Clontarf to City Centre Project
Bus Stop Spacing

City Engineer: Dr. John W. Flanagan,
Dublin City Council,
Civic Offices,
Wood Quay,
Dublin 8.

Active Travel Programme Office
Environment & Transportation Department,
Civic Offices,
Wood Quay,
Dublin 8.
Tel: (01) 2222222

Table of Contents

Figures

Tables

Revision	Prepared By	Reviewed By	Approved By	Issue Date
	VC	ROD	CM	1/12/2022

Bus stop spacing for the Clontarf to City Centre (C2CC) Project

1. Introduction

This report is intended to give some background to the planning, the design process, the consultation, and the decision making process relating to the current bus stop spacing for the Clontarf to City Centre Project. The necessity to examine in detail the bus stop layout came into focus when the requirement to segregate the bus lane and cycle track at bus stops arose during the 2017 Planning and Public Consultation process. Design proposals were discussed and agreed with a Consultative Committee of elected Councillors, representatives of residents groups, businesses and stakeholders during the years of 2018 and 2019, and were finally published on the City Council webpage in early 2021. This lengthy process led to the C2CC Project obtaining final approval from the Board of the National Transport Authority in late 2021, thus facilitating the signing of a Contract with a major civil works Contractor.

Whilst some rationalisation of the bus stops has subsequently occurred, the reorganisation of bus stops is intended to provide for a significantly faster and more reliable bus service in both directions, while ensuring that all bus stops are located within a 3-5 min walking catchment of the local community. The bus stop platform, or 'island' will also be of a higher quality and standard, thus improving the passenger experience while boarding, alighting and waiting for a bus. In combination with the rollout of the BusConnects Service plan, rationalising the bus stop spacing and enhancing the design of the rationalised bus stops will create a step change in quality of service and reliability for buses along this corridor.

Page 23 of this report contains photographs of three of these new 'island' bus stops, two of which have been opened to the public with the third still under construction

2. The current bus stops spacing

Currently there are 16 bus routes in operation along the C2CC scheme. There are 10 inbound bus stops and 10 outbound bus stops along the Project area. The existing bus stops are not uniformly spaced, and the spacing between stops varies from 153m to 487m. International design guidance and best practice would also suggest that this arrangement is inefficient. The maps in Figure 2.1 and Figure 2.2 and on page 2 indicated that the existing arrangements are sub-optimal and that the services along the route are therefore operating inefficiently. This is the inevitable result of the gradual evolution of the bus service and bus stop networks over time. This has created an inherently inefficient bus service, resulting in longer journey times and poorer journey time reliability for passengers.

