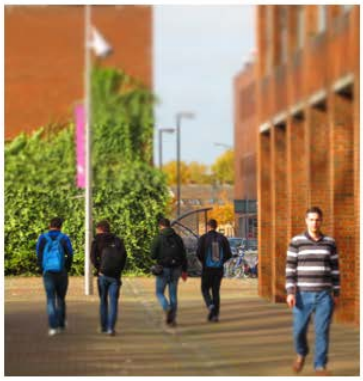
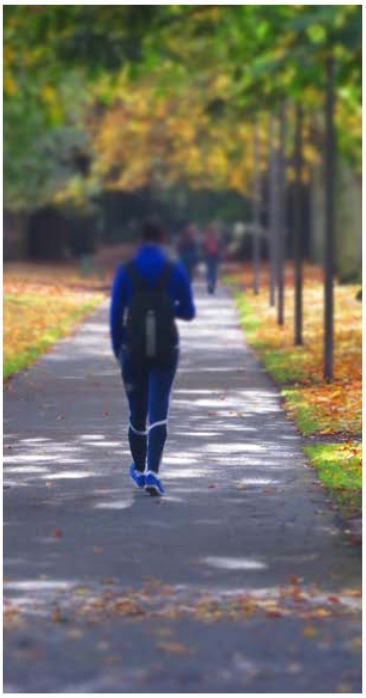
Dublin City University

Campus Connectivity Study

Draft Report

Issue | 16 June 2016





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Document Verification

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Job title		Campus Connectivity Study			**Job number** 245969-00
Document title		Draft Report			**File reference**
Document ref					
Revision	**Date**	**Filename**	245969-00_20160125_PermeabilityStudyReport_RI02_CMG.docx		
Draft 1	29 Jan 2016	**Description**	Client draft		
			Prepared by	Checked by	Approved by
		Name	Rachel Ivers	Conor McGrath	Tiago Oliveira
		Signature			
Draft 2	1 Feb 2016	**Filename**			
		Description	Draft for Issue		
			Prepared by	Checked by	Approved by
		Name	Rachel Ivers	Tiago Oliveira	Tiago Oliveira
		Signature			
Issue	16 Jun 2016	**Filename**	245969-00_20160616_PermeabilityStudyReport_Issue.docx		
		Description	Issue		
			Prepared by	Checked by	Approved by
		Name	Rachel Ivers	Conor McGrath	Tiago Oliveira
		Signature	R Ivers	[illegible]	[illegible]
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

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1 Introduction

1.1 Background

Arup has been appointed by Dublin City University (DCU) to undertake a permeability study and investigate the suitability of upgrading the existing routes between DCU main campus (DCU Glasnevin), St Patricks College (DCU Drumcondra) and All Hallows College (DCU All Hallows) as well as identifying new routes between the campuses. The study has considered two DCU landholdings, which are important from a connectivity point of view: DCU Elmhurst, on the northern side of Griffith Avenue; and the DCU community garden between the main campus and the back of Plunkett College on the Swords Road.

This report presents the findings of the assessment of route options considered to enhance pedestrian, cycle and public transport connectivity, as well as the rationale behind the emerging preferred scheme to be taken forward to preliminary design stage.

DCU is a major employer with 1,385 staff and over 12,500 students, which makes it the second largest generator of trips in north Dublin after Dublin Airport, accounting for circa 4 million journeys to and from its Glasnevin campus every year. The student population of the new enlarged DCU will exceed 16,000 in a multi-campus university with significant additional inter-campus commuter traffic.

1.2 Scope of the Report

This report presents the route options available to pedestrians, cyclists and public transport users. Each section details and evaluates the various route options available to the user type and presents the preferred option.

The concept design for the emerging preferred scheme as a whole has also been developed and is presented in **Section 4.10**.

The actions required to realise the preferred scheme are outlined in **Section 6**.

2 Methodology

2.1 Introduction

This section of the report presents the methodology used for the assessment of route options within the study area. Two route types were assessed:

- Pedestrian and cyclist routes; and
- Public transport routes.

2.2 Study Area and Routes

The study area is bounded by Collins Avenue West to the north, Ballymun Road / St. Mobhi Road in the west, Sword Road / Drumcondra Road Upper to the east and the vehicular entrance to DCU Drumcondra off Drumcondra Road Upper to the south. Access to DCU All Hallows is located off Grace Park Road.

Pedestrian and cycle routes assessed as part of the study have been derived from the local road network presented in **Figure 2** and are discussed in further detail in **Section 3**. In addition to existing routes, a number of potential new routes which require additional footpaths and connections are proposed and assessed.

2.3 Policy Provision

The Cycle Network Plan includes cycle network proposals for areas in the vicinity of the DCU sites as well as other areas in the City Centre. The section of the plan, relative to DCU sites is illustrated in **Figure** 1.

There are a number of specific cycle route objectives aimed at improving the regional and local cycle network, which will benefit accessibility to the DCU sites, including:

- Primary radial route 2A: Dublin Airport to O'Connell Street.
- Primary radial route 3A: Ballymun to Phibsborough Rd.
- Minor Greenway: cuts through DCU main Campus connecting Collins Avenue with Ballymun Road and Griffith Avenue.

In addition to the radial routes above, the Plan also identifies Griffith Avenue as a secondary route as well as proposing a route through DCU Glasnevin to Griffith Avenue and Royal Canal Greenway (3C) which appears to uses Bantry Road.

Figure 1: Proposed Cycle Network

(Source: NTA Cycle Network Plan for the Greater Dublin Area)

Figure 2: Study Area and relevant Road Network

2.4 Pedestrian and Cyclist Assessment

2.4.1 Introduction

A walking and cycling assessment was undertaken for eight identified routes between DCU Glasnevin, DCU Drumcondra and DCU All Hallows. The assessment criteria on which the study is based are described in the following sections.

2.4.2 Assessment Criteria

The options assessment compares the journey time, permeability ratio, lighting, quality of environment, personal security, road safety, footpath condition, cycle facility provision and if there was any policy provision or land ownership constraints. A description of each assessment criterion is outlined below.

2.4.2.1 Journey Time

For the purposes of this assessment, travel time between campuses was calculated based upon the average walking and cycling speeds set-out by the NTA, but factored to take account that the main users are students who are likely to have higher speeds than average. For pedestrians the shortest walking time is a key factor in route choice, while for cyclists other criteria such as level of cycle facility provision are considered more important.

2.4.2.2 Permeability Ratio

The permeability ratio (or the pedestrian route directness (PRD)) is the relationship between the actual distance required to walk or cycle and the direct line distance. The lowest possible value is 1.0 with 1.2 – 1.5 regarded as acceptable standards internationally[1] .

All distances quoted in this report are taken from a central point within each campus.

2.4.2.3 Lighting

Good quality lighting promotes a safer environment by ensuring inter-visibility between users. Poorly illuminated carriageways and cycle lanes can make it difficult for users to identify potential hazards. The quality of light will also have a major impact on perceptions of security. If lighting levels are not sufficient, a place may not be perceived as safe, particularly for pedestrians and cyclists. This may discourage people from walking and cycling particularly in the winter months when days are shorter.

Lighting should be designed to ensure that both the vehicular carriageway and pedestrian / cyclist facilities are sufficiently illuminated.

[1] Permeability Best Practice Guide, National Transport Authority

Lighting is considered under three grades in this study: good (lighting either side of the road, no shadowing caused by e.g. trees, and bright white light), adequate (lighting either side of the road, minimal shadowing caused by e.g. trees, and bright light) and poor (lighting on one side of the road or on a section of road only, shadowing, orange lighting).

2.4.2.4 Quality of Environment[2]

The quality of the walking and cycling environment is a factor in the route choice of users. It can affect all aspects of a scheme design and can influence universal accessibility, personal security, legibility, safety and usage levels. Where possible: schemes should be designed so that path gradients are not too steep, although in practice this may be a compromise with providing suitable levels of directness. Where possible a route should aim to give the area it travels through a sense of place (being a destination in its own right). At the very least it should avoid detracting from an area which already achieves this. The use of suitable high quality material and soft landscaping can assist in maximising the environmental quality of a permeability scheme.

The level of traffic flow has the potential to decrease the quality of environment for pedestrians and cyclists using a footpath or cycle facility adjacent to the road way. Consequently a ranking of traffic conditions has been created for this study which has a three tiered grading system; good, adequate and poor dependent on the level of HGVs, Buses, noise, and traffic volumes.

A route which has a high volume of vehicles has the potential to deter cyclists due to the potential increase in noise, pollution and increased difficultly in navigating the vehicles. The quality of the surrounding environment for cyclists is a key factor in route choice. Cyclists are more likely to avoid a route if it is populated with vehicles or if there is a changing environment and cyclist facility provision. For pedestrians the increase in noise and pollution decrease the quality of the environment. The quality of the environment is not a key factor in route choice for these users, however it can make the journey more attractive.

2.4.2.5 Personal Security

Personal security is assessed under two criteria; a sense of enclosure and active street edges.

Sense of enclosure[3]: enclosed streets with buildings helps to define them as urban places, creates a greater sense of intimacy and promotes them as pedestrian friendly spaces that are overlooked. This sense of intimacy has been found to have a traffic calming effect as drivers become more aware of their surroundings.

Active street edges[4]: Active street edges provide passive surveillance of the street environment and promote pedestrian activity.

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[2] Permeability Best Practice Guide, National Transport Authority
[3] Section 4.2.1, DMURS, Department for Transport, Tourism and Sport
[4] Section 4.2.3, DMURS, Department for Transport, Tourism and Sport

Increased pedestrian activity also has a traffic calming effect as it causes people to drive more cautiously. Retail, commercial and residential uses all promote on-street activity and create active street edges. The inclusion of in-curtilage parking within front gardens (i.e. to the front of the building line) may result in large building setbacks that substantially reduce the sense of active street edges.

The level of passive surveillance associated with a route is a factor in the associated feeling of safety and security it provides. Pedestrians and cyclists are more likely to take a particular route if there is a higher level of passive surveillance such as the presence of retail, housing or outdoor activities throughout the day and evening.

2.4.2.6 Road Safety

The number of crossings required along the route whether signalised or non-signalised is a factor that determines road safety. The number of junctions is effectively a measure of the number of potential conflicts on the route and therefore a measure of the potential for a collision.

2.4.2.7 Footpath Conditions

The level of footpath quality and level of provision is a factor in route safety and comfort. A damaged footpath or footpath with poor drainage may result in pedestrians diverting from the footpath onto the road which may lead to conflicts with vehicles or cyclists. A footpath width under 1.8 metres is considered poor.

2.4.2.8 Cycle Facility Provision

The level and quality of cycle facility provision is a key determinant in its level of usage. The legibility and functionality of the cycle facility is a factor in it being used correctly and preventing potential conflicts with other road users and pedestrians.

2.4.2.9 Land Ownership

When identifying proposed new routes, third party interactions regarding land ownership was also considered. When land acquisition from third party landowners is required for the implementation of a route, the process can be hindered due to the negotiation process. The higher the number of landowners the increase in potential difficulty.

2.4.3 Route Options Assessment Summary Tables

For each identified route a summary table is prepared which collates and summarises the appraisal of each route option under each of the assessment criteria.

For each individual assessment criterion considered, routes have been relatively compared against others based on a five point scale, ranging from having significant advantages to having significant disadvantages over the other route options. For illustrative purposes, this five point scale is colour-coded as presented in **Table 1** which advantaged routes are graded to 'dark green' and disadvantaged routes graded to 'dark red'.

Table 1: Route Options Ranking Scale

Colour	Description
	Significant advantages over the other options
	Some advantages over the other options
	Neutral compared to other options
	Some disadvantages over the other options
	Significant disadvantages over the other options

2.5 Public Transport Appraisal

2.5.1 Introduction

A Public Transport Appraisal of each existing bus route was carried out. No other public transport options are provided between DCU sites. Presently, all relevant bus routes are operated by Dublin Bus.

