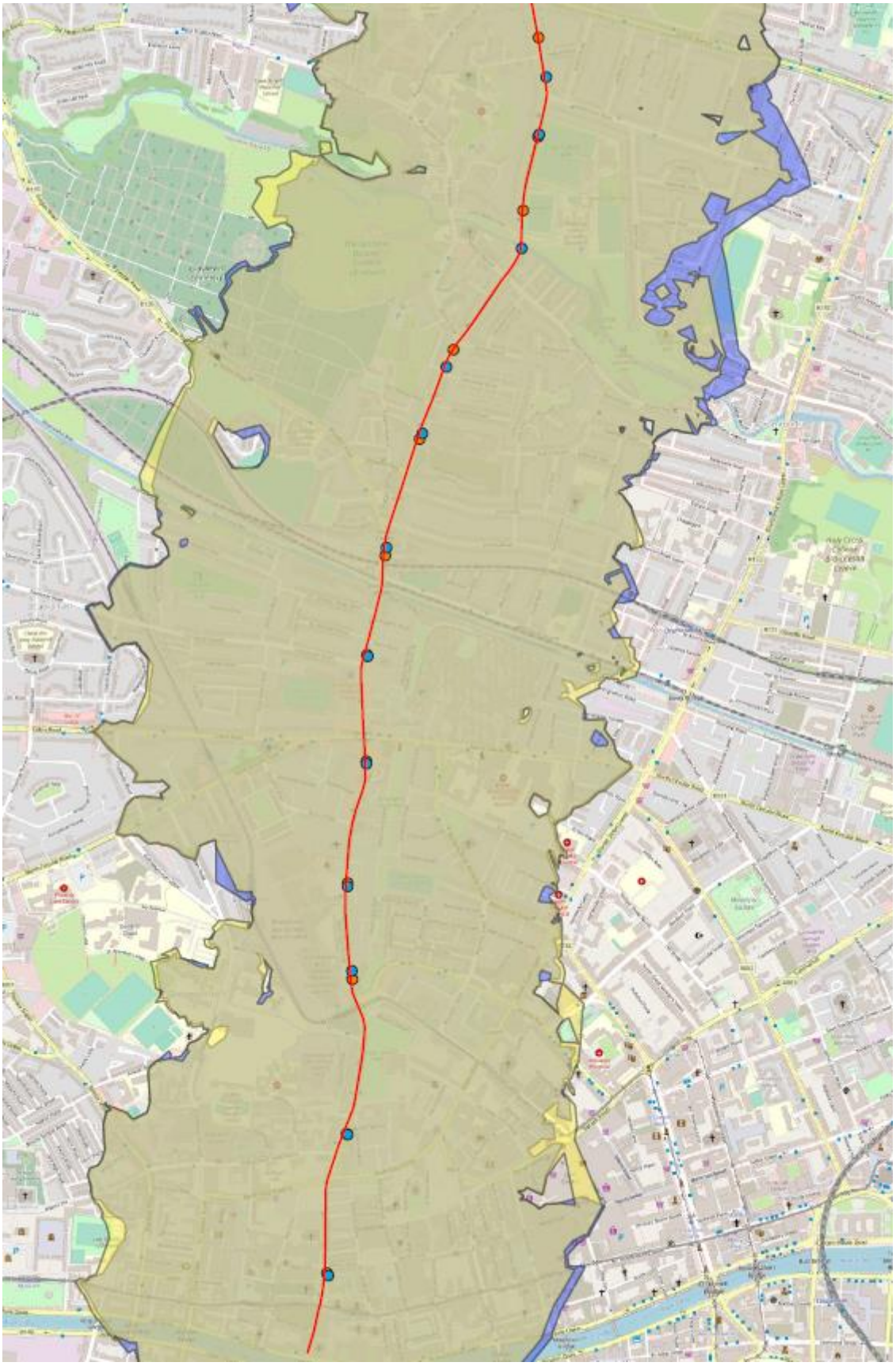
Ballymun 5-minute walking Catchment Inbound (Between Griffith Avenue and Chancery Street)



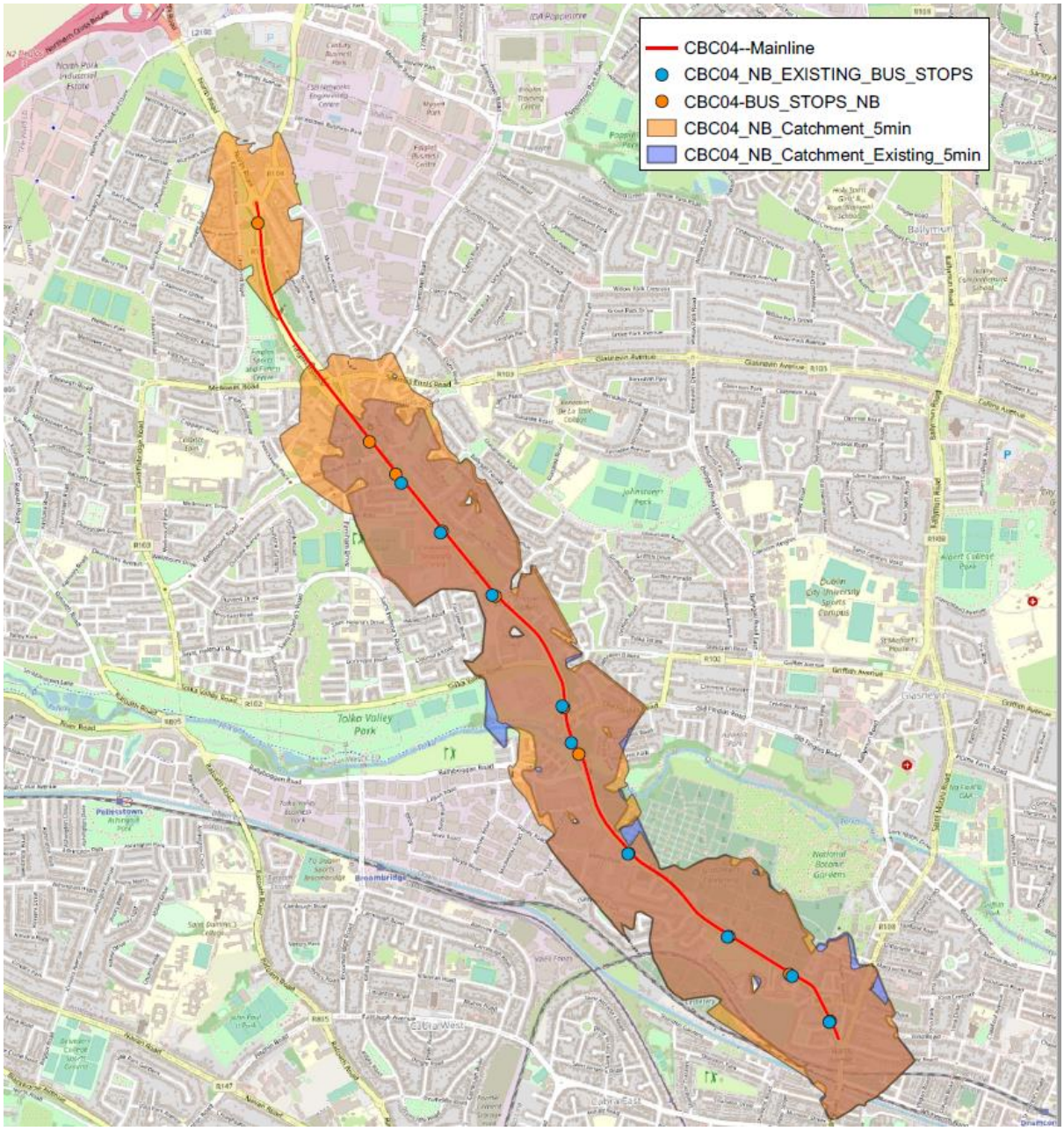
Ballymun 10-minute walking Catchment Inbound (Between St Margaret's Road and Griffith Avenue)