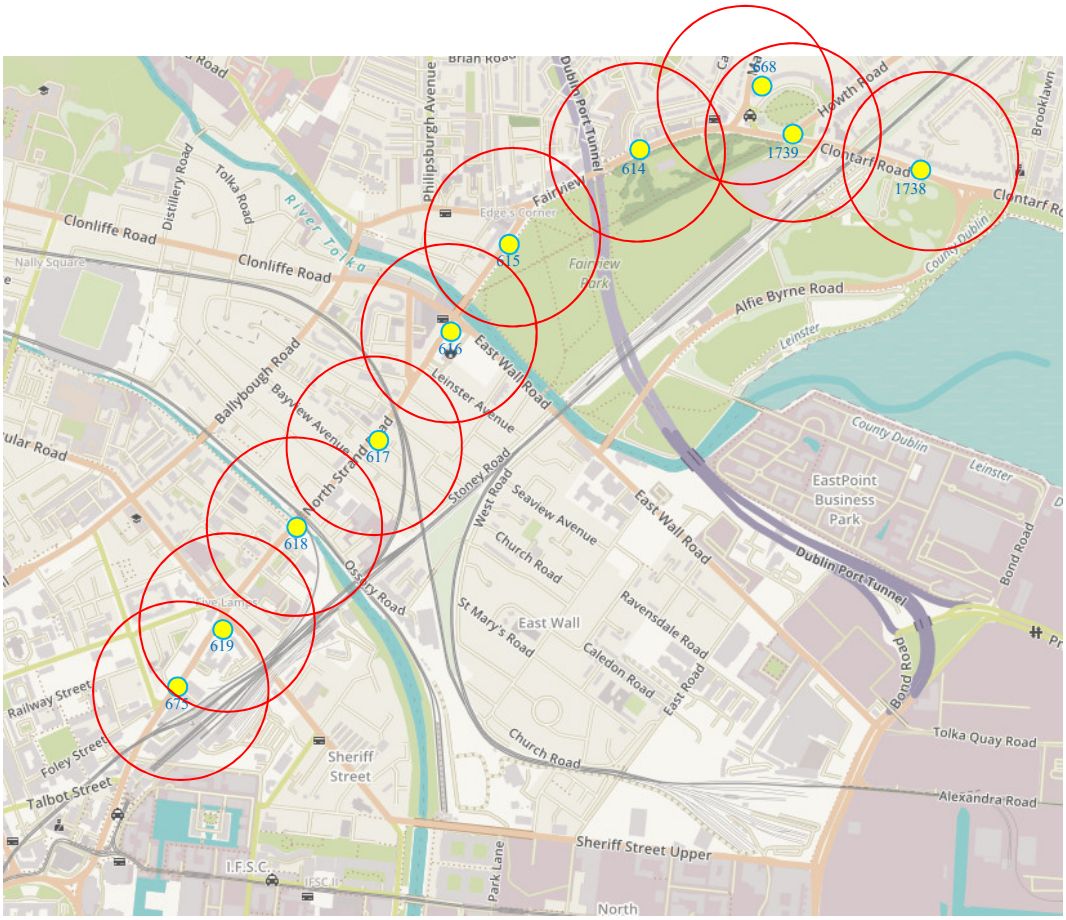


Figure 2.1: Existing Inbound Bus Stops and Catchment Radii

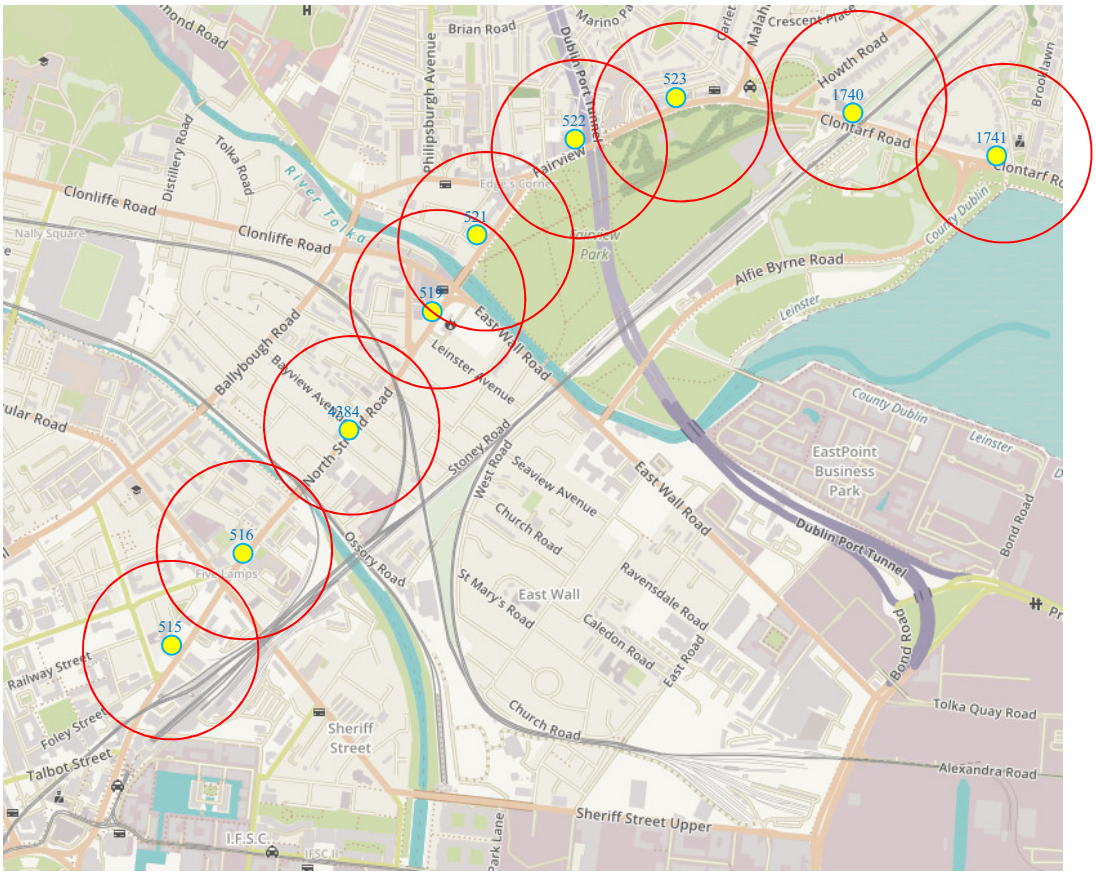


Figure 2.2: Existing Outbound Bus Stops and Catchment Radii

3. Rationale for the optimisation of Bus Stop Spacing

Improving bus stop spacing can benefit all bus service stakeholders, and will help to maintain an equal frequency of bus services along this major bus transit corridor. Design guidelines suggest that following this approach can achieve benefits such as:

- Increased bus reliability
- Reduced bus journey times
- Reduced operator costs

Rationalising the spacing between bus stops has the effect of reducing and standardising bus dwell times. Concentrating passengers at fewer stops improves boarding times over the course of the route and passenger loads become more predictable. Increased service predictability improves schedule adherence and, ideally, reliability of service (World Conference on Transport Research, 2013). Optimising bus stop locations reduces acceleration and deceleration requirements for buses and helps to economise fuel consumption, thus reducing carbon emissions. Maintenance costs for bus stops are also reduced.

Research has indicated that the optimal balance between bus stop frequency and pedestrian walking time to stops is between 400m and 800m to access public services such as bus stops (NTA Permeability Best Practice, 2015). This leads to an acceptable bus stop spacing of up to 800m. However, Transport for London and other international research suggests that the spacing should be reduced in dense urban areas with high transit patronage, and the C2CC scheme would certainly fall under this category. The recommendation for such scenarios is a catchment radius of about 200m, with a consequent bus stop spacing of approximately 400m. With an average walking time of 5Km per hour, a 200m distance equates to about 2.5 minutes duration.

The design team considered the following issues which included many physical / spacing limitations during the design optimisation of the bus stopping arrangements;

1. Segregation of cyclists and buses – the creation of an 'island' bus stop separates the buses from cyclists, this requires a 2.7m width to create a single bus stop platform which is separate to the footpath.
2. Existing street widths played a significant role in locating enough space for these 2.7m wide island bus stops. For example to the front of James Larkin House additional land was required, resulting in the installation of a significant soil retaining wall.
3. The bus islands are designed to include sufficient waiting/standing area for a greater number of passengers, thus increasing the capacity of individual stops as well as the comfort for waiting or alighting passengers.
4. The length of the bus islands are designed to accommodate two buses

stopping concurrently, where practicable.

5. The requirement to have a fully accessible 160mm high bus kerb, required that the start and end of bus stops be located away from existing entrance / vehicular dishings (i.e. low height kerbs). This is essential for universal access to bus services.
6. Ideally the preferred location for bus stops is downstream of junctions, where they are served by crossing facilities at the junctions, and they won't be delayed by traffic lights when departing a stop. This also improves safety by reducing the probability of a stopped bus obstructing visibility of a traffic signal.
7. Other items played a significant role in the bus stop locations include the requirement to maintain a number of mature trees and parking bays along the route.
8. The largest gap along the route between the proposed bus stops will be 592 metres, which is a 296m walk, and at an average walking speed would take approximately 3.5 minutes. This is well within the 800 metres maximum.

Taking these items into consideration, and the level of demand at each bus stop the existing bus stop spacing was reviewed and re-organised as shown in Figure 4.1 and Figure 4.2 on page 11.

4. Design

A set of tables, Table 4.1 and Table 4.2 have been generated to assist the understanding of the Project's design.

Consulting Table 4.1 the average walking distance from each inbound bus stop to the next bus stops is about 5 minutes, so on average a resident who arrives on the inbound route will have a 2.5 minute walk to the nearest bus stop. The longest distance between bus stops is '*North Strand Road at Fire Station'* (Stop 616) to the '*North Strand Rd near Newcomen Bridge / James. Larkin House'* (Stop 618) which is approximately a 7 minute walk, so residents arriving on this stretch of the C2CC will have up to a 3.5 minute walk to the nearest new bus stop, plus a short walk from their house depending on where they live in the area.

In relation to the outbound bus stops (see Table 4.2) the average stop spacing is about a 4.5 minute walk, so on average a resident living along the outbound route of the C2CC will be about 2.25 minute walk from the nearest new bus stop. The biggest distance between bus stops is between '*North Strand Road near Health Centre'* (Stop 516) and '*North Strand Road near East Wall Road'* (Stop 519) which is approximately a 7 minute walk, so residents living along this stretch of the C2CC will have up to a 3.5 minute walk to the nearest new bus stop, once they arrive on the route, depending on where they live in the area.

Stop No.	Location	Discussion	Design	Next Stop			
				Pre 2022 / New	Stop Number	Distance (metres)	Walk (mins)
1738	Clontarf Rd at Pitches near Dart Station	Width and length of bus stop can be accommodated once land from Fairview park is used. Stop located just downstream of a pedestrian crossing. Next new bus stop is a 5 minute walk, so a 2.5 minute walk either way from the mid-point.	Retained	Pre 2022	1739	176	2
				New	668	392	5
1739	Clontarf Road near Station and Westwood	Inadequate road width for this bus stop to be accommodated. Outbound bus stop (No 1740) outside Howth Road school is preferred to retain. There is an existing underground combined sewer pump sump under the footpath between Westwood gym and the railway bridge. Inadequate length available for two busses to stop due to two entrance dishings. Stop is one of the least used along the route. Next new stop towards the city is no 668, a 2.5 minute walk, and the previous new stop is 1738 a 2 minute walk. However the next new stop on bus route 130 is stop number 614 which is a 7 minute walk.	Removed *(For more details see Appendix A)*	Pre 2022	668 / 614	216 / 487	2.5 / 6
				new	668/ 614	216 / 550	2.5 / 7
668	Malahide Rd near Marino Crescent.	Width and length of bus stop can be accommodated along Malahide Road.	Retained	Pre 2022	614	308	3.5
				New	614	380	4.5
614	Fairview at footbridge	Width and length of bus stop can be accommodated once land from Fairview park is used. Stop located at the pedestrian bridge and about midway between two pedestrian crossings. Next new bus stop is a 6 minute walk, so a 3 minute walk either way from the mid-point.	moves approx. 70 metres west	Pre 2022	668	271	3
				New	616	510	6