The purpose of this appraisal is to understand the current level of public transport provision between DCU sites and how this can be embraced or improved to enhance the level of connectivity through sustainable modes of transport.

2.5.2 Routes

The bus routes that were explored were derived from Dublin Buses service network presented in **Figure 3** and are discussed in further detail in **Section 5**. For ease of analysis, bus services are contained within common routes in figure.

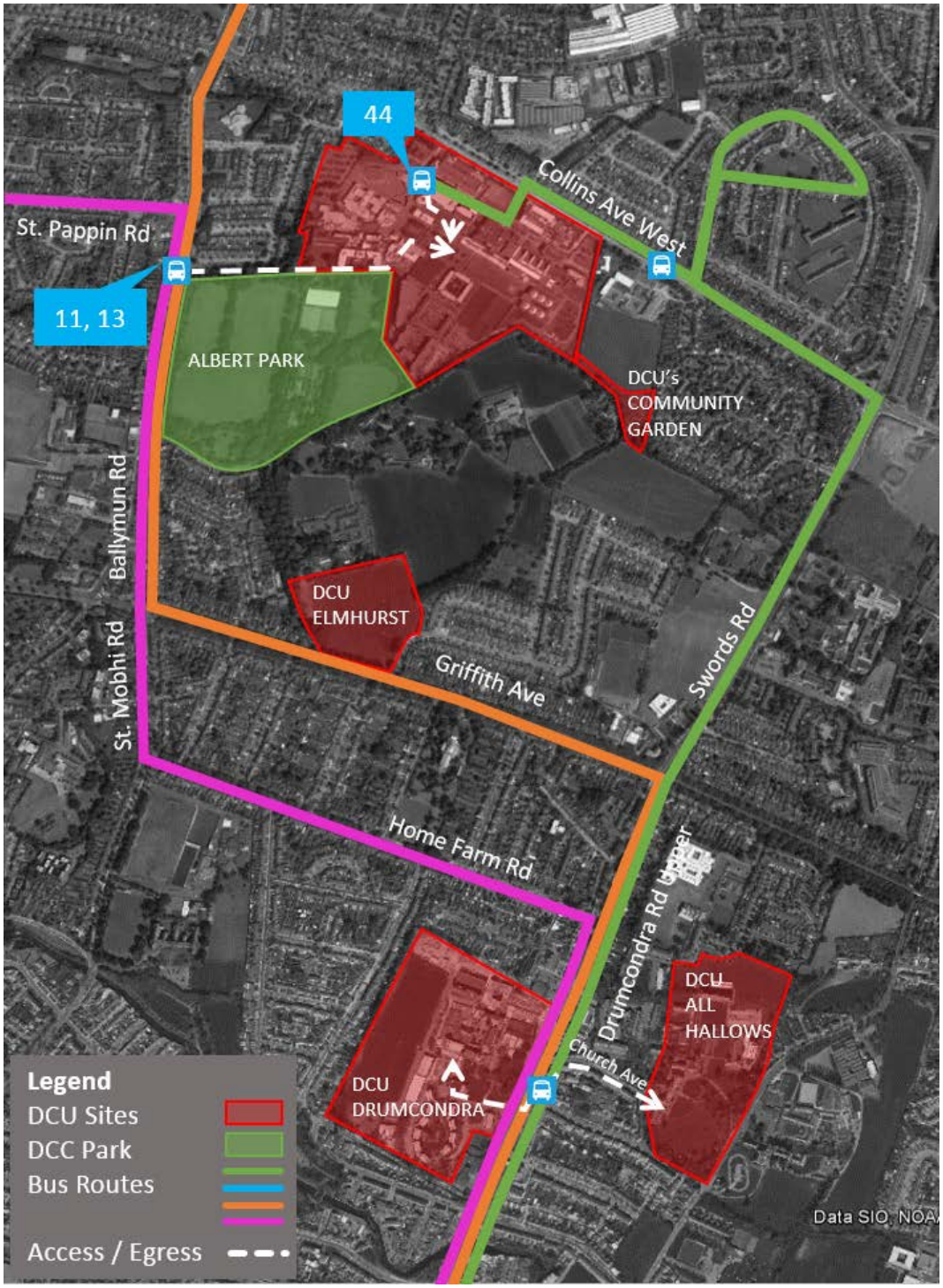

Figure 3: Public Transport Route Options

2.5.3 Appraisal Criteria

The appraisal compares the number of services, frequency, access time, waiting time and travel time of the bus routes. A description of each criterion is outlined below.

2.5.3.1 Number of services

The total number of bus services along an identified bus route from origin to destination.

2.5.3.2 Frequency

The frequency of services along a particular route is defined as the number of hourly services during the inter-peak period of 10:00-16:00. The inter-peak frequency is used as it is expected that most of the trip between the campuses will take place over this period.

2.5.3.3 Total Journey Travel Time

Journey time is the summation of a number of inputs, mainly access time and travel time on the mode. These components are outlined below.

Access time - Bus stop location

The location of the bus stop relative to the origin and destination is a factor in its use. User's mode choice identifies a preference for bus stops that are closer to the origin than to the destination. Consequently users prefer to walk a longer distance after egressing public transport rather than walking a further distance to access public transport. Therefore bus stop location in relation to origin and destination is a factor in the predicted us of the service. Therefore users are more likely to use the bus for travel between DCU Drumcondra and DCU All Hallows towards DCU Glasnevin than the other way around.

Travel time

The travel time of the service between origin and destination is a factor of route choice. The origins and destination considered in this study have been the nearest stops from each DCU campus.

2.5.3.4 Bus Priority Provision

The provision of public transport facilities along the route such as the presence of bus priority feature (bus lanes, etc.) increases the perception of a higher quality bus service and also enables consistent travel time throughout the day.

2.5.4 Bus Route Options Summary Tables

For each identified bus route, a summary table is prepared which collates and summarises the appraisal of each bus route option under each of the criteria.

3 Local Road Network

This section includes a brief description of the road network considered in this report. **Figure 4** illustrates the local road network, in the context of the DCU and relevant neighbouring lands.

Figure 4: Existing Road Network

3.1.1 R103 - Collins Avenue West

The R103 Collins Avenue West is a strategic orbital link, connecting Killester in the east with Finglas in the west and bisecting a number of radial routes such as the R132 and the R108 Ballymun Road.

Along the section of the R103 between the R108 and the R132, this road is a single carriageway with footpaths on either side of the road. There is an on-road cycle lane between the junctions with Larkhill Road and Ballymun Road. At this section, the road widens to include a grass and tree lined verge between the footpaths and the road.

There is one stand-alone pedestrian crossing on Collins Avenue West at the junction with Larkhill Road and a signalised junction with pedestrian crossing at the entrance to DCU Glasnevin on Collins Avenue West.

The main entrance to DCU Glasnevin is located off Collins Avenue West.

3.1.2 R132 - Swords Road / Drumcondra Road Upper

Swords Road and Drumcondra Road Upper form part of the R132 regional road, which provides a connection between Dublin city centre and the M50, the airport, Swords and the north. Both relevant sections provide a single traffic lane and Quality Bus Corridor (QBC) incorporating a cycle lane in each direction. Footpaths are provided on either side of the road along its length.

There are four signalised junctions with pedestrian crossings at junctions with Home Farm Road, Griffith Avenue, Iveragh Road, and Collins Avenue West. There are two stand-alone pedestrian crossings at Plunket College and DCU Drumcondra.

The access to DCU Drumcondra is on Drumcondra Road Upper.

3.1.3 R108 - Ballymun Road

The R108 Ballymun Road is a dual carriageway with QBC lanes in both directions. Pedestrians and cyclists are generally catered for with an off-road cycle track and footpath in either direction. A central median separates the north and southbound carriageways. Ballymun Road is a strategic radial link, providing connection between Dublin city centre and the M50 at Ballymun.

The Ballymun Road / Griffith Avenue junction forms a triangular gyratory one way system. There are two stand-alone pedestrian crossings on Ballymun Road at the secondary entrance to DCU Glasnevin and the entrance to DCU Sport Ground. The secondary access to DCU Glasnevin campus is located off Ballymun Road.

DCU Glasnevin access to Ballymun Road is a two-way single carriageway road which caters for access-only traffic into the campus. The road follows the southern and eastern boundary line of DCU Glasnevin. A footpath is provided on one side of the road and there is no dedicated provision for cyclists.

3.1.4 R 102 - Griffith Avenue

Similar to Collins Avenue, the R102 Griffith Avenue is an orbital link, connecting Marino in the east with Glasnevin and Finglas in the west. Along the section between the R132 Drumcondra Road Upper and R108 Ballymun Road, the R102 is single carriageway with on-street car parking on either side of the road.

The road is residential in nature with wide tree lined footpaths. There are no cycle facilities provided on this road.

There are two stand-alone pedestrian crossings on Griffith Avenue near the junction with Bantry Road and Clare Road.

3.1.5 Home Farm Road

Home Farm Road is a residential street with on-street car parking that runs parallel to Griffith Avenue. There are no road markings to delineate lane allocation however it was observed that it is wide enough to accommodate two passing vehicles. There are traffic calming measures in place with the provision of speed ramps at regular intervals.

There is one stand-alone pedestrian crossing on Home Farm Road at the junction with Ferguson Road.

3.1.6 Links between Griffith Avenue and Home Farm Road

Rathlin Road, Lambay Road, Bantry Road, Valentia Road and Clare Road are all link roads between Griffith Avenue and Home Farm Road. They are all residential in nature with on street car parking and traffic calming measures in the form of speed ramps. All roads have housing either side except for Valentia Road which is bounded to the east by Corpus Christi Church.

3.1.7 Ormond Road and Grace Park Road

Ormond Road is a local link road that connects Drumcondra Road Upper in the west and Grace Park Road to the east.

Ormond Road transitions from a wide residential street with on street car parking to a single carriageway with on street parking on one side of the road. The narrower section of the road, is noted to be wide enough for only one car to pass, allows traffic in either direction. There are speed ramps along this road as a traffic calming measure. A raised entry treatment is provided at the junction with Drumcondra Road Upper. Footpaths are provided on either side of Ormond Road. There are no cycle facilities along Ormond Road.

The main access to DCU All Hallows is located on Grace Park Road, about 90m to the north of the Ormond Road junction. There is no provision for cyclists along Grace Park Road. A wide footpath is present along the western side of the road.

3.1.8 Church Avenue

Church Avenue, a residential street, is a single carriageway one-way road (west-east) with on street car parking provided on one side of the road for the majority of the road length. Pedestrians are facilitated with the provision of footpaths. Cyclists are not provided for. A raised entry treatment is provided at the junction with Drumcondra Road Upper.

The secondary pedestrian access to DCU All Hallows campus is located off Church Avenue.

4 Pedestrian and Cyclist Route Assessments

4.1 Introduction

The purpose of this assessment is to investigate the possible improvements that can be made to increase the level of connectivity between the three DCU campuses.

Figure 5 illustrates the existing and proposed pedestrian and cyclist network between DCU campuses. This network has been divided in routes for the purpose of this assessment. These routes are analysed in more detail in this section.

A total of nine routes are assessed. The first three routes are existing routes that can be taken between DCU Glasnevin, DCU Drumcondra and DCU All Hallows. The subsequent routes are proposed route variations that aim to reduce the travel time of pedestrians and cyclists and increase the level of permeability.