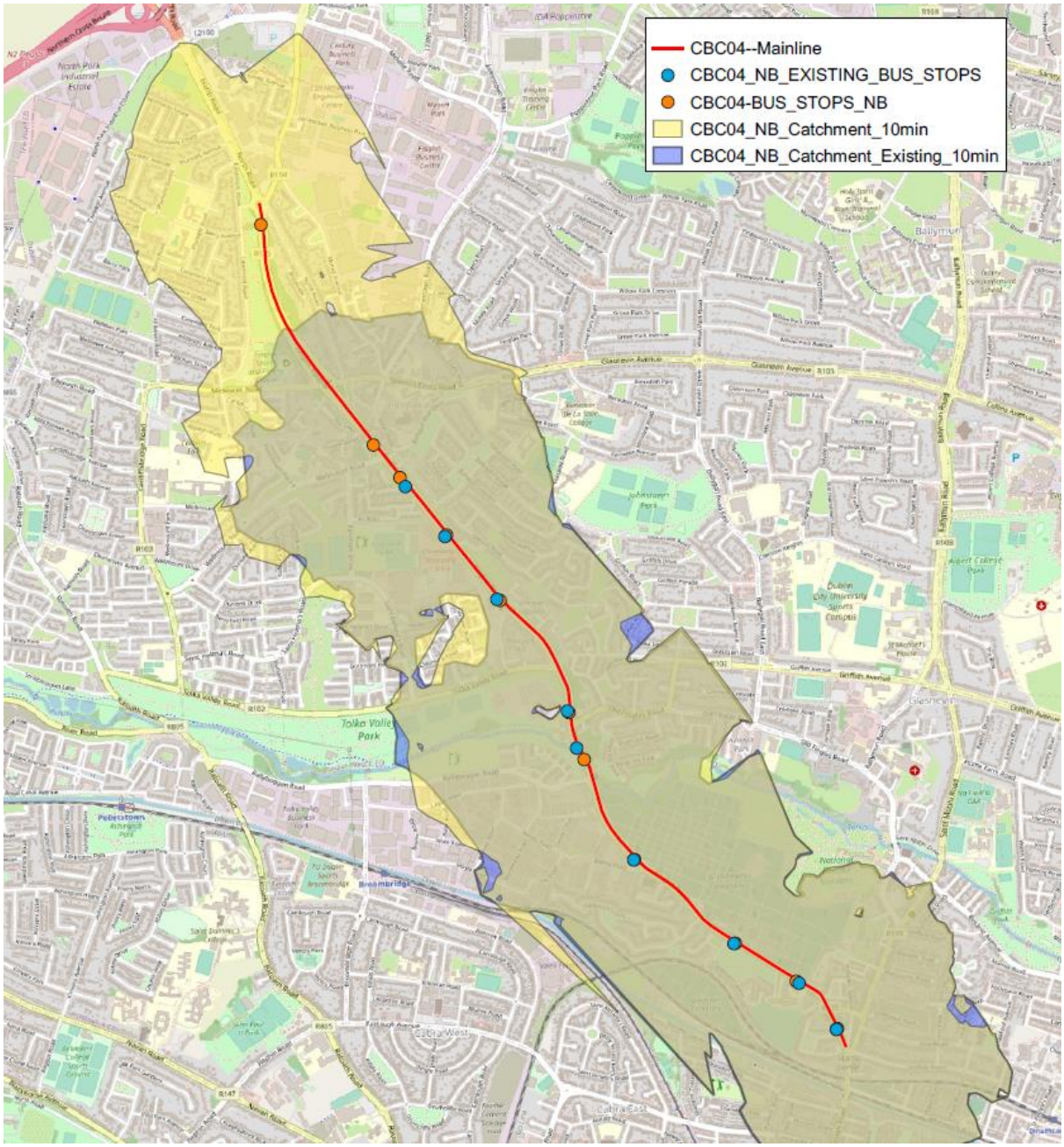
Ballymun 10-minute walking Catchment Inbound (Between Griffith Avenue and Chancery Street)



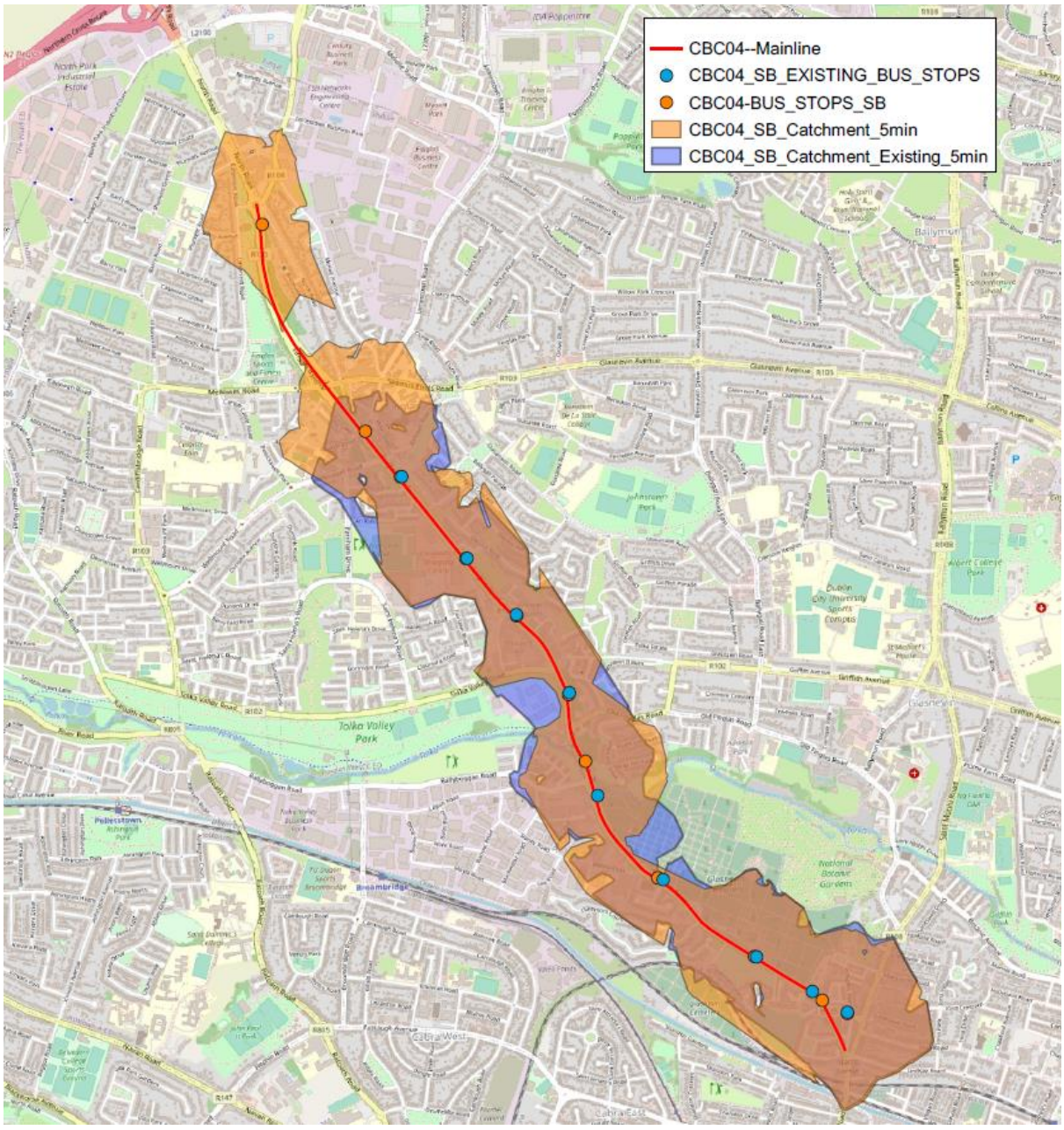
Finglas 5-minute walking Catchment Outbound



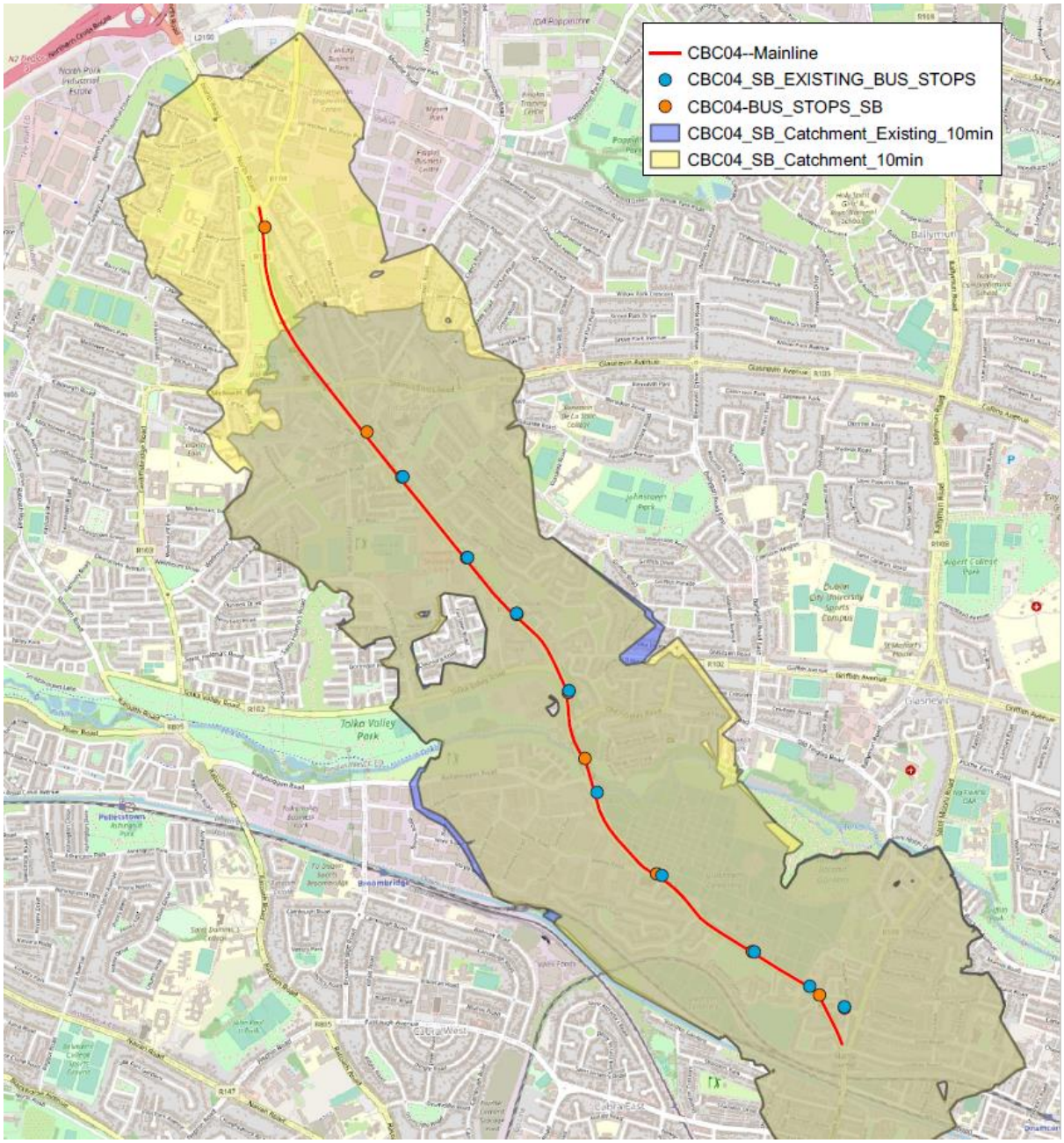
Finglas 10-minute walking Catchment Outbound