Stop No.	Location	Discussion	Design	Next Stop			
				Pre 2022 / New	Stop Number	Distance (metres)	Walk (mins)
615	Annesley Bridge Road near Addison Road	The new bus stop layout cannot be accommodated at this location without the removal of mature London Plane trees, which is undesirable. The nearest pedestrian crossing, to access the existing bus stop, is 110m to the north. The proposed bus stop at Fairview footbridge is 170m from the same pedestrian crossing, a short additional distance. C2CC is providing a new pedestrian crossing on the north side of Annesley Bridge. This will provide an additional crossing allowing passengers to access the Fairview Fire Station bus stop which is 150m south of the new Annesley Bridge Crossing. Given the proximity of the two existing bus stops, Fairview Footbridge and Fairview Fire Station, to the pedestrian crossings, it would be unreasonable to remove mature trees to accommodate the new bus stop layout at its existing location.	Removed *(For more details see Appendix A)*	Pre 2022	616	275	3.5
				New	616	260	3.2
616	North Strand Road at Fire Station	Width and length of bus stop can be accommodated once parking outside the Fire station is regularised. Stop located just downstream of a pedestrian crossing. Next new bus stop is a 7 minute walk, so a 3.5 minute walk either way from the mid-point. Adequate width also for outbound stop No 519.	Retained	Pre 2022	617	267	3
				New	618	582	7
617	North Strand Road near Strandville Avenue	Insufficient space available in terms of width and length for a quality bus stop and the required segregated cycle track. For example there is insufficient space available between a private entrance dishing, and the mouth of Strandville Avenue to provide adequate space for an accessible bus stop, or a standard bus shelter, and only 12m available for standard full height bus kerb, where the standard length along this route is	Removed *(For more details see Appendix A)*	Pre 2022	618	282	4
				New	818	316	4

Stop No.	Location	Discussion	Design	Next Stop			
				Pre 2022 / New	Stop Number	Distance (metres)	Walk (mins)
		between 15 to 30 metres of bus kerbing. Next new stop is no 618, a 3.8 minute walk from the current location or a 1 minute walk from the pedestrian crossing at Ossory Road. The previous bus stop is no 616 a 2 minute walk from the pedestrian crossing at Xavier Avenue which is adjacent to the existing bus stop.					
618	Nth Strand Rd near Newcomen Bridge / J. Larkin Hse	Width and length of bus stop can be accommodated once land from James Larkin House is used. Stop located just downstream of a pedestrian crossing. Next new bus stop is a 2.5 minute walk, so a little over a minute walk either way from the mid-point. Adequate width also for outbound stop No 516.	Retained / slightly moved	Pre 2022	619	283	3.5
				New	619	220	2.5
619	Amiens Street near Portland Row & Seville Place	Width and length of bus stop can be accommodated once a significant number of parking is removed. Stop located just downstream of the 5 lamps pedestrian crossing. Next new bus stop is a 5.5 minute walk, so a little over 2.5 minute walk either way from the mid-point. Adequate width also for outbound new stop No 515 to be moved near this location.	moves approx. 50 metres north	Pre 2022	675	153	2
				New	1500	451	5.5
675	Amiens Street near Buckingham St Lower	Inadequate road width available to accommodate 4 lanes of traffic, including an inbound, an outbound bus lane, an inbound and outbound traffic lane, and two segregated cycle tracks. Next existing stop is no 1500, a 3.2 minute walk.	Removed	Pre 2022	1500	227	3
				New	1500	271	3.2
1500	Amiens Street at Stn	Not part of this scheme	N/A	N/A	N/A	N/A	N/A

Table 4.1: Inbound stops

Stop No.	Location	Discussion	Design	Next Stop			
				Previous / New	Stop Number	Distance (metres)	Walk (mins)
515	Amiens Street near Portland Row	Width and length of bus stop can be accommodated once a significant number of parking is removed. Stop located just before the 5 lamps pedestrian crossing. Next new bus stop is a 3 minute walk, so a little over 1.5 minute walk either way from the mid-point. Adequate width also for inbound new stop No 619 to be moved near this location.	Moves approx. 100 metres north	Pre 2022	516	269	3.2
				New	516	258	3.0
516	North Strand Road near Health Centre	Width and length of bus stop can be accommodated once land across the road from James Larkin House is used. Stop located near a pedestrian crossing. Careful consideration was given to retaining the existing 5 mature London place trees. Next new bus stop is a 7 minute walk, so a little over a 3.5 minute walk either way from the mid-point. Adequate width also for outbound stop No 618.	Moves approx. 100 m north	Pre 2022	4384	306	3.6
				New	519	586	7.0
4384	North Strand Road near Bayview Ave	Inadequate road width available to accommodate 4 lanes of traffic, including an inbound, an outbound bus lane, an inbound and outbound traffic lane, and two segregated cycle tracks. Next new stop is no 519, a 4.5 minute walk, and the previous new stop is 516 a 2.5 minute walk.	Removed *(Appendix A)*	Pre 2022	518	181	2.1
				New	519	365	4.5
518	North Strand Road near Waterloo Avenue (under rail bridge	Insufficient space available in terms of length for a quality bus stop and the required segregated cycle track. For example there is insufficient space available between a private entrance dishing (and private parking), and the mouth of Nottingham Street to provide adequate space for an accessible bus stop and only 12m available for standard full height bus kerb, where the standard length along this route is between 15 to 30 metres of bus kerbing. Next new stop is no 2255, a 2 minute walk from	Removed *(Appendix A)*	Pre 2022	519	178	2.1
				New	519	178	2.1

Stop No.	Location	Discussion	Design	Next Stop			
				Previous / New	Stop Number	Distance (metres)	Walk (mins)
		the current location. The previous bus stop is no 516, which has been moved to Newcomen Bridge, a 5 minute walk from the existing bus stop. This stop also services the No.53 bus service that travels to Dublin Ferryport. Another existing stop that services this route is located 1 minute walk to the north on Annesley Place.					
519	North Strand road near East Wall Rd	Width and length of bus stop can be accommodated once parking outside the Fire station is regularised. Stop located just downstream of a pedestrian crossing. Next new bus stop is a 5 minute walk, so a 2.5 minute walk either way from the mid-point. Adequate width also for outbound stop No 616.	Retained	Pre 2022	521	182	2.2
				New	522	405	4.8
521	Annesley Bridge Road near Addison Road	A bus stop cannot be accommodated between the property boundaries and the mature London Plane trees along the Fairview Park, as the new road width accommodates two bus lanes, two outbound traffic lanes, one outbound cycle lane, and one inbound traffic lane and some parking bays. The new inbound cycle lane is where the current footway is, and the new footpath is located within Fairview Park. Current location is poor, the new locations are close to signalised crossings. Next new stop is no 522, a 3 minute walk, and the previous new stop is 519 a 2 minute walk.	Removed *(For more details see Appendix A)*	Pre 2022	522	268	3.2
				New	522	235	2.8
522	Fairview near Merville Ave	Width and length of bus stop can be accommodated once land from Fairview park is used, and some park parking is reduced. Stop located near the pedestrian bridge and near Edges Corner pedestrian crossing. Next new bus stop is a 6 minute walk, so a 3 minute walk either way from the mid-point.	Retained	Pre 2022	523	269	3.2
				New	523	303	3.6

Stop No.	Location	Discussion	Design	Next Stop			
				Previous / New	Stop Number	Distance (metres)	Walk (mins)
523	Fairview near Marino College	Width and length of bus stop can be accommodated once land from Fairview park is used, and some park parking is reduced. Stop located about midway between Marino Mart and Malahide Road pedestrian crossings. Next new bus stop is a 6 minute walk, so a 3 minute walk either way from the mid-point.	Retained	Pre 2022	1740	324	3.8
				New	1740	359	4.3
1740	Clontarf Road near Howth Road	Width and length of bus stop can be accommodated, once some parking is reduced, and the bus stop on the opposite side of the road (No 1939) is not reinstated.	Moves approx. 50m east	Pre 2022	1741	417	5
				New	1741	370	4.4
1741	Clontarf Road near Alfie Byrne		Retained	N/A	N/A	N/A	N/A