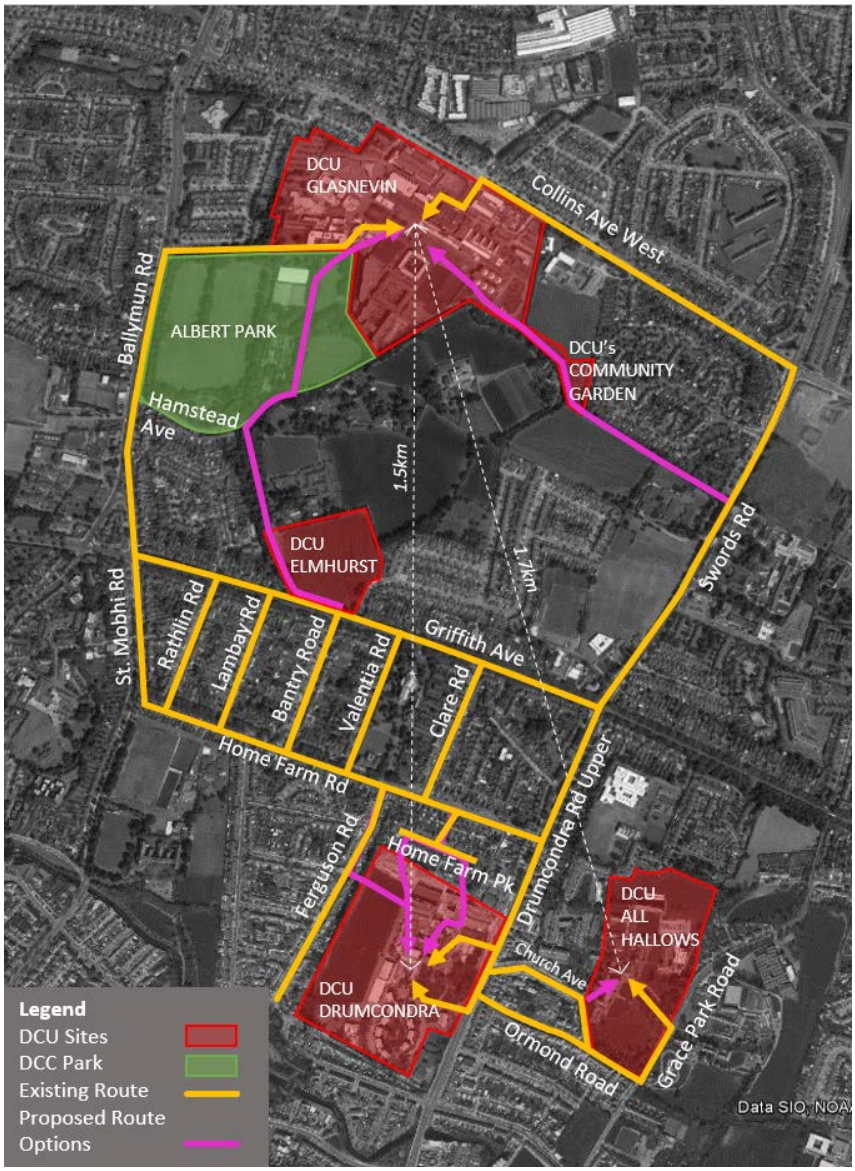

Figure 5: Route Options

4.2 Route 1 – Collins Avenue / Drumcondra Road

Travelling from DCU Glasnevin, pedestrians using this route would exit at the main entrance off Collins Avenue West and turn right. At the junction with Collins Avenue West and Swords Road pedestrians would turn right to continue onto Drumcondra Road Upper. At the junction with Home Farm Road pedestrians would cross at the signalised pedestrian junction across Drumcondra Road Upper to access DCU All Hallows off Ormond Road. Pedestrians would cross Home Farm Road to access DCU Drumcondra to the right.

Cyclists are required to make right-turn movements at the junction with Collins Avenue West / Swords Road and Drumcondra Road Upper / DCU Drumcondra. This is illustrated in **Figure 6**.

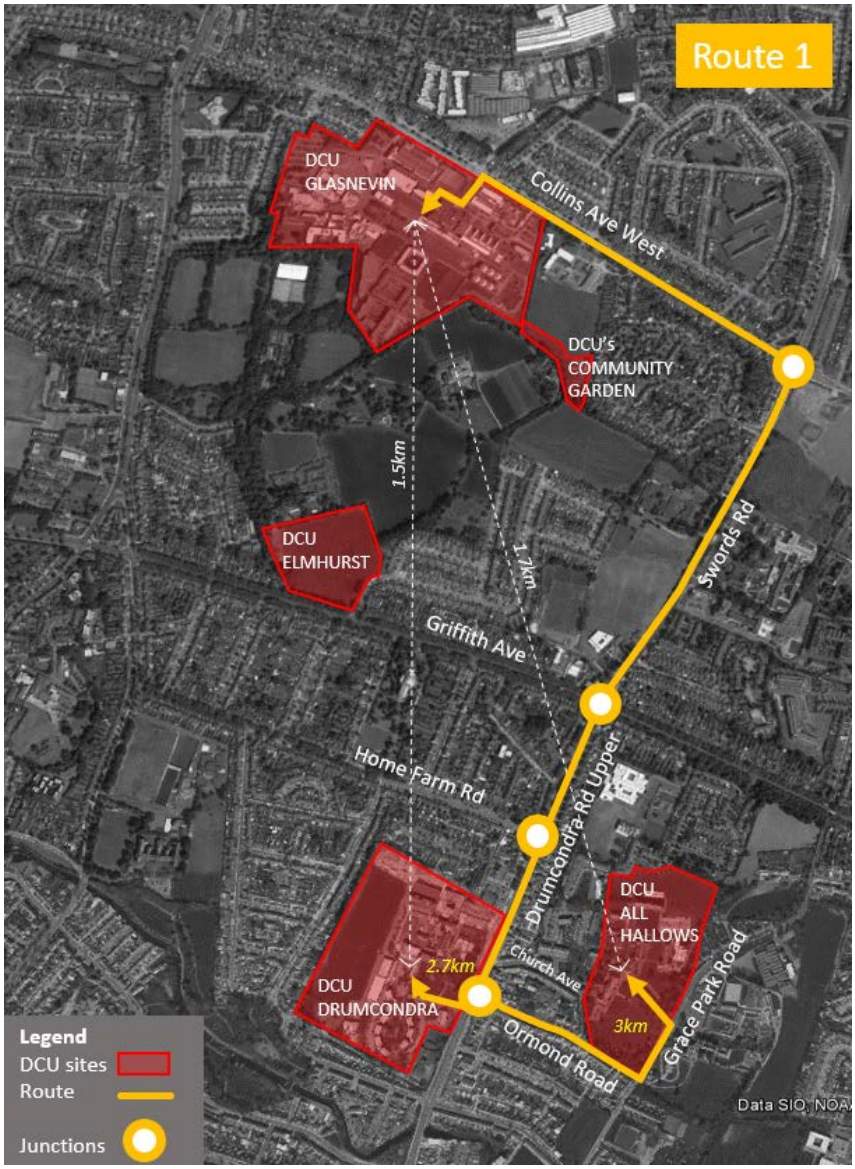

Figure 6: Route 1

4.2.1 Route 1 - Journey Time

The walk time between DCU Glasnevin and DCU Drumcondra / DCU All Hallows exceeds the acceptable commuting travel time of 30 minutes while the cycle time is within acceptable limit of 20 minutes as seen in **Table 2**.

Table 2: Route 1 - Journey Time

DCU Glasnevin to:	Travel Time (min)	
	Walking	Cycling
DCU Drumcondra	30	11
DCU All Hallows	34	12

4.2.2 Route 1 - Permeability Ratio

The permeability ratio shown in **Table 3** exceeds the acceptable limit of 1.5 for both campuses meaning that this route requires a significant diversion off the 'crow-flies' route.

Table 3: Route 1 - Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2705	1520	1.8
DCU All Hallows	3038	1670	1.8

4.2.3 Route 1 - Lighting

Collins Avenue West is well served by public lighting with good white lighting either side of the road and no shadowing.

Swords Road and Drumcondra Road Upper are main radial routes out of Dublin city centre. The roads are well lit by public lighting on either side of the road.

The lighting along Ormond Road, once past the junction with Church Road deteriorates to poor with orange lighting on one side of the road shadowed by trees. This could discourage people from walking or cycling especially in the winter months. The situation is the same for Grace Park Road.

4.2.3.1 Route 1 – Quality of Environment

Drumcondra Road and Swords Road are main radial arteries out of Dublin city centre and as such carry high volumes of traffic.

Collins Avenue West carries a moderate level of traffic, however due to the separation distance between the carriageway and the footpath (including a tree-lined grass verge) the environmental quality is increased.

Ormond Road is a residential street with low traffic volumes. However at the junction with Church Avenue the road narrows to a single lane thereby reducing the quality of the pedestrian environment by reducing the distance between the pedestrians and the road. Ormond Road footpath width is less than 1.8 metres wide in places, which is considered poor.

4.2.4 Route 1 – Personal Security

Collins Avenue West, Swords Road and Drumcondra Road Upper are regional roads and their main function is to facilitate the movement of traffic. There is a reduced sense of enclosure and reduced active street edges. Passive surveillance that is present is provided by residential housing with the inclusion of in-curtilage parking within front gardens.

Ormond Road is a residential street predominantly dominated by in-curtilage parking with space for one vehicle. There is an increase in active street edges due to the presence of semi-detached residential housing. The sense of enclosure is increased due to the reduced road width as Ormond Road is residential in nature.

This results in an associated increase feeling of safety when compared to the other roads.

Once past the junction with Church Avenue on Ormond Road the active street edge reduces, as the road is bounded by a boundary wall, the width of the road also narrows. This deteriorates further on Grace Park Road due to the removal of active street edges and through the presence of walls bounding DCU. All Hallows and a number of other Institutions at this junction.

4.2.5 Route 1 - Road Safety

There are three sections along the route where pedestrians are required to cross a junction. The first junction, Home Farm Road/ Drumcondra Road Upper, is a signalised three armed junction but does not have dedicated pedestrian facilities across Home Farm Road. There is a signalised pedestrian crossing across Drumcondra Road Upper.

The second junction, Griffith Avenue/ Drumcondra Road Upper is a four-arm signalised junction, with staggered pedestrian crossings provided across each arm.

To access DCU All Hallows and DCU Drumcondra there is a stand-alone pedestrian crossing across Drumcondra Road Upper between the junctions with Church Avenue and Ormond Road.

For cyclists, the junctions of Drumcondra Road Upper with Home Farm Road and Griffith Avenue, as well as of Swords Road with Collins Avenue West require cyclists to merge with vehicular traffic at the stop line as indicated in the figure below. This places cyclists in direct conflict with left turn vehicles as drivers are not prepared for this change in road provision as illustrated in **Figure 7**.

Figure 7: Drumcondra Road Upper / Griffith Avenue Junction

Access to DCU All Hallows and DCU Drumcondra by bicycle: There are no cycle facilities at these entrances, cyclist need to navigate across a QBC and one vehicle lane to position themselves in the vehicle right-turn lane. Alternatively cyclists can dismount at the signalised pedestrian facility approximately 500 metres from DCU Drumcondra entrance and use the footpath to enter. To access and egress from DCU All Hallows on Ormond Road cyclists are required to merge with vehicular traffic to navigate the junction.

4.2.6 Route 1 – Footpath Condition

Collins Avenue West has adequate footpath provision along the length of the route. From the junction with Larkhill Road to Ballymun Road the footpath is set back from the edge of the carriageway and separated by a tree lined grass verge.

The footpath surfacing and width vary along the length of the route and the side of the road on Collins Avenue West, Drumcondra Road Upper and Swords Road. Predominantly the surfacing is of adequate quality with minimal damage observed.

However there are locations along the route that have shared space with cyclists as well as sections that have a delineated / separated surface for pedestrians and cyclists. This has the potential reduce legibility and cause conflicts between pedestrians and cyclists.