Finglas 5-minute walking Catchment Inbound



Finglas 10-minute walking Catchment Inbound



APPENDIX D
BUS STOP REVIEW METHODOLOGY

Bus Stop Review Methodology (REV 3)

Project name	Date	Prepared by
Bus Connects Core Bus Corridor	21 June 2020	Joe Seymour - AECOM

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.

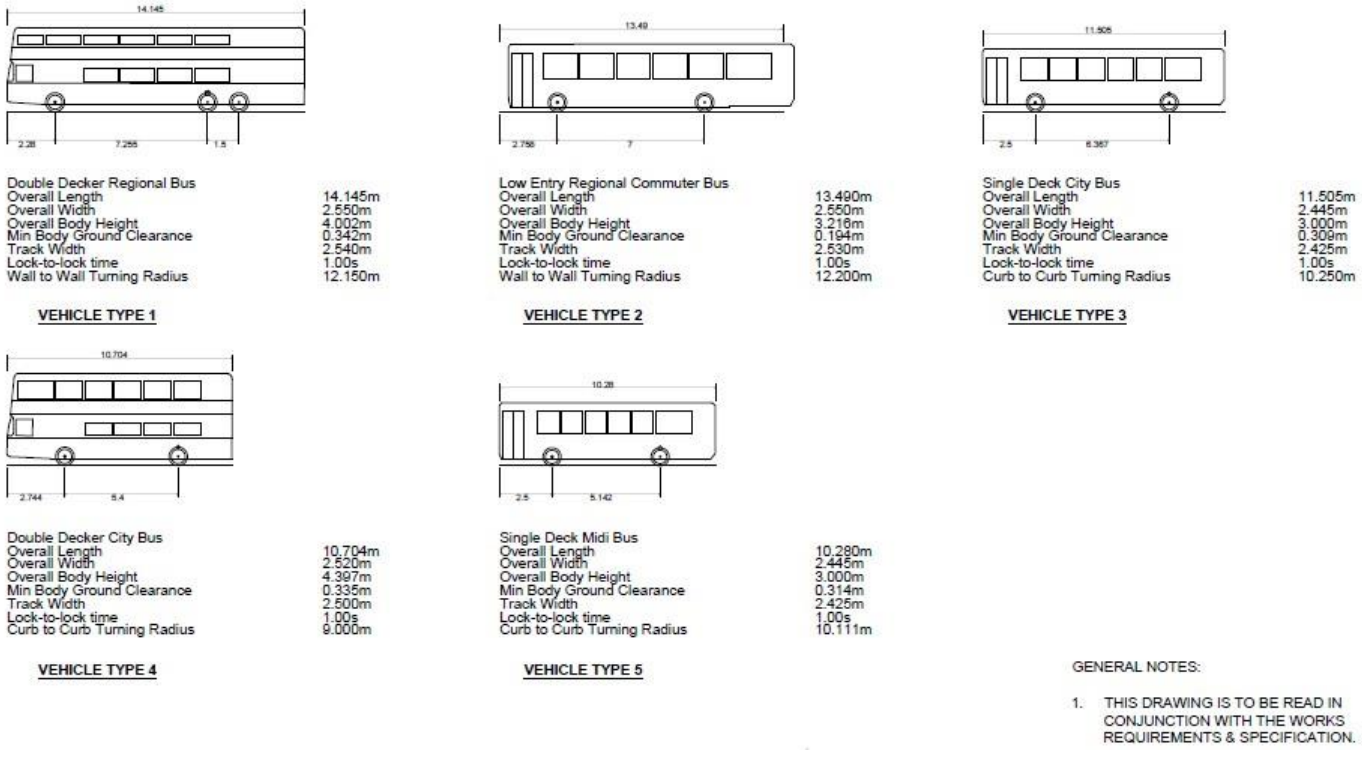


Figure 1.3 Standard Transport for Ireland Bus Specifications.

Considerations for Bus Stop Locations

The basic criteria for consideration when locating a bus stop:

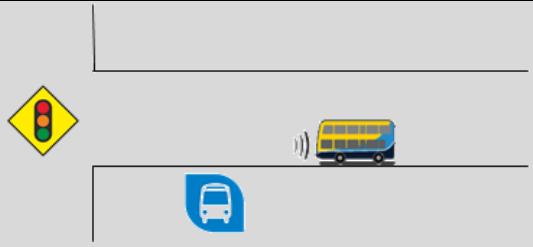
- Driver and waiting passengers are clearly visible to each other;
- Located close to key local facilities;
- Located close to main junctions without affecting road safety or junction operation;
- Located to minimise walking distance between interchange stops;
- Where there is space for a bus shelter;
- 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.

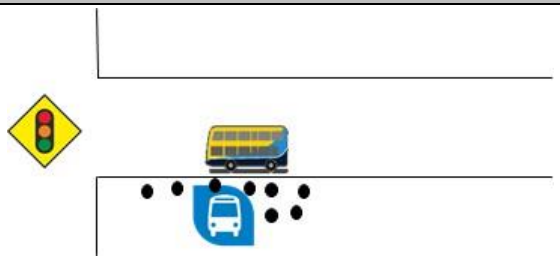
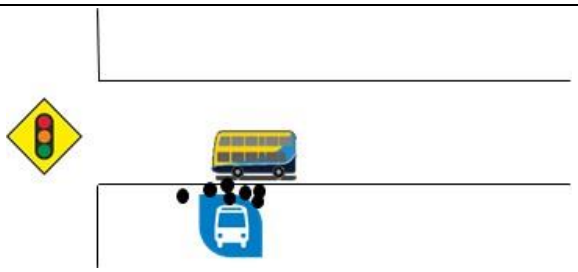
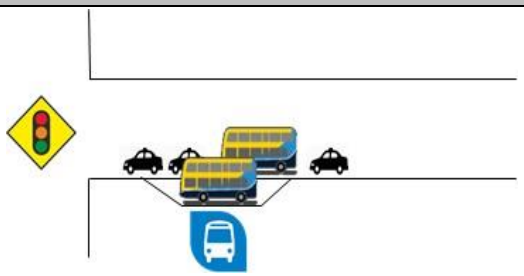
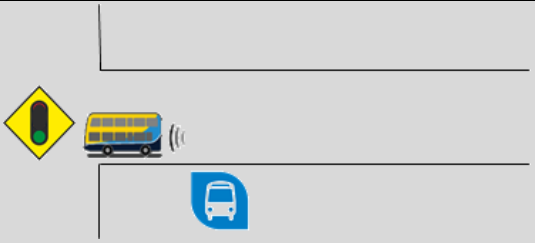
Principals of Bus Stop on high capacity Bus Systems.

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.

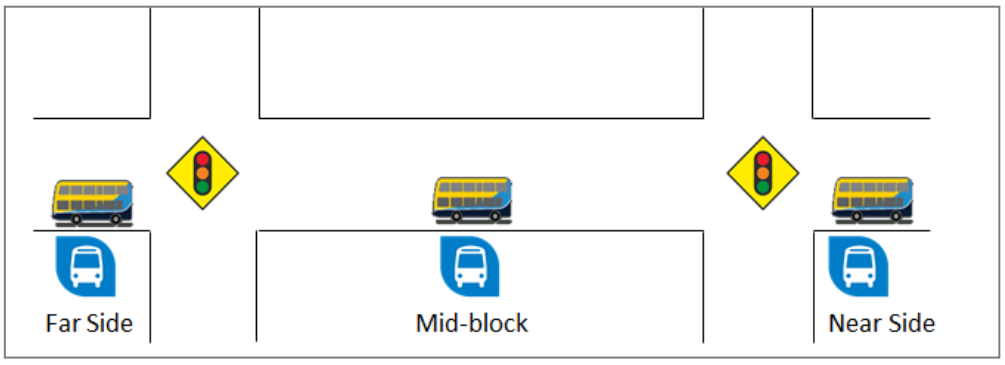


Figure 1.4 Typical Location of Bus Stops.

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).