Table 4.2: Outbound stops

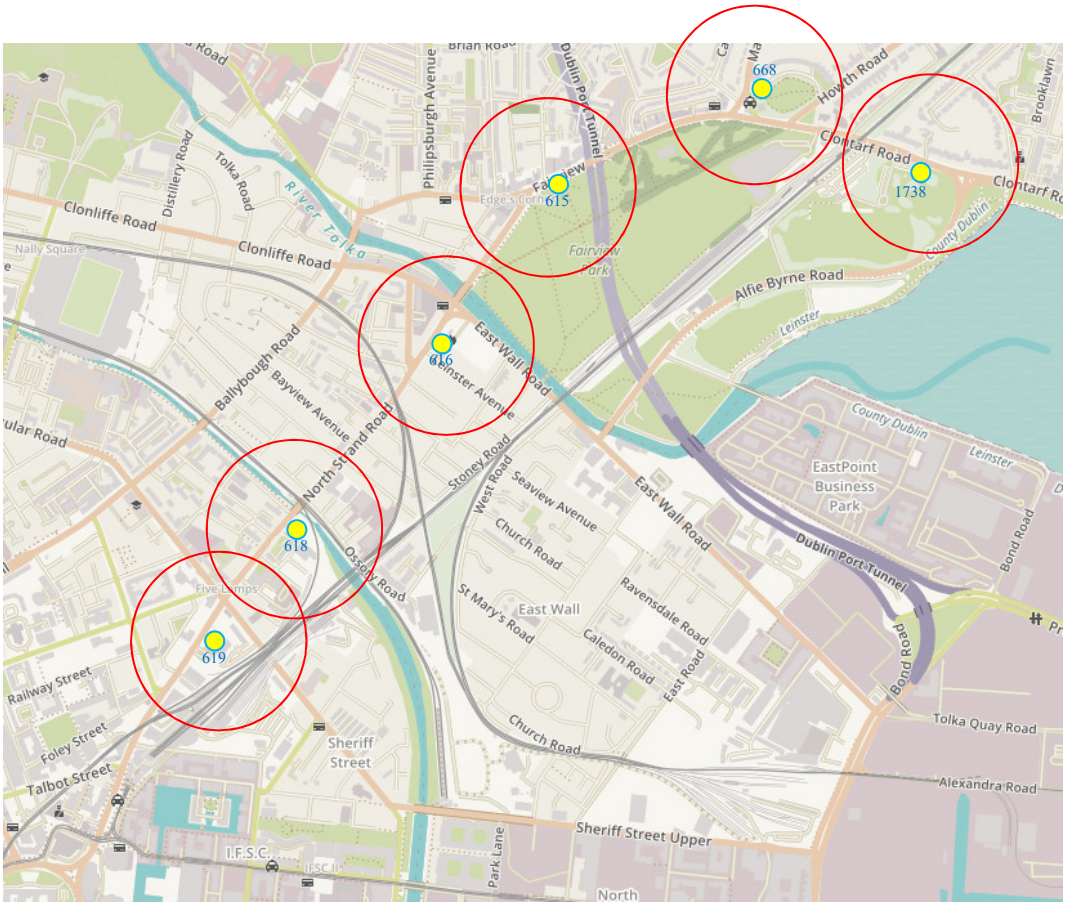


Figure 4.1: Proposed Inbound Bus Stops and Catchment Radii

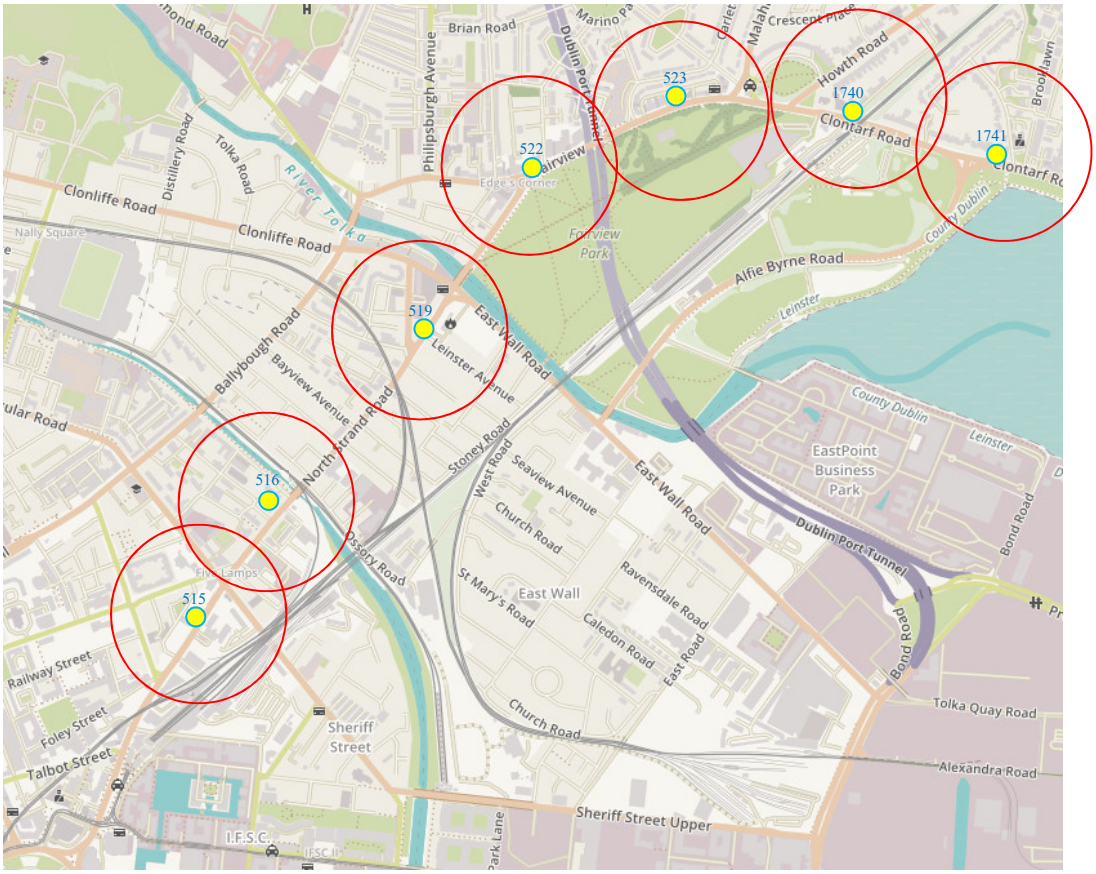


Figure 4.2: Proposed Outbound Bus Stops and Catchment Radii

The following table lists the additional walking times and distances along a section of North Strand Road from the previous bus stop locations to the new bus stop locations, while using the new and upgraded pedestrian crossings.