There is one location past the Griffith Avenue /Swords Road junction traveling northbound where it was noted that there was surface run off from the adjacent sports ground causing ponding and resulting in the degradation of cycle track markings on the footpath / cycle track.

The footpath along Ormond Road past Church Road and the footpath on Grace Park Road deteriorates and presents a damaged and uneven surface.

4.2.7 Route 1 - Cycle Facility Provision

Cycle facilities along Collins Avenue West, Drumcondra Road Upper and Swords Road vary between on-road cycle lanes, QBC incorporating cycle lanes, off-road cycle tracks and shared space with pedestrians of variable widths. These changes in cycling conditions give reduced legibility to cyclists and other road users. The condition and quality of the surfaces also varies which adds to a reduction in cyclists' safety along the route.

There are no cycle facilities along Ormond Road and Grace Park Road.

4.3 Route 2 – Ballymun Road / Griffith Avenue / Drumcondra Road

Travelling from DCU Glasnevin, pedestrians using this route option would exit the secondary entrance to DCU Glasnevin off Ballymun Road and turn left onto Ballymun Road. At the junction with Ballymun Road and Griffith Avenue pedestrians would turn left onto Griffith Avenue and travel eastwards towards Drumcondra Road Upper. At the junction with Drumcondra Road Upper pedestrians would turn right.

There are a number of locations along Griffith Avenue for pedestrians to cross safely. Pedestrians would continue down Drumcondra Road Upper to access DCU Drumcondra. At the junction with Home Farm Road pedestrians would cross at the signalised pedestrian junction across Drumcondra Road Upper to access DCU All Hallows off Ormond Road. Pedestrians would cross Home Farm Road to access DCU Drumcondra to the right. This route is illustrated in **Figure 8**.

Cyclists are required to make a right-turn movement at the junction with Griffith Avenue / Drumcondra Road Upper and Drumcondra Road Upper / DCU Drumcondra.

Figure 8: Route 2

4.3.1 Route 2 – Journey Time

Between DCU Glasnevin and DCU Drumcondra / DCU All Hallows, the walking time exceeds the acceptable commuting time of 30 minutes for both routes shown in Table 4 while the cycling time is within the acceptable limit of 20 minutes.

Table 4: Route 2 - Journey Time

DCU Glasnevin to:	Travel Time (min)	
	Walking	Cycling
DCU Drumcondra	35	13
DCU All Hallows	39	14

4.3.2 Route 2 – Permeability Ratio

The permeability ratio exceeds the standards of 1.5 at a ratio of 2 for both campuses, outlined in **Table 5**.

This is the most impermeable route in this study highlighting that the route presents a significant diversion from the desire line. Upon leaving the western boundary of DCU Glasnevin pedestrians and cyclists are required to travel approximately 200 metres along an access road before exiting onto Ballymun Road which will allow them to travel to DCU Drumcondra and DCU All Hallows.

Table 5: Route 2 - Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	3125	1520	2
DCU All Hallows	3468	1670	2

4.3.3 Route 2 - Lighting

Ballymun Road, Griffith Avenue and Drumcondra Road Upper is well served by public lighting on either side of the road with no significant shadowing observed.

DCU Glasnevin access to Ballymun Road provides adequate lighting for pedestrians and cyclists, despite being tree-lined along most of the route.

The lighting along Ormond Road, once past the junction with Church Avenue deteriorates to poor lighting on one side of the road shadowed by trees. This could discourage people from walking or cycling especially in the winter months. The situation is the same for Grace Park Road.

4.3.4 Route 2 – Quality of Environment

Ballymun Road and Drumcondra Road are main radial arteries out of Dublin city centre and as such carry high volumes of traffic.

Griffith Avenue carries a moderate level of traffic, however due to the separation distance between the carriageway and the footpath (a tree-lined grass verge) the environmental quality is increased.

Ormond Road is a residential street with low traffic volumes. However at the junction with Church Road the road narrows to a single lane thereby reducing the quality of the pedestrian environment by reducing the distance between the pedestrians and the road. Ormond Road footpath width is less than 1.8 metres wide in places, which is considered poor.

4.3.5 Route 2 - Personal Security

Ballymun Road and Drumcondra Road Upper are regional roads and, despite running along consolidated urban areas, their main function is to facilitate the movement of traffic. There is a reduced sense of enclosure and reduced active street edges. Passive surveillance is provided by residential housing with the inclusion of off-road parking in private driveways.

Griffith Avenue is a residential street and an orbital link road.

The wide road and the low building height does not provide a high sense of enclosure, however the residential street is lined with established trees which increases the sense of intimacy. The presence of off-street parking, often within driveways with space for two cars provides a limited active street edge.

Ormond Road is a residential street with off-street parking with space for one vehicle provided on most properties. The presence of semi-detached residential housing provides an active street edge. The sense of enclosure is increased due to the reduced road width as Ormond Road is residential in nature. This results in a better feeling of safety when compared to the other roads.

Once past the junction with Church Avenue on Ormond Road the active street edge reduces due to one side of the road being defined by a boundary wall, despite a narrowing of the road. This deteriorates further on Grace Park Road due to the absence of active street edges and through the presence of walls bounding DCU All Hallows and a number of other institutions at this junction.

4.3.6 Route 2 – Road Safety

There are three junctions along the route where pedestrians are required to cross.

Griffith Avenue / Drumcondra Road Upper is a four-arm signalised junction, with staggered pedestrian crossings provided across each arm. However it is likely that users will cross at a point along Griffith Avenue at one of the two stand-alone pedestrian crossings.

Home Farm Road / Drumcondra Road Upper, is a signalised three-arm junction and does not have dedicated pedestrian facilities across Home Farm Road. There is a signalised pedestrian crossing across the northern side of Drumcondra Road Upper.

For pedestrians and cyclists there is a stand-alone pelican crossing on Drumcondra Road Upper between the junctions with Church Avenue and Ormond Road. This facilitates movements between DCU Drumcondra and DCU All Hallows. Cyclists are required to dismount when using this crossing.

The following junctions require crossing for cyclists.

The Ballymun Road / Griffith Avenue junction is a triangular gyratory one-way system. The QBC / cycle lane on the Ballymun Road stops approximately 130metres before the junction travelling southbound with an on-road cycle lane being provided until the junction. Cyclists turn right and travel eastbound on Griffith Avenue.

Travelling northbound cyclists are unable to turn at the same junction due to this one-way system. Consequently cyclists must use the next junction on Griffith Avenue. This requires cyclists to weave across two lanes of traffic in order to turn into Ballymun Road. This increases the route length in this direction.

At the Griffith Avenue / Drumcondra Road Upper, right-turning cyclists are not adequately provided for.

Travelling from Griffith Avenue onto Drumcondra Road Upper there is one right-turn lane with a second lane for straight-ahead and left-turn movements. Currently, there is no cycle provision as seen in **Figure 9**.

As a result cyclists are required to merge with the traffic and cross the straight through lane to position themselves in the right-turn lane. Once on Drumcondra Road there is a cycle facility within the QBC.

Figure 9: Griffith Avenue / Drumcondra Road Upper Junction

The Home Farm Road / Drumcondra Road Upper is a three armed signalised junction. Travelling southbound from DCU Glasnevin to DCU Drumcondra and DCU All Hallows cyclist travel straight ahead within a QBC lane. Travelling in the opposite direction cyclists are required to merge with vehicular traffic at the stop line. This places cyclists in direct conflict with left-turning vehicles as drivers are not prepared for this change in road provision.

4.3.7 Route 2 – Footpath Conditions

Ballymun Road, Griffith Avenue and Drumcondra Road Upper have adequate footpaths along the length of the route. The footpath along Drumcondra Road Upper travelling northbound in sections is delineated for use by pedestrians and cyclists resulting in the narrowing of the footpath. The presence of obstacles on the path (e.g. waste bins) results in the possibility of pedestrians diverting onto the cycle track.

DCU Glasnevin access to Ballymun Road is used by pedestrians. It was noted that some pedestrians were using the carriageway.

The footpath along Ormond Road past Church Avenue and the footpath on Grace Park Road deteriorates and presents a damaged and uneven surface and poor footpath width of less than 1.8 metres in sections.

4.3.8 Route 2 – Cyclist Facility Provision

A combination off-road cycle tracks, on-road cycle lanes and QBCs containing cycle lanes are provided on Ballymun Road and Drumcondra Road Upper.

The changes in cyclist facility gives reduced legibility to cyclists and other road users. The condition of the surfaces also changes as does the width of these facilities. This adds to a reduction in cyclist safety along the route.

The access road between DCU Glasnevin and Ballymun Road is well used by cyclists. There are no dedicated cycle facilities along this section.

No cycle facilities are provided on Griffith Avenue, Ormond Road and Grace Park Road.

4.4 Route 3 – Ballymun Road / St. Mobhi Road / Home Farm Road / Drumcondra Road

Travelling from DCU Glasnevin, pedestrians and cyclists would exit at the secondary entrance onto Ballymun Road and turn left. At the junction with Griffith Avenue pedestrians and cyclists would continue straight onto St. Mobhi Road. At the junction with Home Farm Road users turn left and continue until the junction with Drumcondra Road Upper.

At the junction with Home Farm Road, pedestrians can cross at the signalised pedestrian junction across Drumcondra Road Upper to access DCU All Hallows off Ormond Road. Pedestrians would cross Home Farm Road to access DCU Drumcondra to the right as illustrated in **Figure 10**.

Cyclists are required to turn right at the junction with Home Farm Road / Drumcondra Road Upper and Drumcondra Road Upper / DCU Drumcondra.

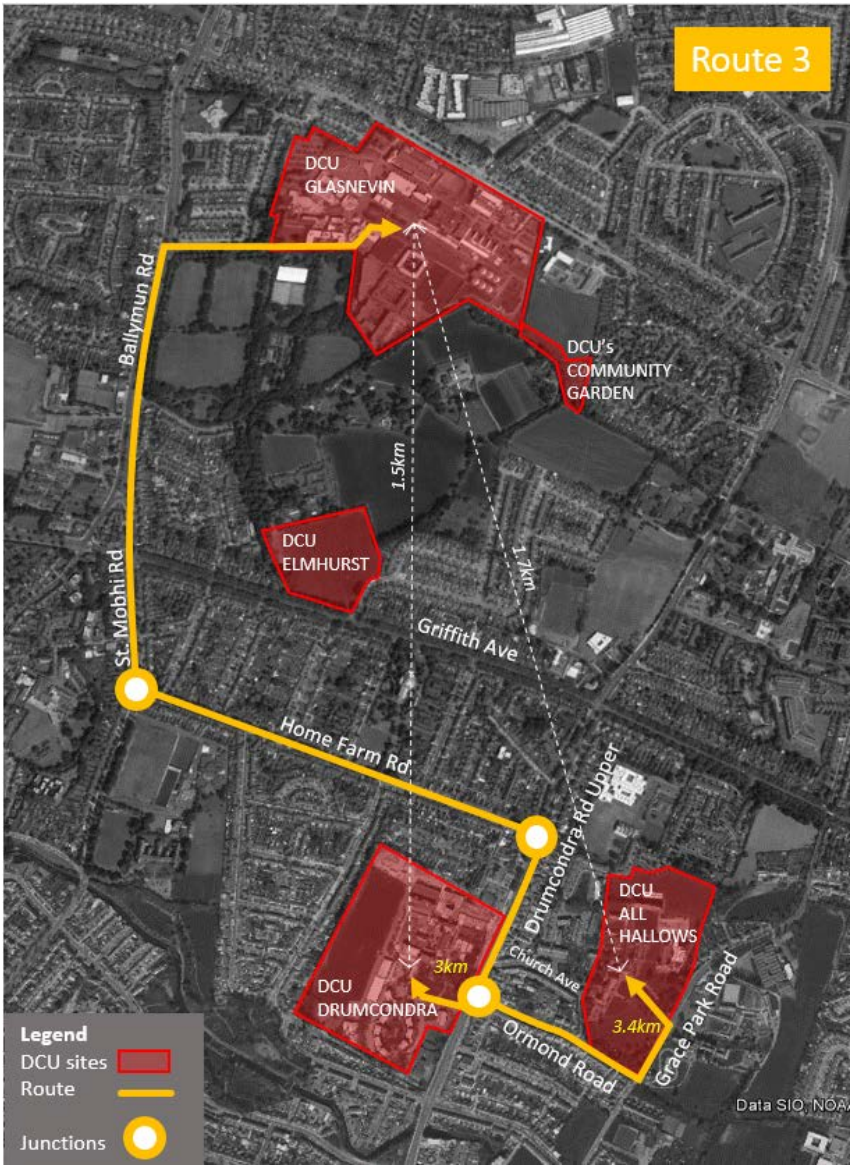

Figure 10: Route 3

4.4.1 Route 3 – Journey Time

Between DCU Glasnevin and DCU Drumcondra / DCU All Hallows the walking time exceeds the acceptable commuting time of 30 minutes for both routes while the cycling time is within the acceptable limit of 20 minutes as seen in **Table 6**. The distance is marginally shorter when compared with the above-described Route 2 (see section 4.3).