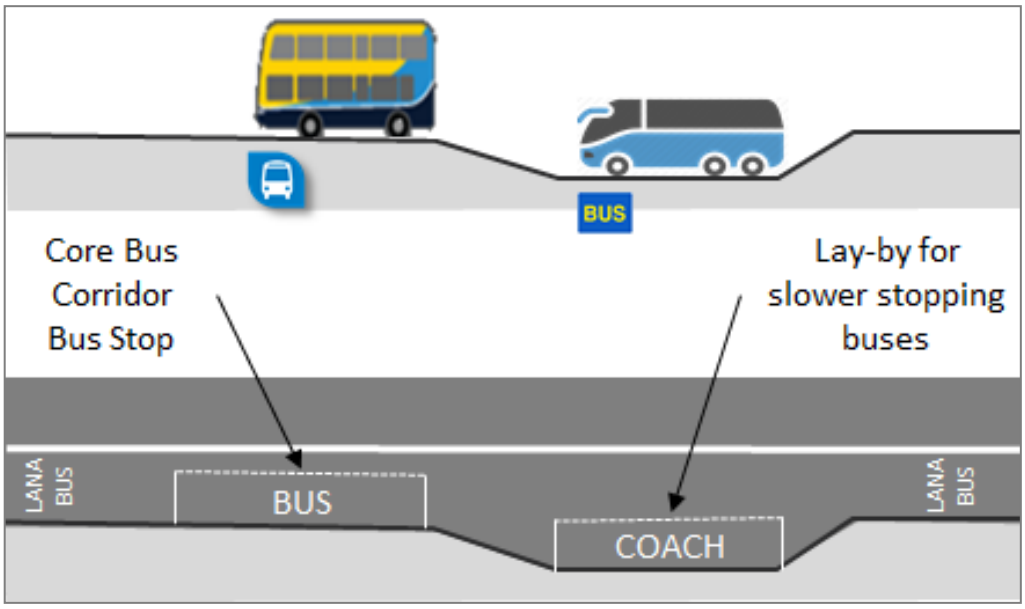


Figure 1.7 Double Bus Stop (in-line for BusConnects routes) concept for locations with buses requiring different dwell times.

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.

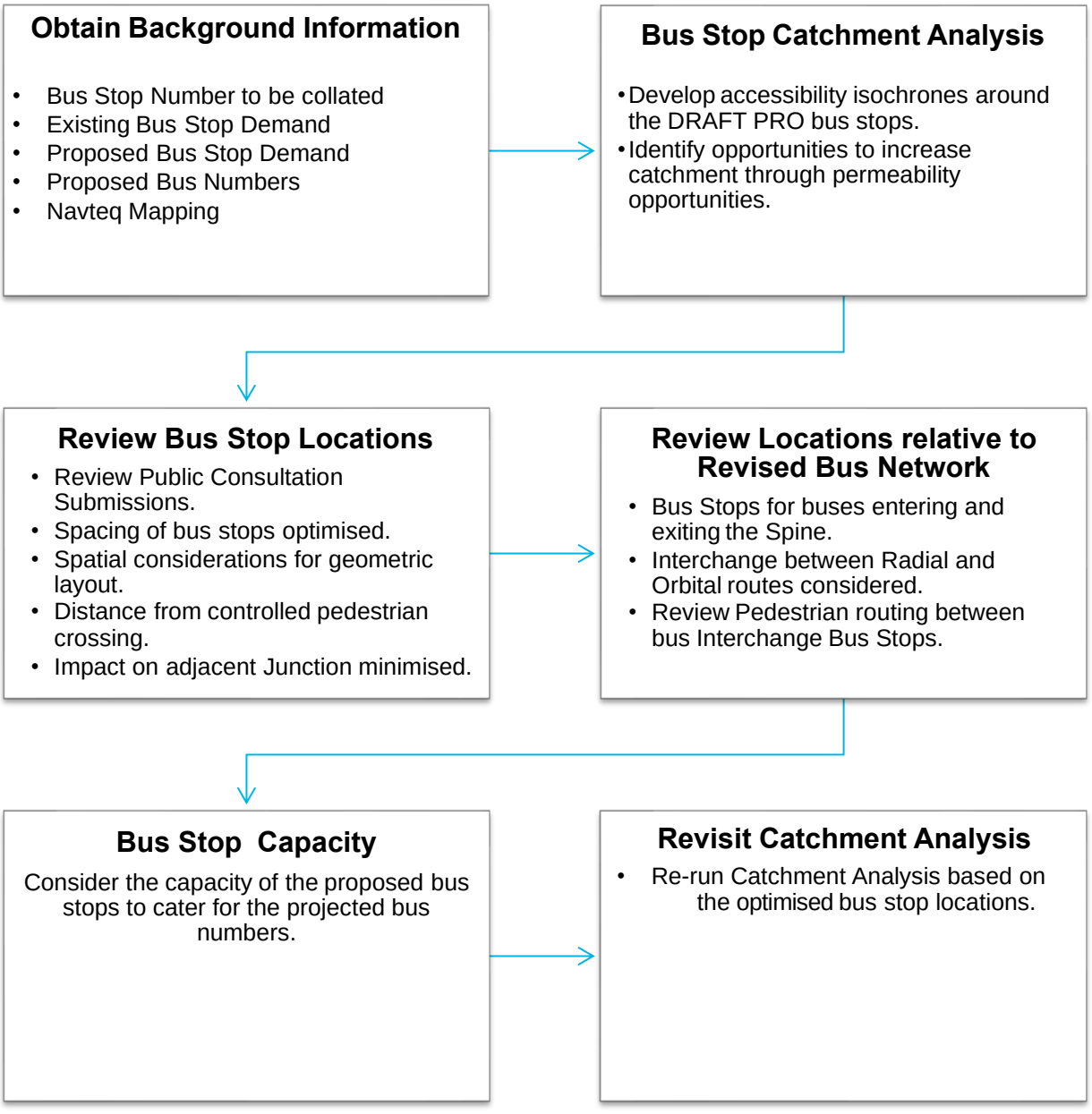


Figure 2.1 Flow Chart for proposed Bus Stop Review.

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.

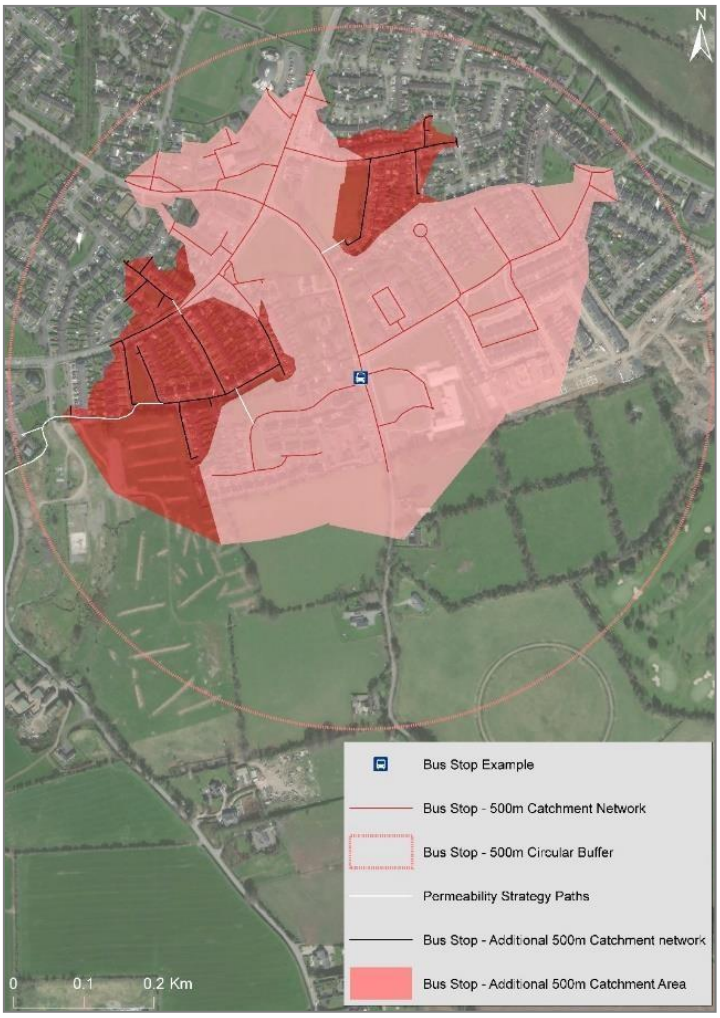


Figure 4.1 Passenger catchment analysis for a bus stop indicating the existing and possible catchment areas assuming permeability improvements can be undertaken.

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.