	North Strand Road Bus Stops					
	To Closest Inbound Stop			To Closest Outbound Stop		
Street At the Junction with North Strand Road	New Closest Bus Stop	Change in Distance (m)	Change in Time to Walk (mm:ss)	New Closest Bus Stop	Change in Distance (m)	Change in Time to Walk (mm:ss)
Ossory Road	618	45	00:32	516	0	00:00
Newcomen Ave	618	45	00:32	516	0	00:00
Newcomen Court	618	45	00:32	516	81	00:58
Charleville Avenue	618	85	01:01	516	180	02:10
Bessborough Ave	618	195	02:20	516	10	00:07
Bayview Avenue	618	250	03:00	516	220	02:38
Strandville Avenue	618	305	03:40	516	120	01:26
Xavier Avenue	616	171	02:03	519	160	01:55
Waterloo Avenue	616	157	01:53	519	175	02:06
Northbrook Ave Lwr	616	50	00:36	519	60	00:43
Nottingham Street	616	40	00:29	519	30	00:22
St. Brigid's Avenue	616	0	00:00	519	0	00:00
Spring Garden St	616	0	00:00	519	0	00:00
Leinster Avenue	616	0	00:00	519	0	00:00
Annesley Place	616	0	00:00	519	0	00:00
East Wall Road	616	0	00:00	519	0	00:00
Poplar Row	616	0	00:00	519	0	00:00

Table 4.3: New walking times on a portion of North Strand Road

NOTE: Speed of walking taken as 5km/h

Bus Stop Reference number	Direction	Street Address
618	Inbound	Newcomen Bridge Stop
617	Inbound	Strandville Road Stop (Removed)
516	Outbound	North Strand Road Outside North William's Street Flats
518	Outbound	Bayview Avenue Stop (Removed)
519	Outbound	East Wall Road Stop

Table 4.4: Bus stop reference numbers and locations

For example, using Strandville Avenue which is the longest inbound walk for residents in the list above. Those living on that street will have an additional walk of 3 minutes 40 seconds to their nearest inbound bus stop at James Larkin House. So if you lived at the furthest home at the bottom of Strandville Ave at the junction of Stoney Road, before the C2CC Project started, you would have a walk of 2min. 38secs (220m) to the old stop on North Strand Road, with the new arrangement you walk along Strandville Avenue to North Strand Road, turn left towards the city and walk to the new bus stop at James Larkin House which is a walk of 6min. 18secs (525m). Essentially an additional 3 minute and 40 second walk.

The new longest walk on the outbound side will be from Bayview Avenue, which is listed as a 2min 38sec additional walk to near North William Street. So if you lived at the bottom of Bayview Avenue, near Ballybough Road, you would walk 3min. 22sec (280m) to the old stop near the top of the avenue, with the new arrangement you walk along Bayview Avenue to North Strand Road, turn right toward the city and walk 6min. (500m) to the new stop near William Street North. Essentially an additional 2 minute 38 second walk.

5. The Consultation Process

5.1. Planning

The Project was lodged with the Planning Department in January 2017 under the statutory Part 8 procedure, and went through a period of statutory consultation, finally obtaining approval from the elected members of the City Council at their meeting in October 2017. Following representations from City Councillors, the following amendments to the proposal before the City Council were agreed;

> "*The locations of bus stops shall be examined and all bus stops along the route shall be redesigned to segregate buses and bicycles as recommended by the National Cycle Manual."*

And

> *"The junctions and traffic signalling on the route shall be designed….to provide for full segregation of bicycles and motor vehicles.*

The Part 8 proposal was approved subject to these amendments. This has defined the design process.

5.2. Consultation subsequent to amendments

Subsequent to amendments being issued modifications to the design was required. In parallel to this process a C2CC Consultative Committee was established to ensure the local community would be engaged and consulted throughout the C2CC design process. This committee consisted of local Councillors and representatives of local residents groups and local businesses. Existing and proposed bus stop locations were presented at their first meeting in May of 2018, a subsequent discussion was had referring to bus stop location, type, segregation, and it was noted at this meeting that "*in broad terms,* (the scheme) *was accepted by the committee and that no major change was suggested."*

At another Consultative meeting in March of 2019, general arrangement drawings were "tabled", showing the location of the bus stops, and it should be noted that since this meeting the location of the bus stops have not altered. Following the meeting the drawings were shared with all committee members.

In February of 2021 drawings which illustrate what the current bus stops locations are were uploaded to www.dublincity.ie/c2cc, so that they could be freely downloaded by anyone with access to the internet.

6. Summary

For a variety of reasons there has been some rationalization of bus stops along the route. However, the reorganisation of bus stops will result in a significantly faster and more reliable bus service in both directions, while ensuring that all bus stops are located within a 3-4min walking catchment of the local community. The bus stop platform, or 'island' will also be of a higher quality and standard, thus improving the passenger experience while boarding, alighting and waiting for a bus.

Examples of new bus stops currently under construction can be viewed at ……..

This matter is being dealt with by Victor Coe, Project Resident Engineer of the Active Travel Programme Office.

Project Webpage - www.c2cc.ie

Active Travel Programme Office
Email: ActiveTravelOffice@dublincity.ie

7. Bibliography

https://www.nationaltransport.ie/wp-content/uploads/2011/12/Permeability_Best_Practice_Guide_NTA_20151.pdf

https://www.ciht.org.uk/media/4459/buses_ua_tp_full_version_v5.pdf

https://nacto.org/wp-content/uploads/2016/02/TfL-accessibile-bus-stop-design-guidance.pdf

http://content.tfl.gov.uk/bus-stop-design-guidance.pdf

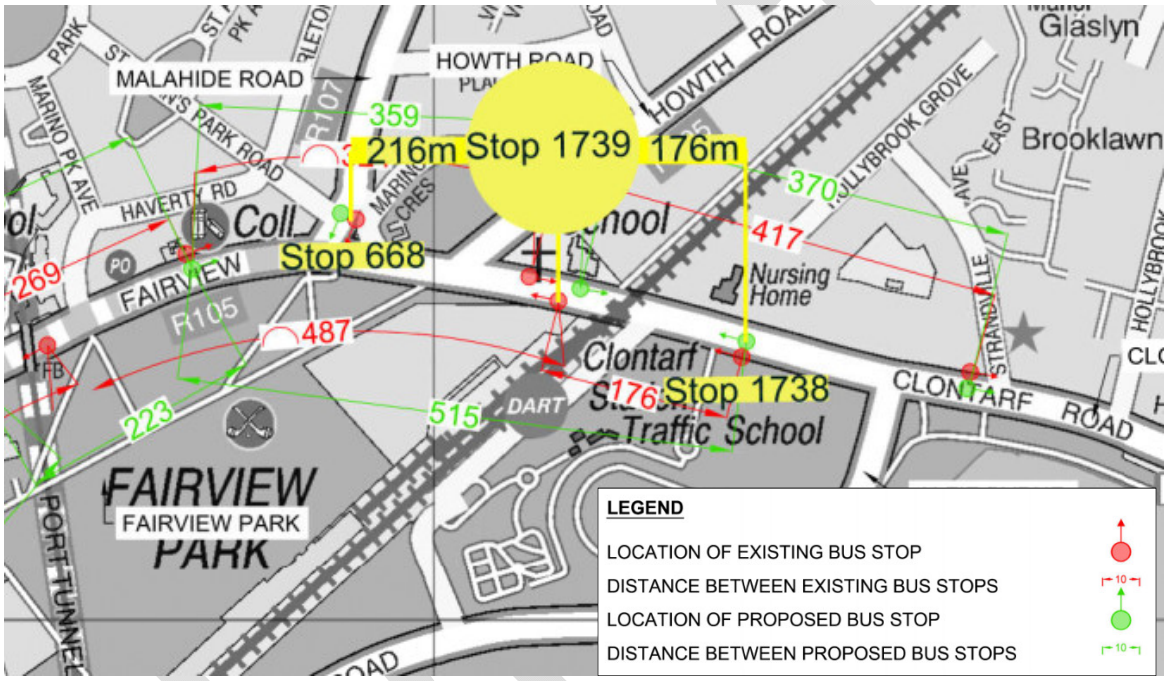
Furth, P. and Rahbee, A., 2000. Optimal bus stop spacing through dynamic programming and geographic modelling. Transportation Research Record: Journal of the Transportation Research Board, (1731), pp.15-22.