Table 6: Route 3 – Journey Time

DCU Glasnevin to:	Travel Time	
	Walking	Cycling
DCU Drumcondra	34	12
DCU All Hallows	37	13

4.4.2 Route 3 – Permeability Ratio

This is the second most impermeable route in the study with a permeability ratio of 2 seen in **Table 7**. Similar to Route 2 the necessity to use the western entrance and then travel down Ballymun Road increase the travel time of this route which adds unnecessary travel unlike Route 1.

Table 7: Route 3 – Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	3025	1520	2
DCU All Hallows	3368	1670	2

4.4.3 Route 3 – Lighting

Ballymun Road and Drumcondra Road Upper are well served by public lighting with bright lighting on either side of the road.

The access road from Ballymun Road into DCU Glasnevin while tree lined provides adequate lighting for pedestrians and cyclists on the footpath.

St. Mobhi Road and Home Farm Road are residential roads and are well lit by bright public lighting on either side of the road.

The lighting along Ormond Road, once past the junction with Church Road deteriorates to poor with one side of the road shadowed by trees. This can discourage people from walking or cycling especially in the winter months. The situation is the same for Grace Park Road.

4.4.4 Route 3 – Quality of Environment

Drumcondra Road Upper and Ballymun Road are main radial arteries out of Dublin city centre and as such carry high volumes of traffic. The volume of traffic reduces on St. Mobhi Road.

Home Farm Road is a street with moderate levels of traffic. There are traffic calming measures along this road in the form of speed ramps which increase the environmental quality of the street.

Ormond Road is a residential street with low traffic volumes. However at the junction with Church Avenue the road narrows to a single lane thereby reducing the quality of the pedestrian environment by reducing the distance between the pedestrians and the road. Ormond Road footpath width is less than 1.8 metres wide in places.

4.4.5 Route 3- Personal Security

Ballymun Road and Drumcondra Road Upper are regional roads and, as such, their main function is to facilitate the movement of traffic. Consequently there is a reduced sense of enclosure and limited active street frontage. Any limited passive surveillance is provided by residential housing with the inclusion of off-street parking within residential driveways.

Personal security is improved on St. Mobhi Road and Home Farm Road with better sense of enclosure due to reduced road width and active residential frontages.

Once past the junction with Church Avenue on Ormond Road the active street edge reduces due to one side of the road being defined by a boundary wall, despite a narrowing of the road. This deteriorates further on Grace Park Road due to the absence of active street edges and through the presence of walls bounding DCU All Hallows and a number of other Institutions at this junction.

4.4.6 Route 3 – Road Safety

There are a number of junctions that pedestrians need to navigate along this route.

Ballymun Road / Griffith Avenue / St. Mobhi Road junction is a four-arm signalised junction with signalised pedestrian facilities across Griffith Avenue.

St. Mobhi Road / Home Farm Road junction is not signalised, but this poses no issues as pedestrians do not need to cross St. Mobhi Road to access either campuses.

Home Farm Road / Drumcondra Road Upper junction has a pedestrian crossing across Drumcondra Road Upper. This facilitates movement to DCU All Hallows. No further crossings are required to enter DCU Drumcondra or DCU All Hallows.

There are eight access roads to residential roads on the northern side of Home Farm Road and four on the southern side. There are no pedestrian crossings for movement across Home Farm Road. However this should pose minimal issues until the junction with Drumcondra Road Upper as it was seen that the road has limited traffic volumes to that seen on other roads and will allow users to cross at safe locations along the road length.

The junctions that cyclists are required to navigate are outlined below.

The Ballymun Road / Griffith Avenue junction has previously been described in **Section 4.3.6**. Cyclists travel straight through this junction onto St. Mobhi Road when travelling southbound.

Cyclists navigating this junction travelling northbound from DCU Drumcondra or DCU All Hallows to DCU Glasnevin are unable to travel straight-ahead. Consequently cyclists must turn left, continue to the next junction to make the right-turn. This requires cyclists to weave across two lanes of traffic in order to turn into Ballymun Road.

St. Mobhi Road / Home Farm Road junction is not signalised. This junction poses minimal issues for southbound cyclist as a left turn movement is made. For cyclists traveling northbound, requiring a right turn movement, cyclists must wait until it’s safe to do so.

Home Farm Road / Drumcondra Road Upper junction is a three-arm signalised junction. Only right-turn movements are permitted from Home Farm Road onto Drumcondra Road Upper.

There are two lanes at the stop line on Home Farm Road, however there is only one vehicle lane on Drumcondra Road, with the second lane dedicated to buses. This results in the inside lane on Home Farm Road becoming redundant, with no cars observed using this lane. There is on-street parking approximately 25m from the stop line, which further reduces the usability of the inside lane, **Figure 11.**

Figure 11: Home Farm Road / Drumcondra Road Upper Junction

Travelling northbound to DCU Glasnevin cyclists are required to merge with vehicular traffic at the stop line. This places cyclists in direct conflict with left-turning vehicles as drivers are not prepared for this change in road provision as shown in **Figure 12.**

Figure 12: Drumcondra Road Upper / Home Farm Road Junction

4.4.7 Route 3 – Footpath Conditions

Good footpath conditions were observed along all the route, with the exception of Ormond Road and Grace Park Road.

The footpath along Ormond Road past Church Avenue and the footpath on Grace Park Road deteriorates and presents a damaged and uneven surface and poor footpath width of less than 1.8 metres in sections.

DCU Glasnevin access to Ballymun Road is used by pedestrians. It was noted that some pedestrians were using the road.

4.4.8 Route 3 – Cyclist Facility Provision

Cyclist facilities along Drumcondra Road, St. Mobhi Road and Ballymun Road vary from on-road cycle lanes, QBC incorporating cycle lanes, and off-road cycle tracks. The changes in cycling conditions give reduced predictability to cyclist and other road users. The condition of the surfaces also changes. This hinders cyclist's safety along the route.

DCU Glasnevin access to Ballymun Road is well used by cyclists. Cyclists use the road to navigate this route section.

On Ormond Road and Grace Park Road there are no cycle facilities.

4.5 Route 4 – Ballymun Road / St. Mobhi Road / Home Farm Road / Home Farm Park

Travelling from DCU Glasnevin, pedestrians and cyclists using this route would exit at the secondary entrance onto Ballymun Road, turn right and continue straight until the junction with Home Farm Road. At Home Farm Road users turn left and continue eastwards. At the junction with Home Farm Park users turn right and can either turn left or right at the end of the road.

This route proposes a new access through existing laneways between residential houses on Home Farm Park to access DCU Drumcondra illustrated in **Figure 13**. This route is similar to Route 3 and so only the variation from Home Farm Road will be reviewed.

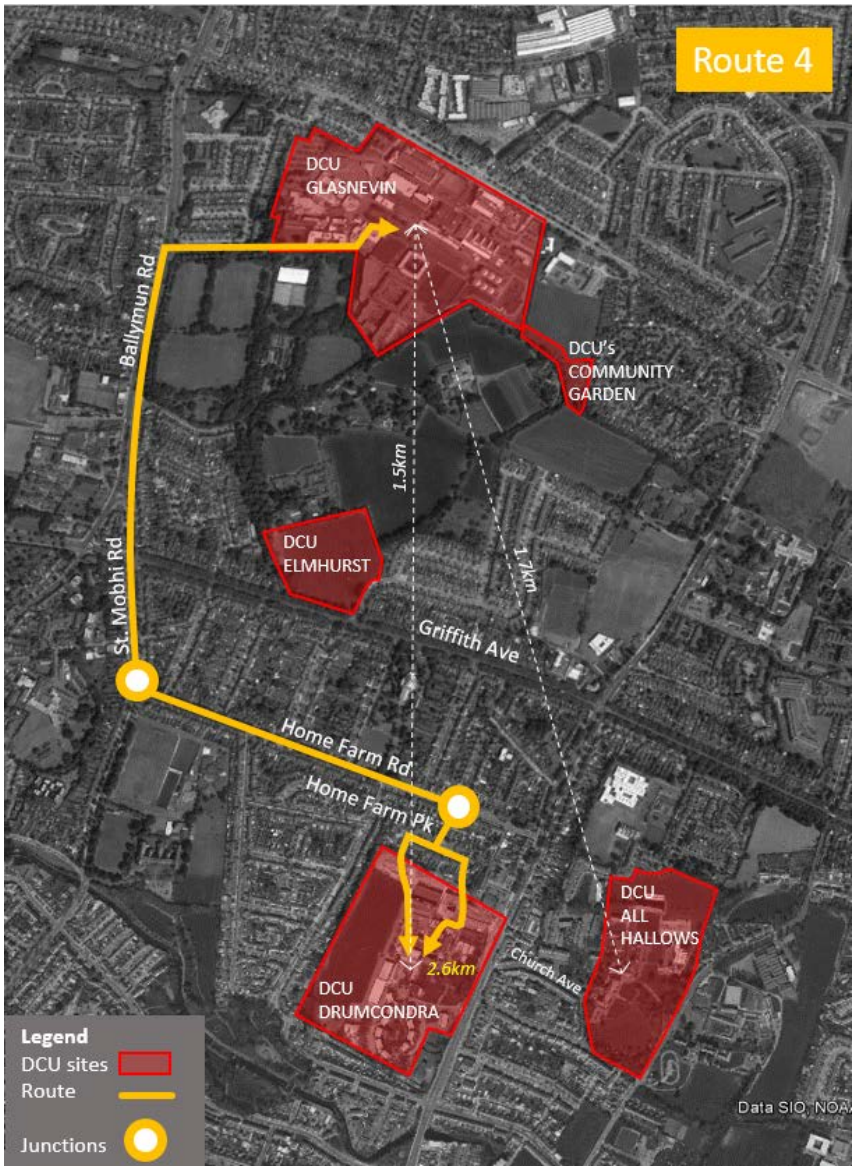

Figure 13: Route 4

4.5.1 Route 4 – Journey Time

This proposed route variation sees a reduction in travel time for pedestrians (5 minutes) and cyclists (1 minute) when compared with Routes 1, 2 and 3 by removing the requirement to use Drumcondra Road Upper to access DCU Drumcondra.

The walking time is still above the recommended limit, but it is reduced from the current travel time seen in **Table 8.** The cycling travel time is within the recommended limit of 20 minutes.

Table 8 Route 4 – Journey Time

DCU Glasnevin to:	Travel Time (mins)	
	Walking	Cycling
DCU Drumcondra	29	11

4.5.2 Route 4 – Permeability Ratio

There is an average reduction in the permeability ratio of 0.2 seen in **Table 9**, however the reduction still results in the internationally accepted standard of 1.5 being exceeded.