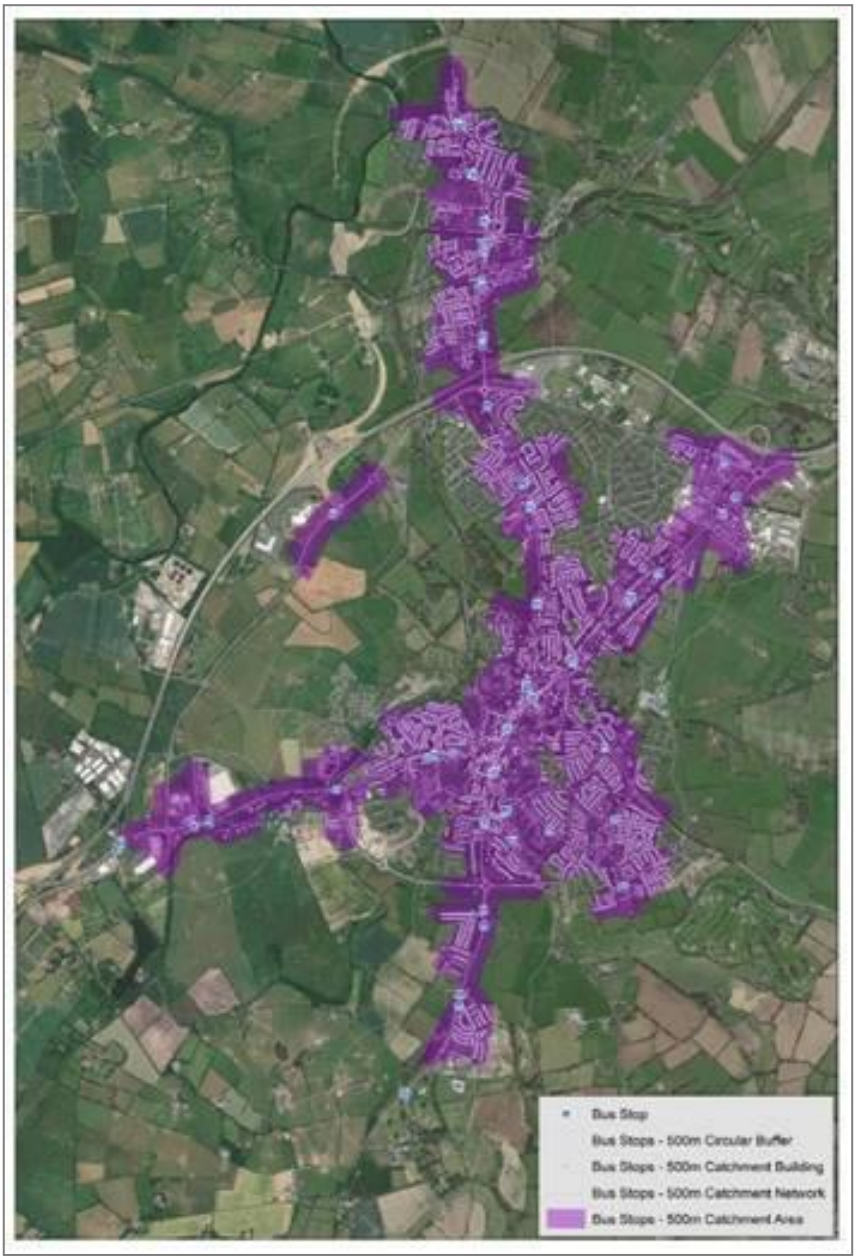


Figure 4.3 Example of catchment analysis run for all bus stops in Naas

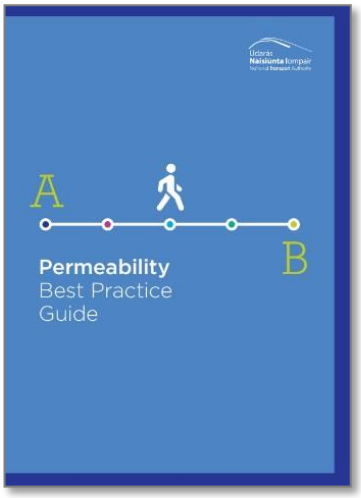
Task 3: Production of catchment tables identifying number of households using Geo Directory or population estimate using census 2016 and Geo Directory to apportion sections of Census Small Area within 400m and 800m catchments of each bus stop. Catchments will be non-overlapping to avoid double counting 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 5.1) 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. [Standard Detail in Development (21/6/20) which may change these dimensions, Rev 4 will include updated information].

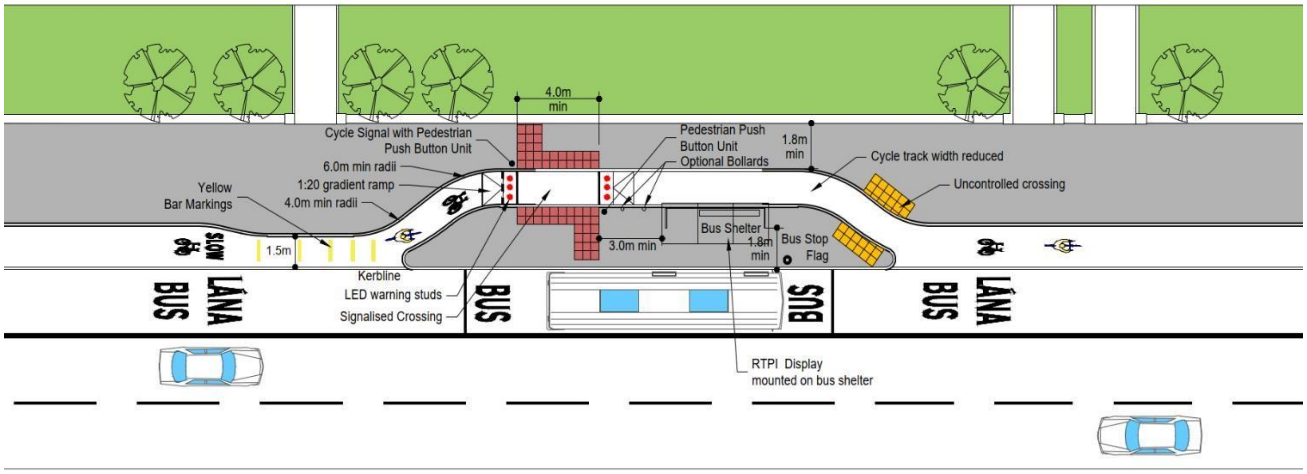


Figure 5.1 Typical Island Bus Stop Arrangement (Bus Connects Design Guideline).

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

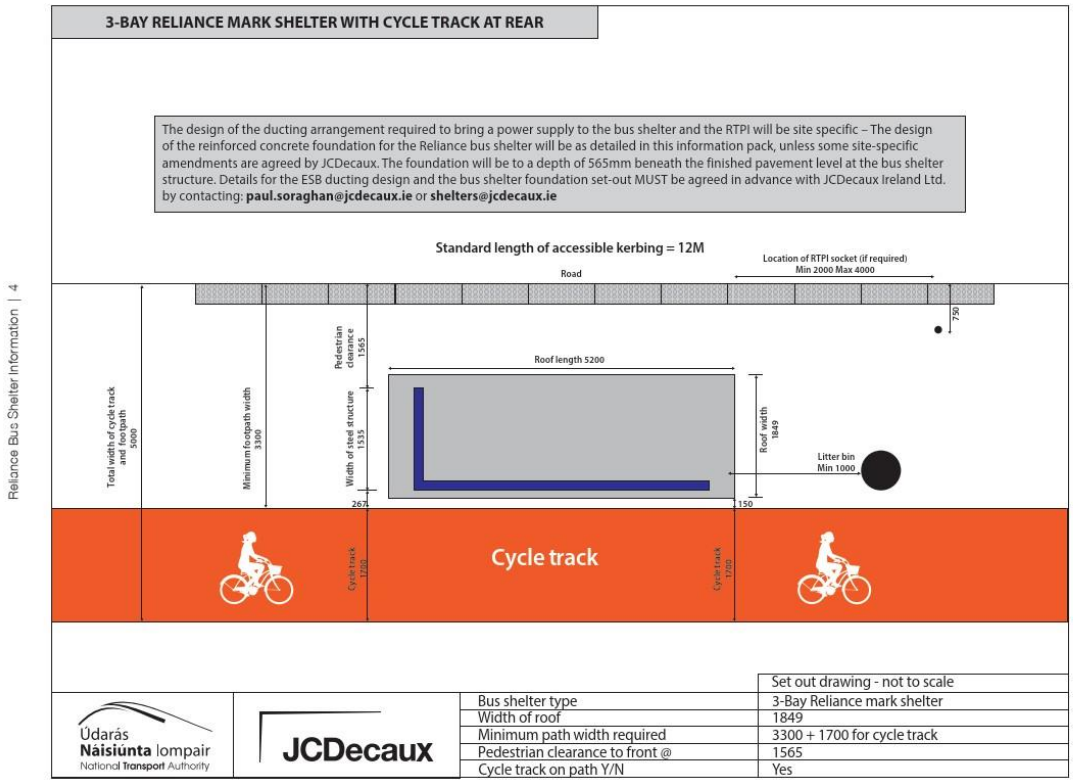


Figure 5.3 Standard layout for a 3 Bay Reliance Mark Shelter with full width advertising panel and cycle lane to the rear (note cycle lane width is to be determined by designers).

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).