Appendix A: Removed / Combined / Relocated Stops

Bus Stop 1739 (inbound):

Location Description; Clontarf Road adjacent to Westwood Gym and Dart Station (inbound)

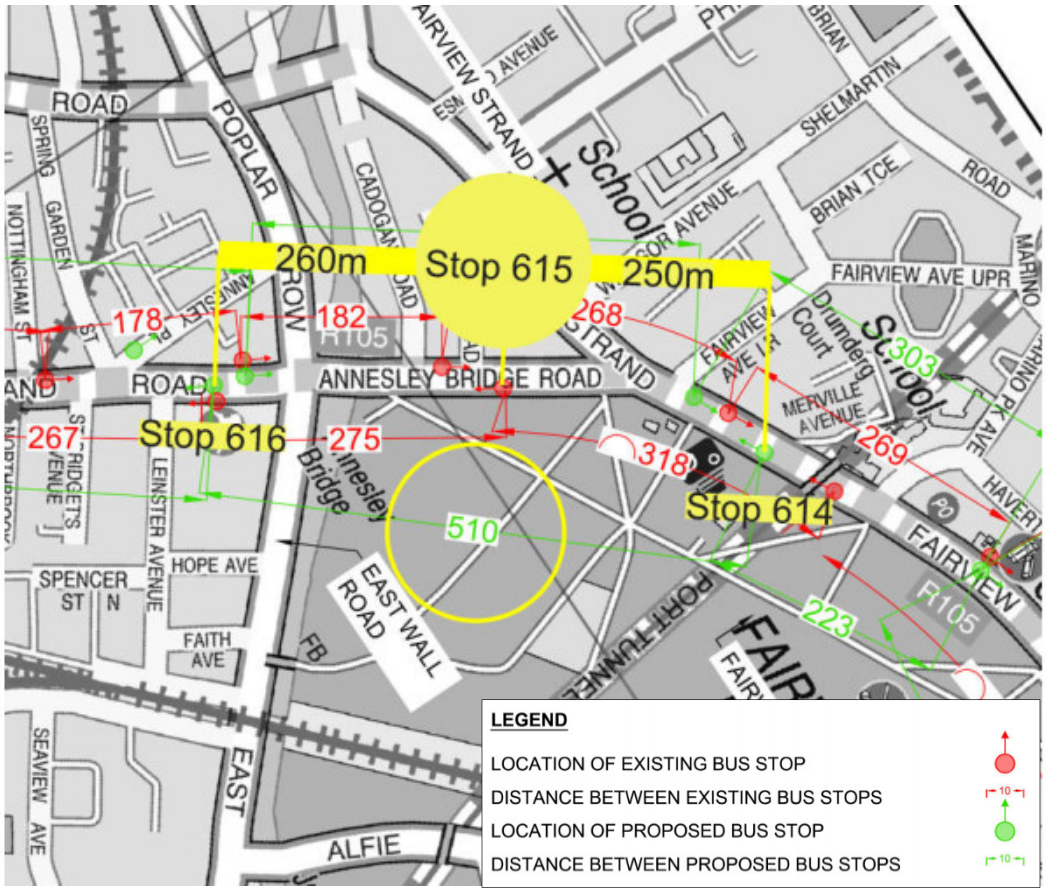
Bus stop Number	Location (travelling from Clontarf)	Distance to nearest downstream stop	Distance to nearest upstream stop
1739	Clontarf Road near Station and Westwood	216m to stop 668 (located at bottom of Malahide Road Approx 2.5 mins walk	176m to stop 1738 (located at Clontarf Road pitches adjacent to Dart Station Approx 2 mins walk



Bus Stop 615 (inbound);

Location Description; Annesley Bridge Road opposite Addison Rd (inbound)

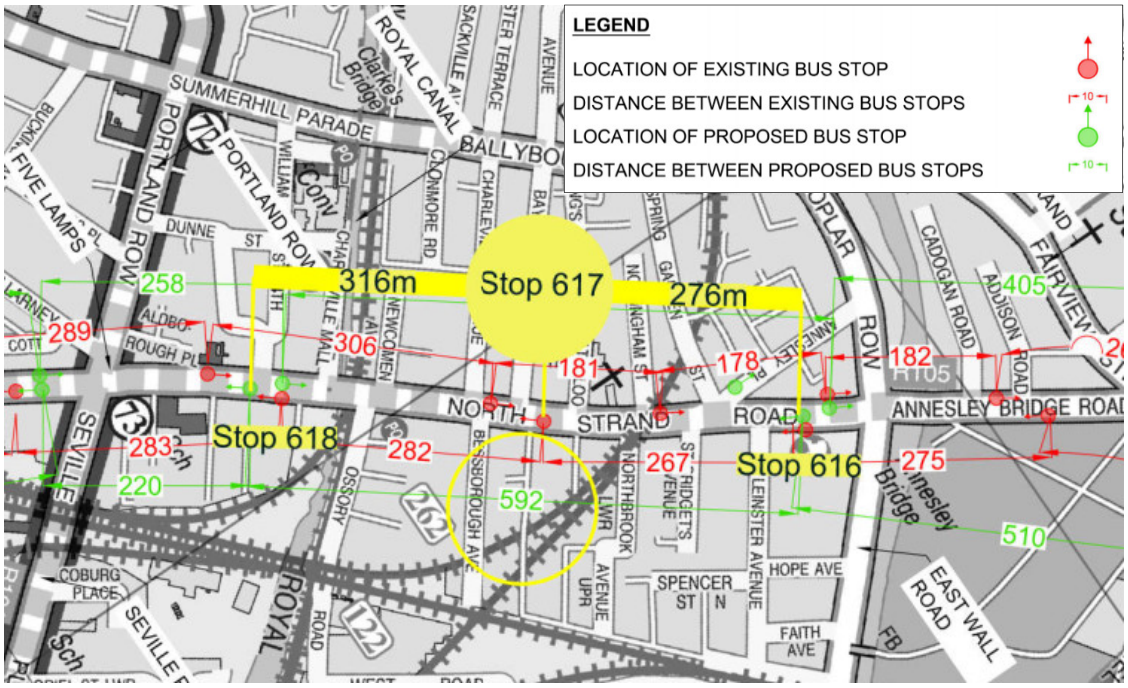
Bus stop Number	Location (travelling from Clontarf)	Distance to nearest downstream stop	Distance to nearest upstream stop
615	Annesley Bridge Road opposite Addison Rd	265m to stop 616 (located outside North Strand Rd Fire Station) Approx. 3.2 mins walk	240m to relocated stop 614 (located at Fairview Footbridge) Approx. 2.9 mins walk



Bus Stop 617 (inbound);

Location Description; North Strand Rd adjacent to Strandville Avenue (inbound)