Table 9 Route 4 – Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2625	1520	1.8

4.5.3 Route 4 – Lighting

Home Farm Park is a residential cul-de-sac with good bright lighting on either side of the road. The potential access locations into DCU Drumcondra through laneways between residential dwellings do not have lighting at present. However, these would need to be provided with good Metal Halide lighting with focused light to illuminate the footpath and minimise light pollution.

4.5.4 Route 4 – Quality of Environment

Home Farm Road is a residential cul-de-sac and has low traffic volumes with minimal noise. The potential laneway access does not carry any traffic, pedestrian or cycle movements.

4.5.5 Route 4 – Personal Security

There is a good sense of enclosure on Home Farm Park, however on the potential access laneways there are no active street edges, which provides poor passive surveillance, albeit along a relatively short distance, as illustrated in **Figure 14**.

Figure 14: Home Farm Park Laneways

4.5.6 Route 4 – Road Safety

There is one new junction in this route variation at Home Farm Road / Home Farm Park. This junction is not signalised and has no dedicated crossing facilities for pedestrians or cyclists.

4.5.7 Route 4 – Footpath Conditions

The footpaths are currently in poor condition with cracking and uneven surfaces observed. There may be insufficient width in the laneway to provide comfortable through access for both pedestrians and cyclists. Footpaths on each side of the road along Home Farm Park are in good condition.

4.5.8 Route 4 – Cycle Facility Conditions

The current surface along both potential laneways is damaged and difficult to manoeuvre on a bicycle. The narrow width of the lane means that it is not sufficient to carry volumes of both cyclists and pedestrians.

4.5.9 Route 4 – Land Ownership

The laneway leads to private gates suggesting it is in private use. Agreements need to be made with the neighbouring residents and Dublin City Council to gain access to the lane as well as creating an entrance into DCU Drumcondra.

This route could to face resistance from local residents, even if land ownership issues are resolved.

4.6 Route 5 – Collins Avenue / Drumcondra Road / Church Avenue (access to DCU All Hallows)

Travelling from DCU Glasnevin, pedestrians and cyclists using this route would at the main entrance off Collins Avenue West and turn right. At the junction with Collins Avenue West and Swords Road pedestrians would turn right to continue onto Drumcondra Road Upper.

At the junction with Home Farm Road pedestrians would cross at the signalised pedestrian junction across Drumcondra Road Upper to access DCU All Hallows off Church Avenue as illustrated in **Figure 15**.

This is a route variation from Route 1, and as such only the variation from Church Avenue will be assessed. Cyclists are required to make right-turn movements at the junction with Collins Avenue West / Swords Road.

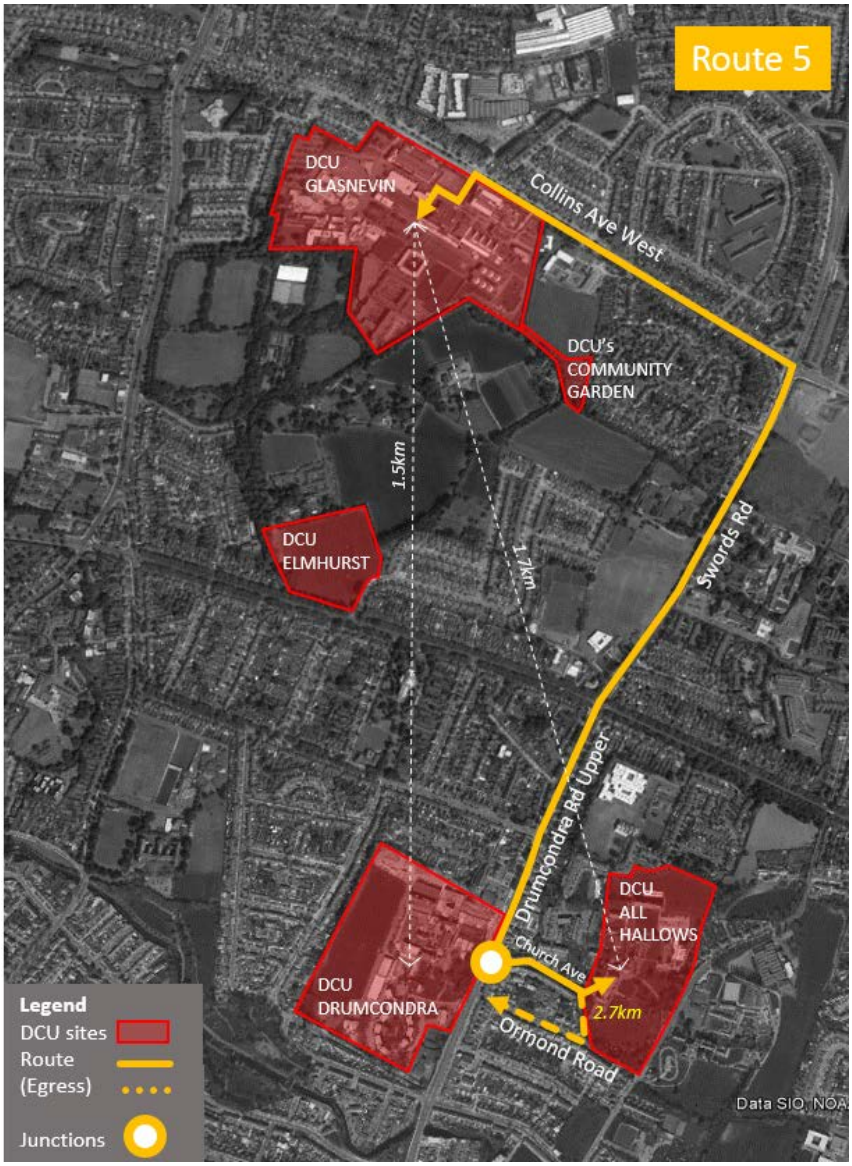

Figure 15: Route 5

4.6.1 Route 5 – Journey Time

This route variation reduces walking time by 5 minutes and a cycle time of 2 minutes by opening up the access to DCU All Hallows on Church Avenue when compared to Route 1. The walking time is still above the recommended limit however it is reduced from the current travel time. The cycling travel time is within the recommended limit of 20 minutes as seen in **Table 10**.

Table 10: Route 5 – Journey Time

DCU Glasnevin to:	Travel Time (mins)	
	Walking	Cycling
DCU All Hallows	30	11

4.6.2 Route 5 – Permeability Ratio

There is a reduction in the permeability ratio by 0.2 when compared to Route 1 as seen in **Table 11**, this is just above the internationally accepted standards of 1.5.

Table 11: Route 5 - Permeability Ratio

DCU Glasnevin to:	Permeability Ratio
DCU All Hallows	1.6

4.6.3 Route 5 – Lighting

There is good lighting on Church Avenue with bright public lighting on both sides of the road.

4.6.4 Route 5 – Quality of Environment

Church Avenue is a one-way residential road with low traffic volumes. The rear entrance to DCU All Hallows currently does appear to be used as a pedestrian and cyclist entrance. It does, however appear to be used as an occasional service entrance. The environment does not suggest that it is to be used or that it is an access to a DCU campus except for a small sign seen in **Figure 16**.

Figure 16: Church Road & rear entrance to DCU All Hallows

4.6.5 Route 5 – Personal Security

There is a good sense of enclosure on Church Avenue with a narrower road and terrace housing typology. The use of terraced houses also creates a good active street frontage with limited building setbacks.

4.6.6 Route 5 – Road Safety

Church Avenue is a one-way road (west to east), consequently cyclists egressing from the rear entrance to All Hallows are unable to use Church Avenue. Cyclists must travel to the end of Church Avenue and take a right-turn at the junction with Ormond Road. This junction is not signalised and there is no provision for cyclist or pedestrian to cross the road.

There is a stand-alone pedestrian crossing at the mid-point between Church Avenue and Ormond Road to facilitate pedestrian movements across Drumcondra Road Upper. Cyclists can dismount to use this crossing.

4.6.7 Route 5 – Footpath Conditions

No damaged surfaces were observed on the footpaths on either side of Church Avenue.

4.6.8 Route 5 – Cycle Facility Provision

There are no cyclist facilities on Church Road. Cyclists share the road with other vehicles.

4.7 Route 6 – Albert Park / Bantry Road / Drumcondra Road

Travelling from DCU Glasnevin, pedestrians and cyclists using this route would exit through a proposed new exit into Albert Park and travel towards Hampstead Avenue. At Hampstead Avenue, a left turn would be made onto the access lane for Elmhurst nursing home.

Continuing straight down this lane, **Figure 17**, and through DCU Elmhurst, pedestrians and cyclists would exit onto Griffith Avenue opposite the junction with Bantry Road.

Users would travel down Bantry Road until the junction with Home Farm Road and turn left. At the junction with Drumcondra Road Upper pedestrians accessing DCU All Hallows would cross at the signalised pedestrian crossing across Drumcondra Road Upper off Ormond Road. Cyclists are required to make a right-turn movement at the Home Farm Road / Drumcondra Road Upper and Drumcondra Road Upper and / DCU Drumcondra junctions. This route is illustrated in **Figure 18**.

This is similar to Route 3 and as such only the variation between DCU Glasnevin and Home Farm Road will be discussed.

Figure 17: Elmhurst nursing home access road

Figure 18: Route 6

It is worth noting that the National Transport Authority has identified a route through Albert Park and DCU Elmhurst and the proposed new access points into Albert Park from DCU Glasnevin as a Greenway in its Greater Dublin Area Cycle Network Plan, which was adopted in 2014 (see **Section 2.3**).

4.7.1 Route 6 – Journey Time

This proposed route variation reduces the walking time by approximately 6 minutes to both campuses and the cycling time by approximately 2 minutes seen in **Table 12**. The opening up of Albert Park at another location on the southern boundary enables increased permeability to key destinations such as the Students Union, The Helix, student accommodation as well as a number of the lecture buildings.

Table 12: Route 6 – Journey Time

DCU Glasnevin to:	Travel Time (mins)	
	Walking	Cycling
DCU Drumcondra	28	10
DCU All Hallows	32	12

4.7.2 Route 6 - Permeability Ratio

This proposed route variation aims to increase permeability from DCU Glasnevin onto Griffith Avenue by removing the requirement to use Ballymun Road to travel between the DCU campuses.

There is a reduction in the permeability ratio of on average 0.3 to both campuses DCU Drumcondra and DCU All Hallows seen in **Table 13**.

Table 13: Route 6 – Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2540	1520	1.7
DCU All Hallows	2923	1670	1.7

4.7.3 Route 6 – Lighting

The lighting in Albert Park is poor with orange lighting on one side of the path for a section of the route only as illustrated in **Figure 19**.

Figure 19: Route through Albert Park

There is poor lighting on Hampstead Avenue and along the private access road to Elmhurst nursing home with shadowed lighting on one side of the road.

DCU Elmhurst is a green field site, but should it be used as part of this route, it would need to be provided with good Metal Halide lighting with focused light to illuminate the footpath and minimise light pollution.

Bantry Road is a residential road with good lighting on either side of the road.

4.7.4 Route 6 – Quality of Environment

There are no cars permitted in Albert Park and there is access-only traffic on Hampstead Avenue to a car park associated with the park, as well as to the aforementioned nursing home. Consequently there are low traffic volumes on this section of the route.

Bantry Road is a residential street with low traffic volumes. It is one of five roads that link Griffith Avenue to Home Farm Road, any of which can provide a cycle/pedestrian connection between those two roads. However, we have considered this particular road, as it appears to be the one included in the proposed cycle link as per the NTA Greater Dublin Area Cycle Network Plan.

4.7.5 Route 6 – Personal Security

The majority of this route is through a park and a proposed greenfield site. As a result there are no conventional indicators to determine the sense of enclosure and level of active street edges as this route has none of them.