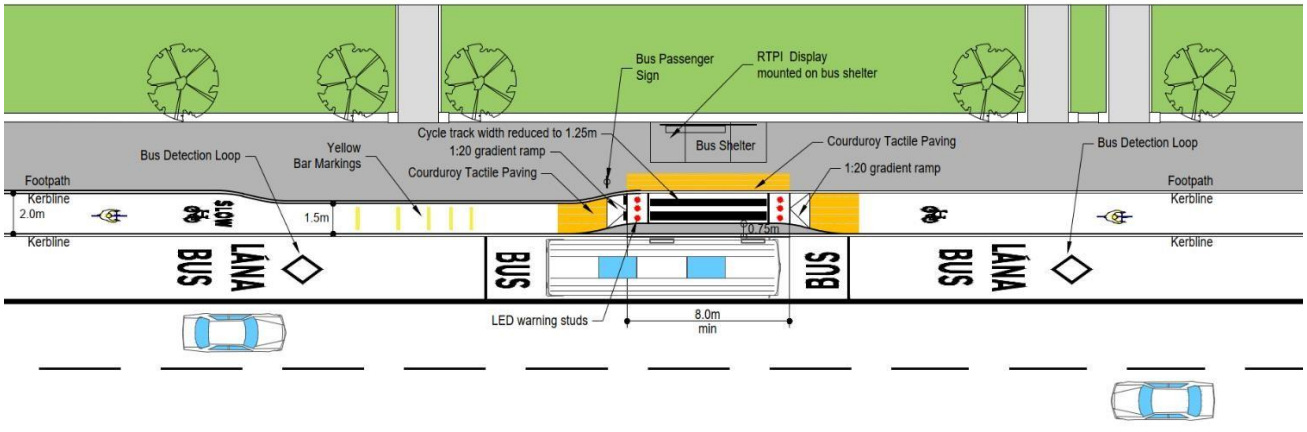


Figure 5.4 Shared Bus Stop Landing Zone Arrangement (Bus Connects Design Guideline).

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 the optimum location in terms of the operation of a corridor a near-side bus stop may still be appropriate when 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.

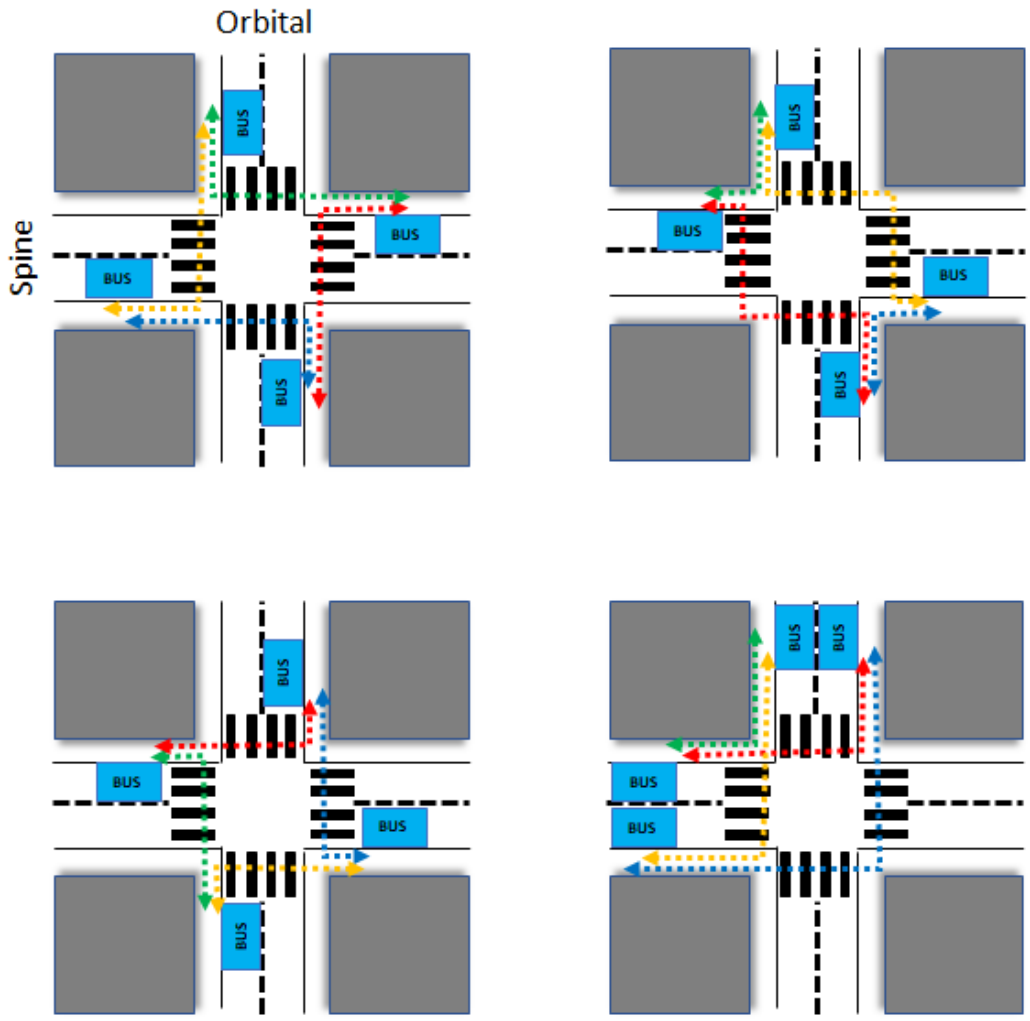


Figure 5.8 Bus stop locations and passenger interchange routes between them.

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.

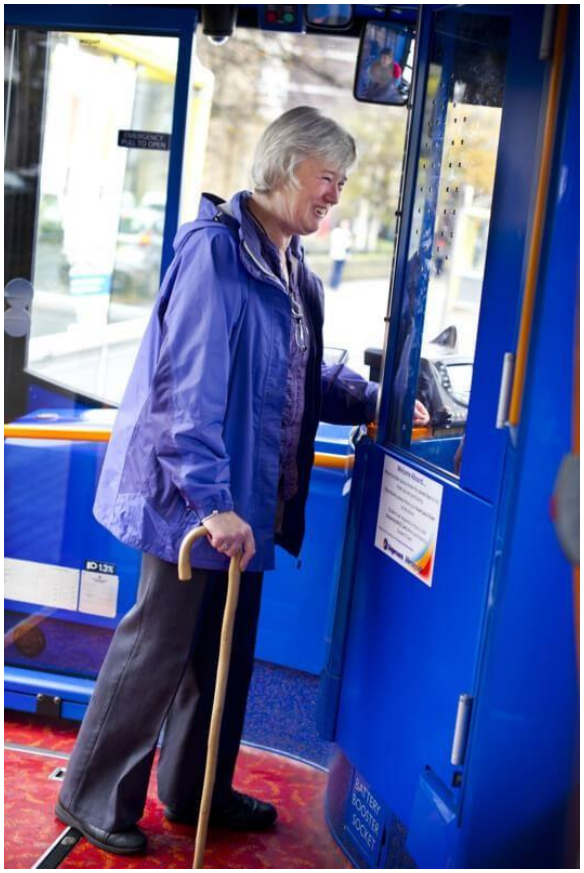


Figure 5.9 Pedestrians using sticks have a limited range of 50m before needing a rest.

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.

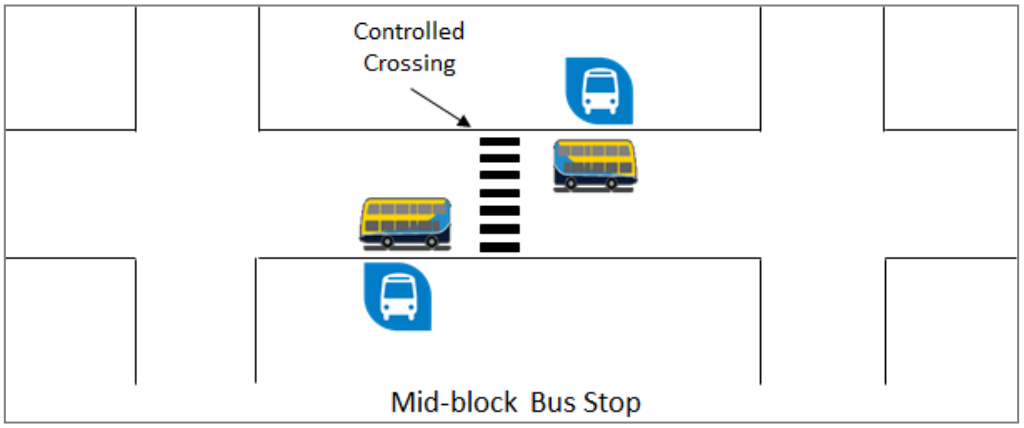


Figure 5.10 Mid-block bus stop optimum layout.

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.

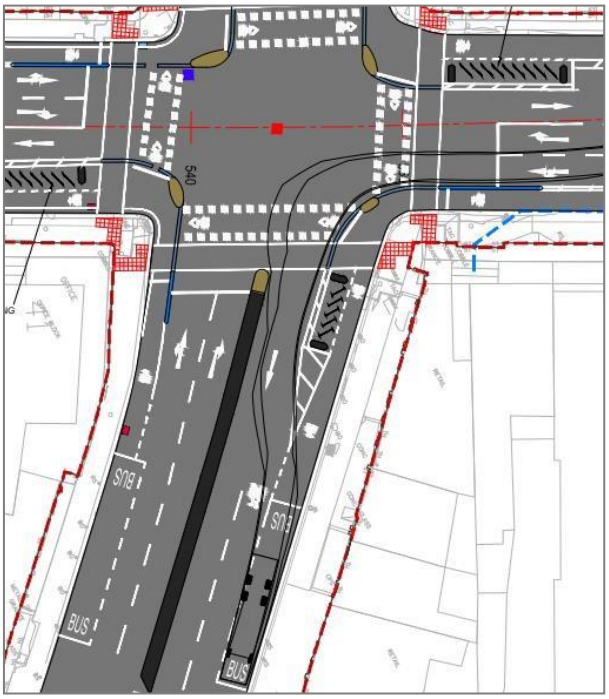


Figure 5.11 Tracking of a turning bus entering a bus stop.