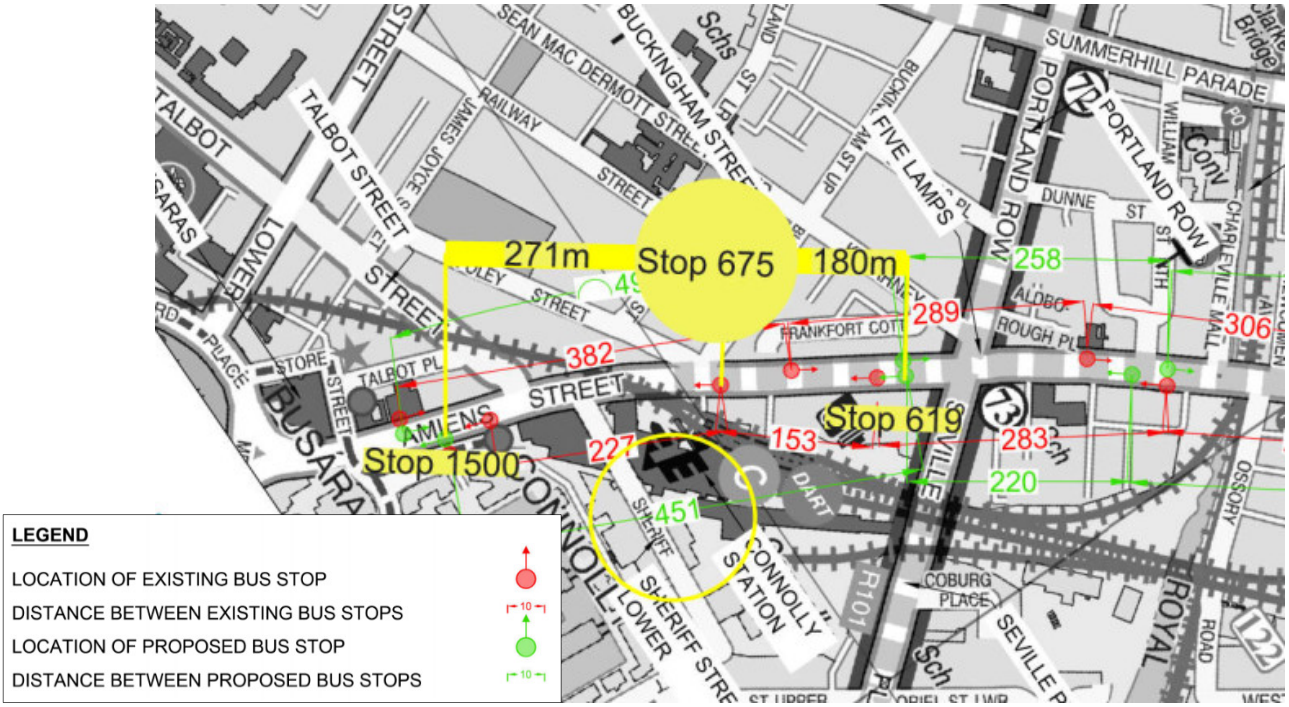
Bus stop Number	Location (travelling from Clontarf)	Distance to nearest downstream stop	Distance to nearest upstream stop
617	North Strand Road near Strandville Avenue	31m to stop 618 (located outside James Larkin House, North Strand Rd) Approx 3.8 mins walk	276m to stop 616 (located outside North Strand Fire Station) Approx 3.4 mins walk



Bus Stop 675 (inbound);

Location Description; Amiens Street near Buckingham St Lower (inbound**)**

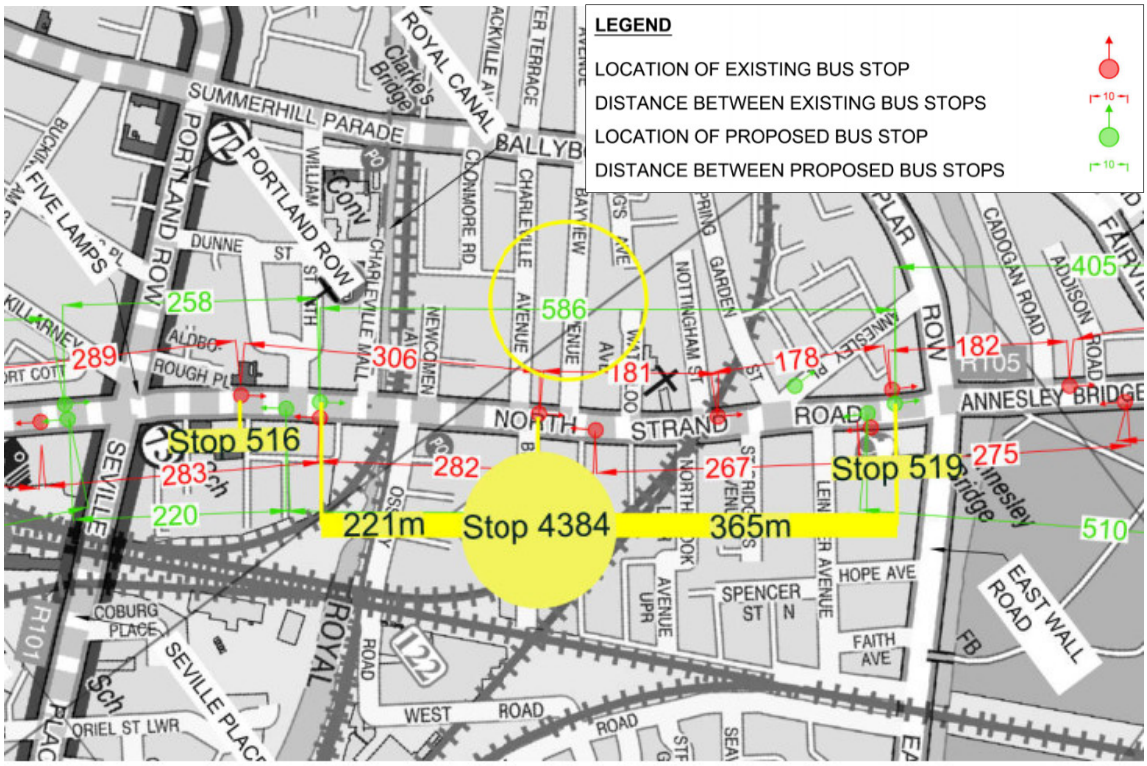
Bus stop Number	Location (travelling from Clontarf)	Distance to nearest downstream stop	Distance to nearest upstream stop
675	Amiens Street near Buckingham St Lower	271m to stop 1500 (located outside Connolly Station, Amiens St) Approx 3.2 mins walk	180m to relocated stop 619 (located on Amiens Street near Portland Row & Seville Place) Approx 2 mins walk



Bus Stop 4384 (outbound);

Location Description; North Strand Road near Bayview Avenue (outbound)

Bus stop Number	Location (travelling from City)	Distance to nearest city side stop	Distance to nearest out of city stop
4384	North Strand Road near Bayview Avenue	221m to relocated stop 516 (located outside Health Centre) Approx 2.5 mins walk	365m to relocated stop 519 (located on North Strand Road near East Wall Road) Approx 4.5 mins walk



Bus Stop 518 (outbound);