Associated park activities both recreational and sporting improve the feeling of personal security in Albert Park. The visual connection with Elmhurst nursing home while moving through the private access road also gives a level of personal security.

The proposed route will be provided with illuminated emergency call points, **Figure 20**, to enhance the feeling of personal security while ensuring a visual connection is maintained with Griffith Avenue while transitioning through DCU Elmhurst.

Figure 20: Emergency Call Point (example)

Bantry Road provides a good sense of enclosure due to reduced road width and good active street frontages.

4.7.6 Route 6 – Road Safety

A proposed egress location from DCU Elmhurst onto Griffith Avenue requires pedestrian and cyclist crossing to Bantry Road. There is currently a stand-alone pedestrian crossing on Griffith Avenue east of Bantry Road. This crossing is unsuitable for the proposed egress from DCU Elmhurst due to the diversion necessary.

A left-turn movement is required at Bantry Road / Home Farm Road junction. There are no pedestrian or cyclist crossing facilities at this priority-controlled junction.

4.7.7 Route 6 – Footpath Conditions

The footpaths within Albert Park are observed to be in good condition. The footpaths are poor on Hampstead Avenue as the width is under 1.8 metres and it was observed that they were damaged.

The footpaths through DCU Elmhurst would be provided through a wide shared two-way cycle and pedestrian facility to allow for high volumes of activity.

There are footpaths on either side of Bantry Road and Griffith Avenue which are in good condition.

4.7.8 Route 6 – Cycle Facility Provision

Cycling is presently not permitted in Albert Park resulting in no cycling provision.

For this route to operate adequately as a cycle connection, this usage restriction should be reviewed with Dublin City Council. There are no cycle facilities present on Hampstead Avenue.

A cycleway would be provided through DCU Elmhurst as per **Section 4.7.7**.

Bantry Road does not provide any cycle facilities, but is considered as suitable for shared cycle and vehicular circulation.

4.7.9 Route 6 – Land Ownership

Albert Park is owned by Dublin City Council and closes at various times throughout the year. The closing times range from 5pm to 10pm, depending on the time of the year. Currently cyclists are not allowed through the park. For this route to operate adequately as a pedestrian and cycle connection, these time restriction should be reviewed with Dublin City Council.

Hampstead Avenue is a public road providing access to a number of houses as well as Albert Park and their associated buildings.

The private road to Elmhurst nursing home is privately owned by a 3rd party. The southern access to DCU Elmhurst is directly off Griffith Avenue, a public road.

Consultation is required with Dublin City Council and the 3rd party landowner to agree usage of the laneway between Hampstead Avenue and DCU Elmhurst.

4.8 Route 7 – DCU's Community Garden / Drumcondra Road Upper

Travelling from DCU Glasnevin, pedestrians and cyclists using this route would exit from the eastern access into DCU Community Garden, travel through the garden and exit to the east. Users would then travel along a path bounding the farm to the south and Iveragh estate to the north and cross through Plunket College to egress onto Swords Road. At Swords Road users turn right and travel through two further junctions with Griffith Avenue and Home Farm Road until a left turn is required to access DCU All Hallows and right-turn is required for DCU Drumcondra.

Pedestrians accessing DCU All Hallows can cross at a number of locations along Swords Road and Drumcondra Road Upper.

Cyclists would have to make two right-turn movements when exiting Plunket College / Swords Road and Drumcondra Road Upper / DCU Drumcondra.

As this route is a variation of Route 1, only the proposed section from DCU Glasnevin to Swords Road will be assessed. The route is illustrated in **Figure 21**.

Figure 21: Route 7

4.8.1 Route 7 – Journey Time

This variation reduces the travel time compared to Route 1 by approximately 6 minutes for pedestrians and approximately 2 minutes for cyclists, as shown in **Table 14**.

Table 14: Route 7 – Journey Time

DCU Glasnevin:	Travel Time (mins)	
	Walking	Cycling
DCU Drumcondra	25	9
DCU All Hallows	30	11

4.8.2 Route 7 – Permeability Ratio

This route variation increases the permeability to the eastern boundary of DCU Glasnevin through DCU's Community Garden. The reduction in the permeability ratio of an average of 0.35 to both campuses from DCU Glasnevin reveals the largest increase in permeability to an average of 1.55 making this the most permeable route in this study shown in **Table 15**, but still exceeding internationally accepted standards.

Table 15: Route 7 – Permeability Ratio

DCU Glasnevin:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2275	1520	1.5
DCU All Hallows	2668	1670	1.6

4.8.3 Route 7 – Lighting

The suggested route is not in place at present, but should it be implemented. Good Metal Halide lighting with focused light to illuminate the footpath and minimise light pollution would need to be provided between DCU Glasnevin and the Swords Road.

4.8.4 Route 7 – Quality of Environment

There is no traffic on the route section between DCU Glasnevin and the Swords Road and therefore, there are no associated environmental issues.

4.8.5 Route 7 – Personal Security

The proposed route will be provided with illuminated emergency call points (see **Figure 20**) to enhance the feeling of personal security. Maintaining a visual connection to a source of activity (e.g. a road or sports field) will not be possible, this reduces the feeling of personal security on the route.

4.8.6 Route 7 – Road Safety

Upon egressing onto Swords Road, pedestrians will follow along the road. Cyclists are required to cross Swords Road. There is a pelican crossing at Plunket College which can be used by cyclists when dismounted.

4.8.7 Route 7 – Footpath Conditions

The footpaths between DCU Glasnevin and Swords Road would be provided through a wide shared two-way cycle and pedestrian facility to allow for high volumes of activity.

4.8.8 Route 7 – Cycle Facility Provision

A cycleway will be provided as per **Section 4.8.7.**

4.8.9 Route 7 – Land Ownership

Consultation is required with Department of Education and the 3rd party landowner to gain access to lands and the school grounds.

4.9 Route 8 – Ballymun Road / St. Mobhi Road / Home Farm Road / Ferguson Road

Travelling from DCU Glasnevin, pedestrians and cyclists using this route would exit at the secondary entrance on Ballymun Road and turn left. At the junction with Griffith Avenue users would continue straight through until the junction with Home Farm Road where users would turn left and travel eastbound.

At the junction with Ferguson Road users would turn right and continue approximately 150 metres south until a laneway access to the left. DCU Drumcondra would be accessed through a proposed western entrance as shown in **Figure 22**. Cyclists would have to make one right-turn movement at Ferguson Road / DCU Drumcondra.

Route 8 uses a comparable route to Route 3 but takes a variation through Ferguson Road to a potential western entrance to DCU Drumcondra. As such only this variation will be reviewed.

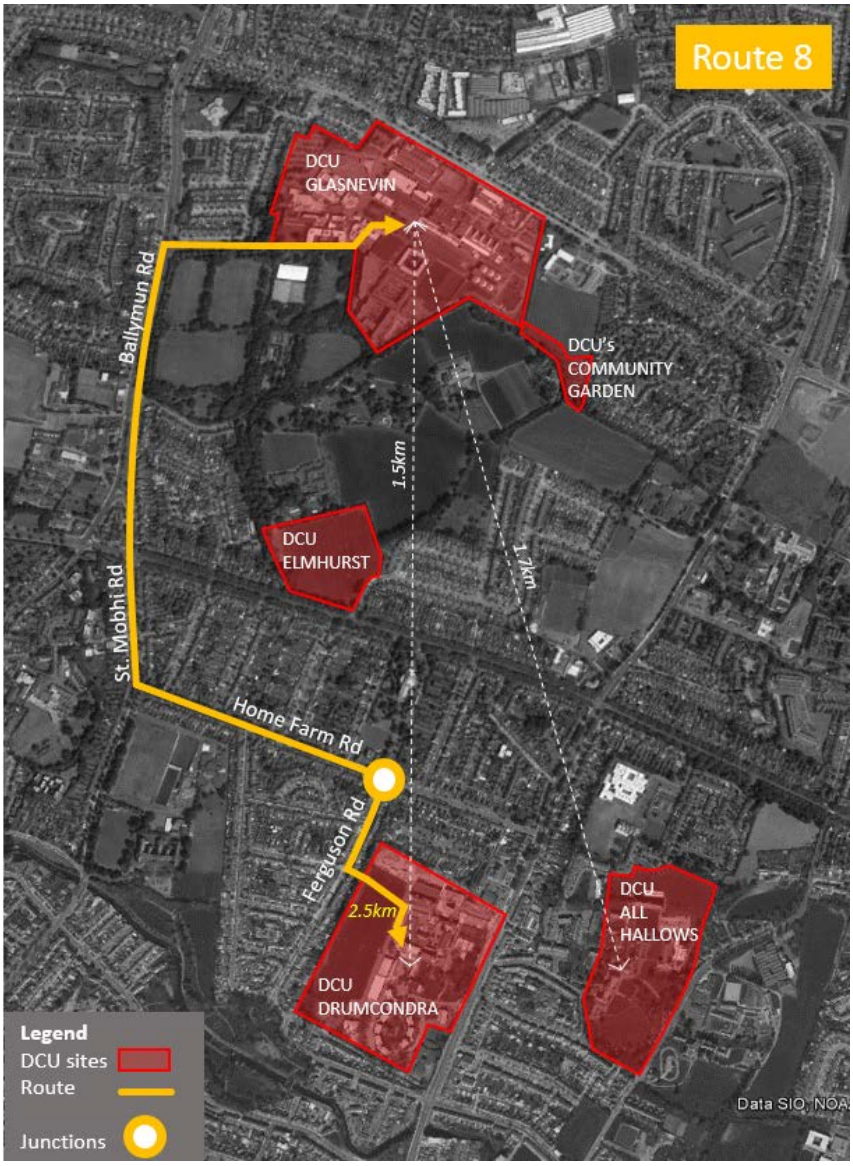

Figure 22: Route 8

4.9.1 Route 8 – Journey Time

Accessing DCU Drumcondra through the western boundary off Ferguson Road reduces travel time the comparable Route 3 by 7 minutes for pedestrians and 2 minutes for cyclists as shown in. **Table 16.**

Table 16: Route 8 – Journey Time

DCU Glasnevin to:	Travel Time (mins)	
	Walking	Cycling
DCU Drumcondra	28	10

4.9.2 Route 8 – Permeability Ratio

There is a reduction in permeability ratio of 0.3, which is still above the upper limit of 1.5 shown in **Table 17**.

Table 17: Route 8 – Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2534	1520	1.7

4.9.3 Route 8 – Lighting

Ferguson Road is a residential cul-de-sac with good bright lighting on either side of the road. The potential access locations into DCU Drumcondra through a laneway between residential dwellings have no lighting.

4.9.4 Route 8 – Environment

Ferguson Road is a through residential street with low traffic volumes and minimal noise. The potential laneway access does not presently carry any traffic, pedestrian or cyclist movements.

4.9.5 Route 8 – Personal Security

There is a good sense of enclosure on Ferguson Road, however on the potential access laneway there are no active frontages and the route provides poor passive surveillance as illustrated in Figure 23

Figure 23: Ferguson Road potential connection to DCU Drumcondra

4.9.6 Route 8 – Road Safety

There is one additional junction on this proposed route, which is the junction between Home Farm Road and Ferguson Road. There is a pelican crossing on Home Farm Road, immediately to the west of this junction.

4.9.7 Route 8 – Footpath Conditions

There are footpaths on either side of Ferguson Road, which are of adequate width. No surface damage was noticed.

While there is a footpath to access the laneway this is not wide enough for two people to pass.

4.9.8 Route 8 – Cycle Facility Provision

There are no cycle facilities on Ferguson Road. There is insufficient width to comply with cycle track width seen in **Section 4.9.7**. However, this is a calm street, suitable to shared vehicular and cycle use.