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.

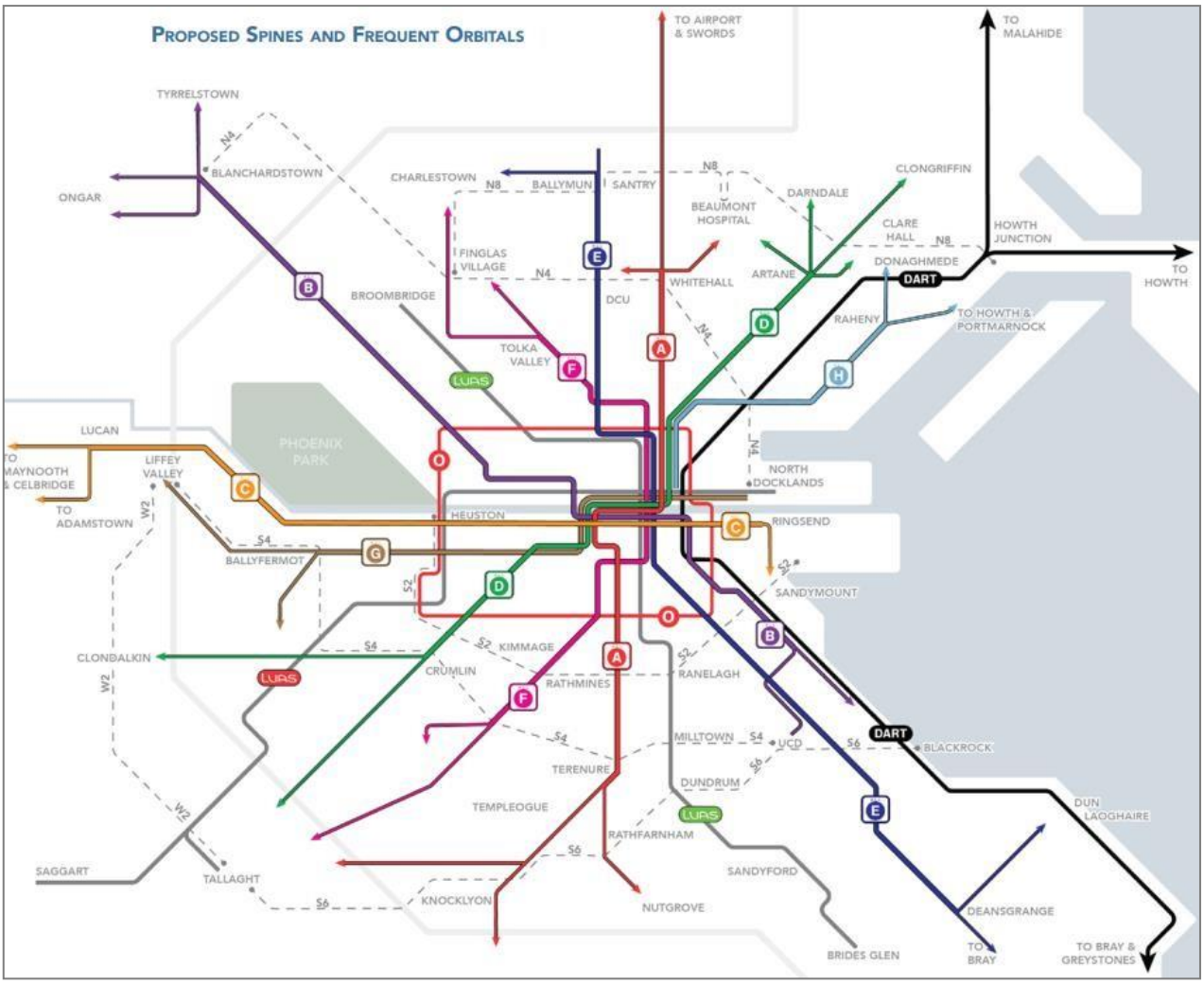


Figure 6.1 Simplified diagram of spines and frequent orbitals in the proposed network

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 another bus stop.

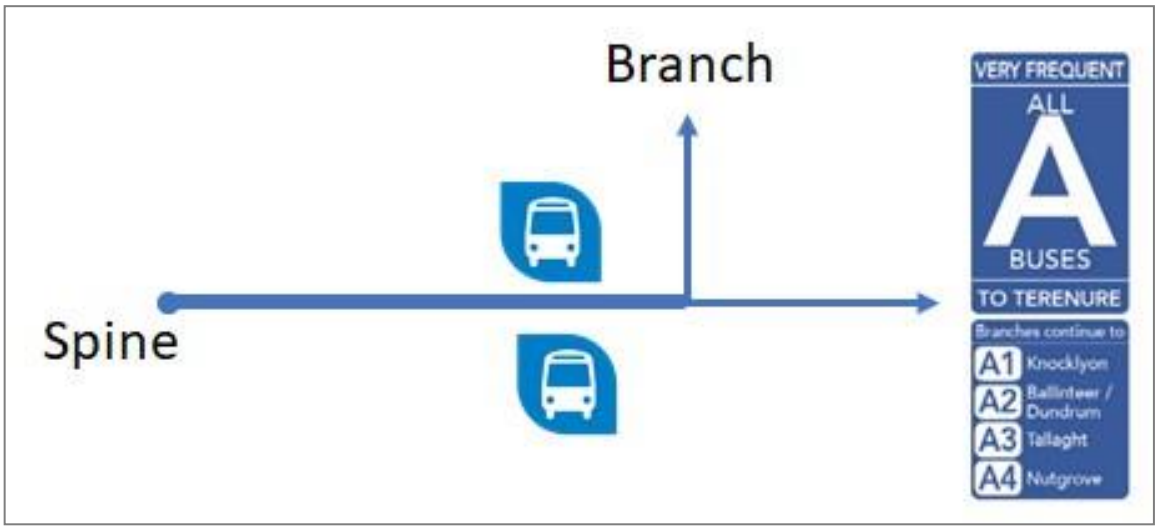


Figure 6.3 Location of Bus Stops Immediately before Branch Route Peels Off Spine

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).

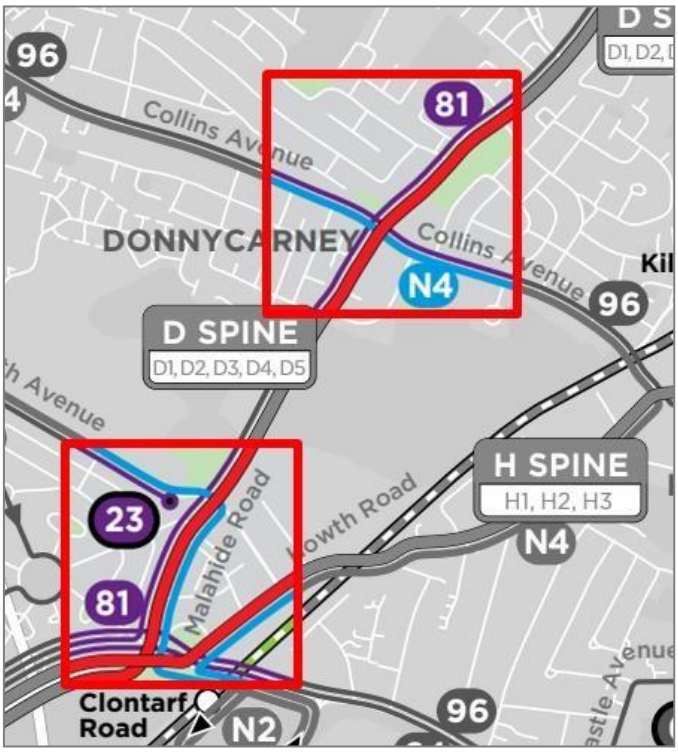


Figure 6.4 Two Different Scenarios for Interchange between orbital and radial corridors.

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 stop should have sufficient space to board and alight two buses at once.