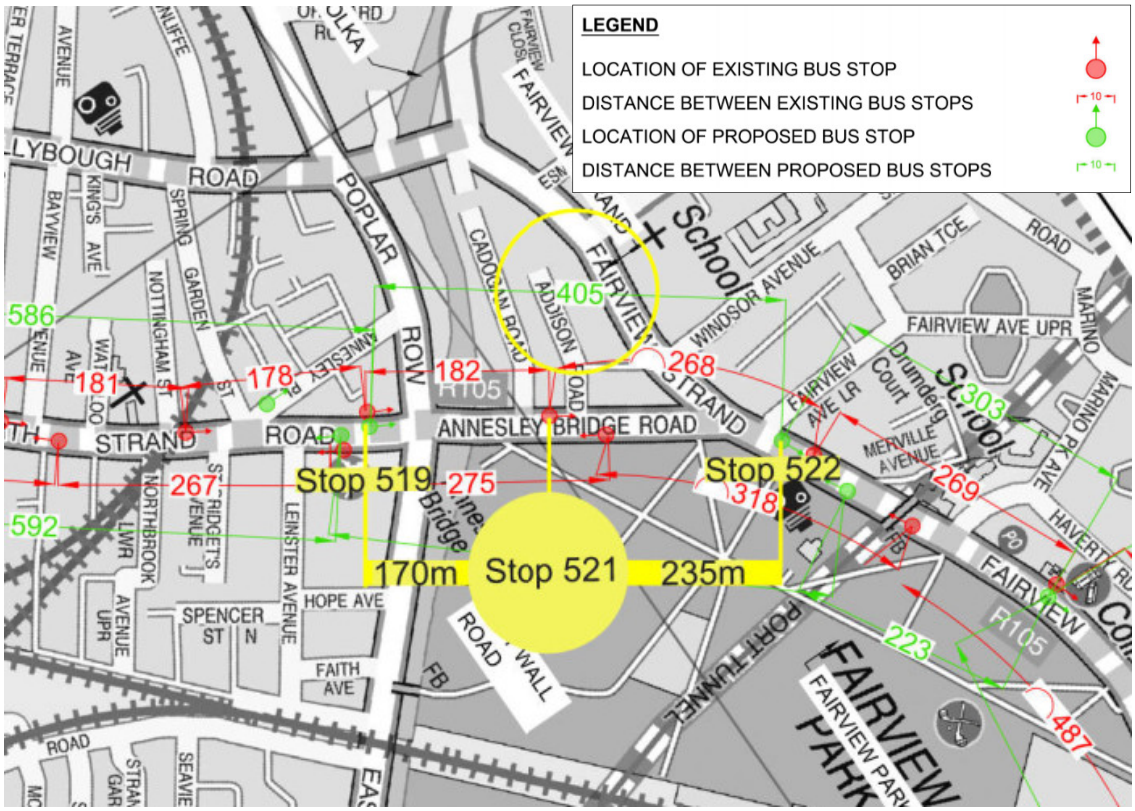
Location Description; North Strand Road near Waterloo Avenue (outbound)

Bus stop Number	Location (travelling from City)	Distance to nearest city side stop	Distance to nearest out of city stop
518	North Strand Road near Waterloo Avenue	406m to relocated stop 516 (located outside Health Centre) Approx 5 mins walk	180m to relocated stop 519 (located on North Strand Road near East Wall Road) Approx 2 mins walk

Bus Stop 521 (outbound);

Location Description; Annesley Bridge Road near Addison Road (outbound)

Bus stop Number	Location (travelling from City)	Distance to nearest city side stop	Distance to nearest out of city stop
521	Annesley Bridge Road near Addison Road	170m to relocated stop 519 (located North Strand Road near East Road) Approx 2 mins walk	180m to relocated stop 522 (located on Fairview near Fairview Avenue Lower) Approx 3 mins walk



Appendix B: Photos of new stops

Figure 7.1: Bus Stop 619 Amiens Street near Portland Row (Photo 26/10/2022)

Figure 7.2: Bus Stop 614 Footbridge at Fairview (Photo 26/10/2022)

Figure 7.3: Bus Stop 1738 Clontarf Road at pitches near Clontarf Dart Station

Appendix C: 2018 bus stop information

Existing Configuration on C2CC Corridor during 2018

The following table summarise the existing numbers of boarding and alighting passengers at each stop over a 24 hour period during 2018.

Location	Buses	Inbound			Buses	Outbound		
		Stop No.	Spacing (m)	Boardings		Stop No.	Spacing (m)	Boardings
Clontarf Road	32, 32x	1738	176	-	32, 32x	1741	-	-
	130	1739	487	-	130	1740	417	-
Malahide Road	14, 14c, 15, 27, 27a, 27b, 42, 43	668	300	388	-	-	-	-
Fairview	14, 14c, 15, 27, 27a, 27b, 27x, 29a, 31, 31a, 31b, 32, 32x, 42, 43, 130	614	318	359	14, 15, 27, 27a, 27b, 27x, 29a, 31, 31a, 31b, 32, 42, 43, 130	523	324	499
	14, 14c, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 32x, 42, 43, 130	615	275	529	14, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 32x, 42, 43, 130	522	269	683
					14, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 130	521	268	174
North Strand	14, 14c, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 53, 130	616	267	961	14, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 130	519	182	305
					14, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 130	518	178	-
		617	282	267	14, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 53, 130	4384	181	207
Amiens Street	14, 14c, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 53, 130	618	283	299	14,15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 42, 43, 53, 130	516	306	646
		619	153	131		515	289	488
	14, 14c, 15, 27, 27a, 27b, 29a, 31, 31a, 31b, 32, 32x, 42, 43, 53, 130	675	227	129				

Table 1: Existing Bus Stop Usage (Figures from 2018)

From CITY CENTRE

Stop No.	Location	Moves approx. from - to
515	Amiens Street near Portland Row	Moves approx. 100 metres north
516	North Strand Road near Health Centre	Moves approx. 100 metres north
4384	North Strand Road near Bayview Avenue	To be removed
518	North Strand Road near Waterloo Avenue	To be removed
519	North Strand Road near East Wall Road	Retained
521	Annesley Bridge Road near Addison Road	To be removed
522	Fairview near Merville Ave	Retained
523	Fairview near Marino College	Retained
1740	Clontarf Road near Howth Road	Moves approx. 50 metres east
1741	Clontarf Road near Alfie Byrne Road	Retained

From CLONTARF

Stop No.	Location	Moves approx. from - to
1738	Clontarf Rd at Pitches near Dart Station	Retained
1739	Clontarf Road near Station and Westwood	To be removed
668	Malahide Road near Marino Crescent Park	Retained
614	Fairview at footbridge	moves approx. 70 metres west
615	Annesley Bridge Road near Addison	To be removed
616	North Strand Road at Fire Station	Retained
617	North Strand Road near Strandville Avenue	To be removed
618	North Strand Road near Newcomen Bridge	Retained
619	Amiens Street near Portland Row & Seville Place	moves approx. 50 metres north
675	Amiens Street near Buckingham St Lower	To be removed

LEGEND

- LOCATION OF EXISTING BUS STOP
- DISTANCE BETWEEN EXISTING BUS STOPS
- LOCATION OF PROPOSED BUS STOP
- DISTANCE BETWEEN PROPOSED BUS STOPS

Project Ireland 2040 Building Ireland's Future

Comhairle Cathrach Bhaile Átha Cliath Dublin City Council

NTA Údarás Náisiúnta Iompair National Transport Authority

No.	Revision	Date	By	Chk'd	App'd

AECOM - Roughan & O'Donovan Alliance

ROD ROUGHAN & O'DONOVAN AECOM

ROUGHAN & O' DONOVAN CONSULTING ENGINEERS ARENA HOUSE, ARENA ROAD, SANDYFORD, DUBLIN 18 D18 V8P6, IRELAND

Project Title	Clontarf to City Centre Project (Main Works)
Drawing Title	BUS STOP LOCATIONS
Drawing Number	C2CC-ROD-HGN-S2_AE-SK-CH-6022001

Drawn: CG | Designed: CG | Checked: EOC | Approved: SMG | Status: S0 - Work In Progress | Scale (A1): 1:250 | Date: AUGUST 2022 | Job No: 17.203 | Rev: 01

10 August 2022 16:56:30 J:\2017\17203\DWG\SKETCH\CONTRACT SKETCHES\C2CC-ROD-HGN-S2_AE-SK-CH-602201-BUS STOP LOCATIONS.DWG

DO NOT SCALE USE FIGURED DIMENSIONS ONLY