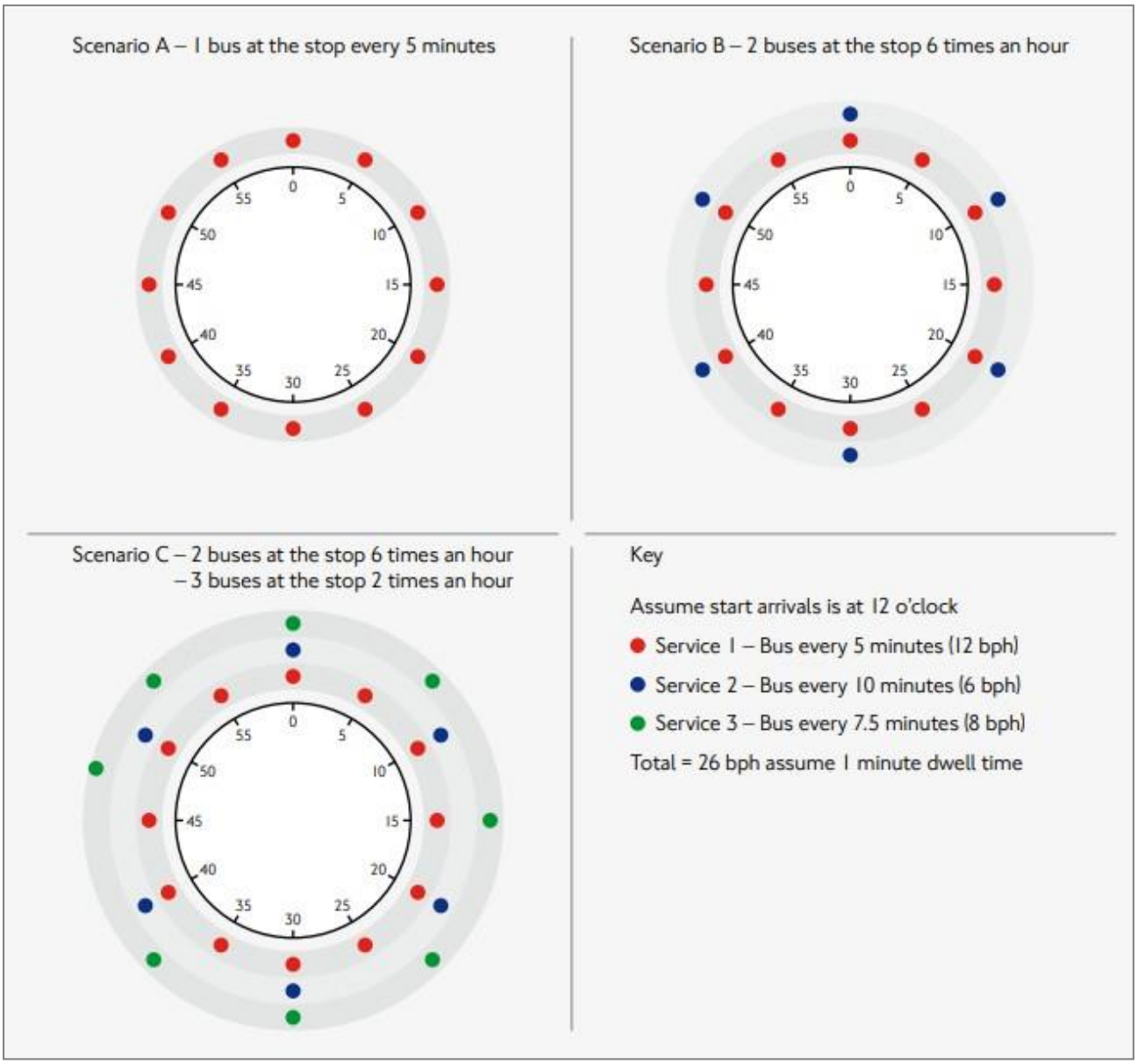


Figure 7.1 Bus Arrival Pattern at a Bus Stop (Source: TFL Bus Stop Design Guidance)

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.

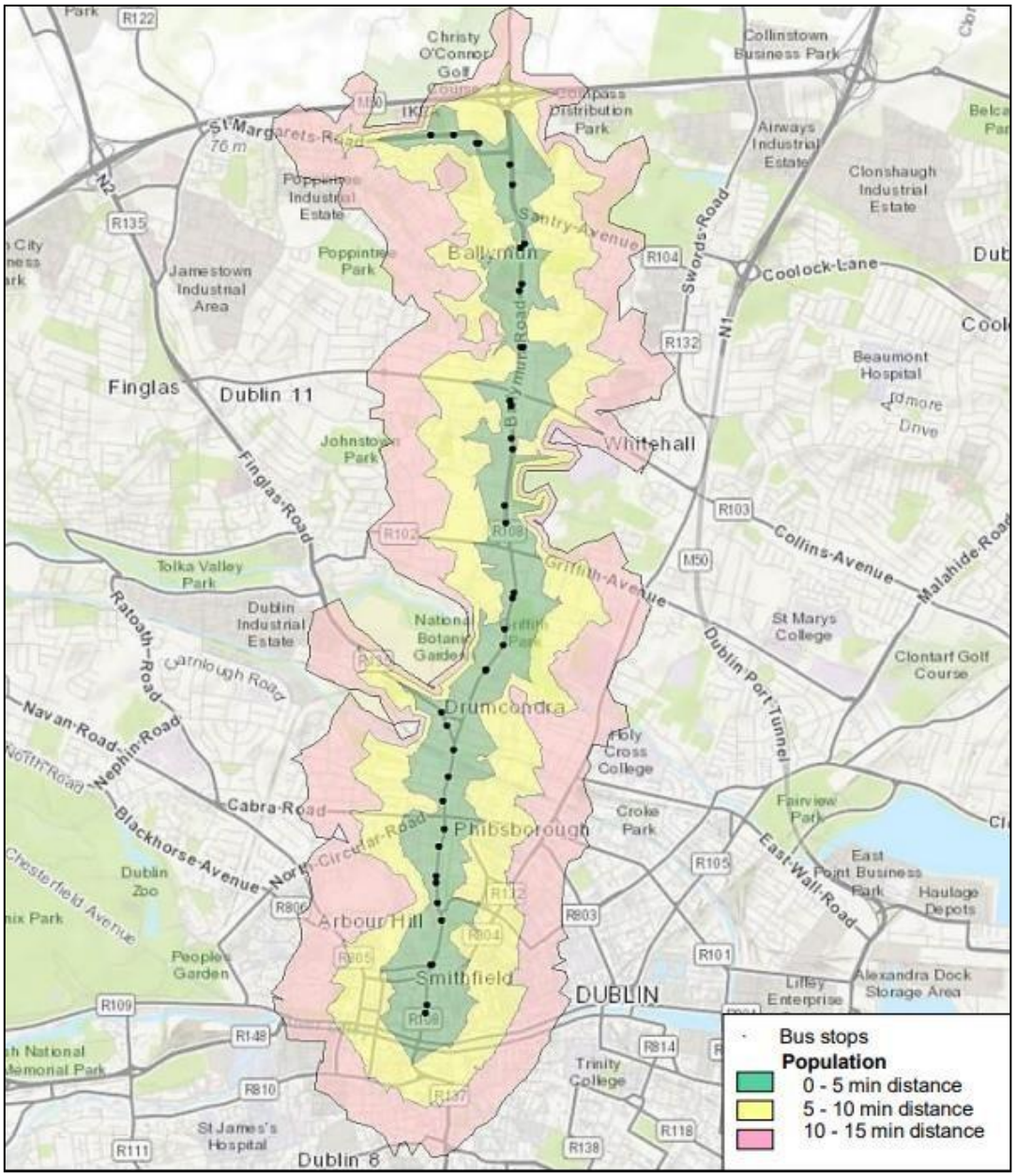


Figure 8.1 Typical map of bus corridor catchment areas

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).

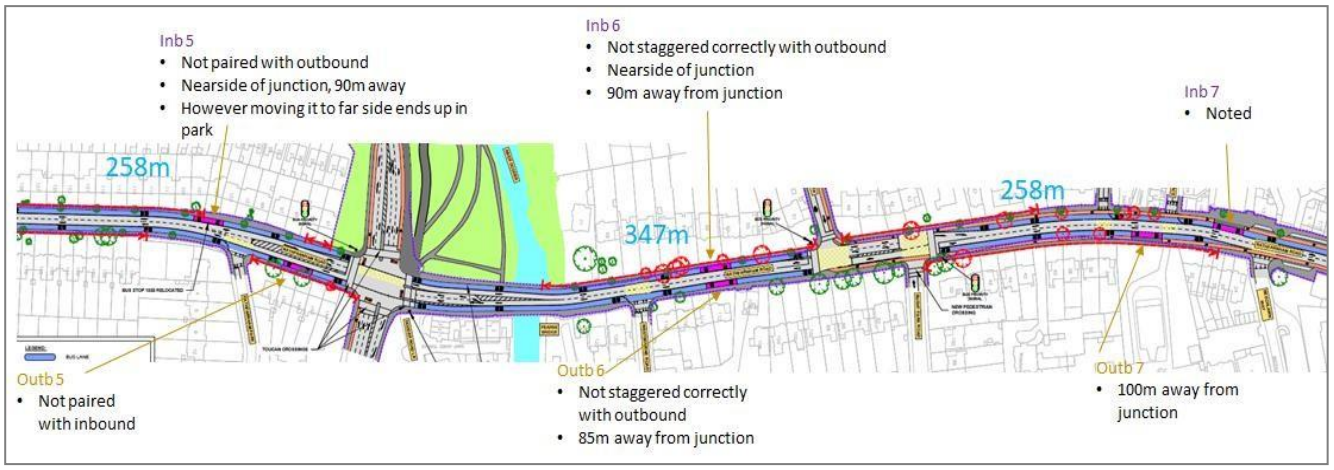


Figure 8.2 Example Review of Bus Stop Locations (Source: ARUP, Rathfarnham CBC).

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.

Revision History

Revision	Revision date	Details	Authorised	Name	Position
DRAFT 1	25 May 2020	Issued for Comment	JSY	Joe Seymour	Director
DRAFT 2	26 May 2020	Issued for Comment	JSY	Joe Seymour	Director
DRAFT 3	21 June 2020	Issued to ED's	JSY	Joe Seymour	Director