4.9.9 Route 8 – Land Ownership

The laneway is gated suggesting it is in private use. Agreements need to be made with the neighbouring residents and Dublin City Council to gain access to the lane for an entrance into DCU Drumcondra.

Another option would be to purchase a house on Ferguson Road in order to gain an access into DCU Drumcondra.

4.10 Route 9

Route 9 takes variations from Route 5 and Route 6. Travelling from DCU Glasnevin, pedestrians and cyclists would use a proposed new access into Albert Park, onto Hampstead Avenue and exit onto Griffith Avenue through DCU Elmhurst.
Users would travel on Bantry Road, turn right onto Home Farm Road and travel until the junction with Drumcondra Road Upper and turn right. Users wishing to access DCU All Hallows turn left at Church Avenue to access their rear entrance, while users accessing DCU Drumcondra turn right into the main entrance. This is illustrated in **Figure 24**.

Figure 24: Proposed Pedestrian and Cyclist Route

As mentioned in **Section 2.3** the route through Albert Park with an exit using Bantry Road is provided in the NTA Greater Dublin Area Cycle Network Plan 2014.

4.10.1 Route 9 – Journey Time

Accessing DCU Glasnevin through the southern boundary via Albert Park reduces travel time the comparable Route 3 by 7 minutes for pedestrians and 2 minutes for cyclists shown in **Table 18**.

Table 18: Route 8 – Journey Time

DCU Glasnevin to:	Travel Time (mins)	
	Walking	Cycling
DCU Drumcondra	29	10
DCU All Hallows	28	10

4.10.2 Route 9 – Permeability Ratio

DCU All Hallows sees a maximum reduction in permeability ratio to 1.5 which is at the upper limit of the acceptable standards. DCU Drumcondra sees a maximum reduction to 1.7 shown in **Table 19**. While this is still above the acceptable standards set at 1.5 it is an improvement to the current situation of 2.0.

Table 19: Route 8 – Permeability Ratio

DCU Glasnevin to:	Distance (m)		Permeability Ratio
	Journey	Direct	
DCU Drumcondra	2540	1520	1.7
DCU All Hallows	2524	1670	1.5

4.10.3 Route 9 – Lighting

The lighting conditions along the various sections of this route have been described in **Section 4.6.3** and **Section 4.7.3**.

4.10.4 Route 9 – Quality of Environment

The quality of environment along the various sections of this route have been described in **Section 4.6.4** and **Section 4.7.4**.

4.10.5 Route 9 – Personal Security

The personal safety conditions along the various sections of this route have been described in **Section 4.6.5** and **Section 4.7.5**.

4.10.6 Route 9 – Road Safety

The road safety conditions along the various sections of this route have been described in **Section 4.6.6** and **Section 4.7.6**.

4.10.7 Route 9 – Footpath Conditions

The footpath conditions along the various sections of this route have been described in **Section 4.6.7** and **Section 4.7.7**.

4.10.8 Route 9 – Cycle Facility Provision

The cycle facilities provided along the various sections of this route have been described in **Section 4.6.8** and **Section 4.7.8**.

4.10.9 Route 9 – Land Ownership

Aspects pertaining to the land ownership along the various sections of this route have been described in **Section 4.7.9**.

4.11 Options Assessment

4.11.1 Introduction

Section 2 outlined the methodology for the report and set out an assessment that compares the journey time, permeability ratio, lighting, quality of environment, personal security, road safety, footpath condition, cycle facility provision and if there was any policy provision or land ownership constraints. The results of the analysis are summarised in the table below. The routes are ranked under five headings from significant advantages to significant disadvantages over other route options.

For each identified route the summary table collates and summarises the route option appraisal under each of the assessment criteria.

For each individual assessment criterion considered, routes have been relatively compared against others based on a five point scale, ranging from having significant advantages to having significant disadvantages over the other route options. For illustrative purposes, this five point scale is colour coded with advantaged routes graded to 'dark green' and disadvantaged routes graded to 'dark red'.

Table 20: Route Options Ranking Scale

Colour	Description
	Significant advantages over the other options
	Some advantages over the other options
	Neutral compared to other options
	Some disadvantages over the other options
	Significant disadvantages over the other options

4.11.2 Summary

Table 21 compares the results of the route options using the five point scale. The table shows that route 9 produces the best results while route 1, route 2, and route 3 do not appear to result in real accessibility benefits. This is mainly due to the reduced lighting and road safety noted on this routes.

Table 21: Summary of Access to DCU Drumcondra

DCU Glasnevin to:		Permeability Ratio	Lighting	Quality of Environment	Personal Security	Road Safety	Footpath condition	Cycle Facility Provision	Land Ownership
Route 1	DCU Drumcondra								
Route 2	DCU Drumcondra								
Route 3	DCU Drumcondra								
Route 4	DCU Drumcondra								
Route 6	DCU Drumcondra								
Route 7	DCU Drumcondra								
Route 8	DCU Drumcondra								
Route 9	DCU Drumcondra								

The proposed routes for DCU All Hallows access are shown to have advantages over the existing routes as illustrated in **Table 22**. Route 9 sees significant advantages as it is a combination of two routes which propose variations that benefit both DCU All Hallows and DCU Drumcondra.

Table 22: Summary of Access to DCU

DCU Glasnevin to:		Permeability Ratio	Lighting	Quality of Environment	Personal Security	Road Safety	Footpath condition	Cycle Facility Provision	Land Ownership
Route 1	DCU All Hallows								
Route 2	DCU All Hallows								
Route 3	DCU All Hallows								
Route 5	DCU All Hallows								
Route 6	DCU All Hallows								
Route 7	DCU All Hallows								
Route 9	DCU All Hallows								

4.11.3 Conclusion

As can be seen in **Table 21** and **Table 22** Route 5 Route 6 and Route 8 offer more benefits over the other options. Route 8 while scores highly regarding road safety and personal security poor worst regarding Land Ownership and the requirements for land purchase and land agreements. Route 5 and Route 6 are further looked at and when combined in Route 9 they offer the best option. Route 9 is therefore the best option to increase the accessibility conditions between DCU Glasnevin with DCU Drumcondra and DCU All Hallows. The main reasons are as follows:

- Reduction in the current travel time between campuses;
- Increase in the level of permeability for the campuses as well as the surrounding areas;
- Better quality of environment and road safety due to the reduced use of regional roads and their associated junctions by vulnerable users; and
- Limited need to upgrade sections of the regional roads and junctions.
- Consider route via Ferguson Road southbound and route via swords road northbound. Therefore increase quality of cycle facilities along route necessary.

5 Public Transport Route Appraisal

5.1 Introduction

A Public Transport Appraisal of the existing bus routes was carried out, considering those routes that directly connect the DCU campuses. The assessment identified current Dublin Bus services that are provided along the routes, access time and travel time as well as the Quality Bus Corridor (QBC) provision.

This enables a better understanding of the current level of public transport provision between DCU sites, in order to identify potential ways to increase the level of connectivity through public transport.

5.2 Existing Bus Service Appraisal

There are three sets of bus stops that serve DCU Glasnevin, one within the campus, one on Ballymun Road (northbound and southbound) and one on Swords Road (northbound and southbound). DCU Drumcondra and DCU All Hallows are served by the same set of bus stops on Drumcondra Road Upper (northbound and southbound). These bus stops, as well as the associated bus services are illustrated in **Figure 25**.

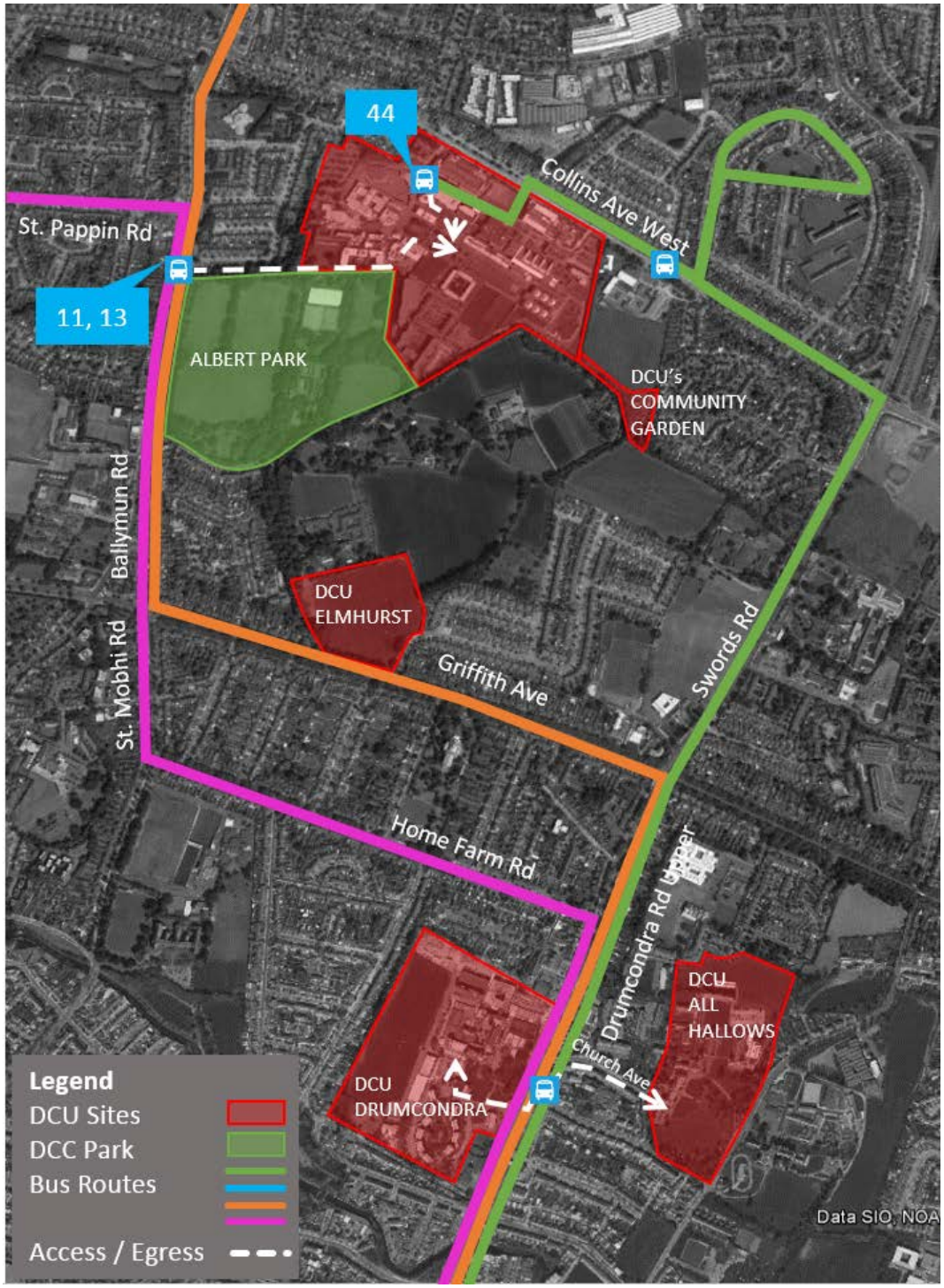

Figure 25: Bus services and routes

The nearest bus stop for DCU Glasnevin is located within the campus, at The Helix within the centre of the campus. This is a terminus bus stop, which is sheltered and provided with RTPI signage.

The bus service at this stop is the Dublin Bus service 44, which connects DCU with Enniskerry, in County Wicklow. The 44 service uses Collins Avenue West, serves Larkhill Road residential estate and follows Swords Road and Drumcondra Road Upper towards Dublin City Centre and from there, to Enniskerry. A QBC is provided along the Swords Road and Drumcondra Road Upper.

The next nearest bus stops are located on Ballymun Road, approximately 550 metres from the centre of DCU Glasnevin campus. Accessing to these stops is via the secondary campus access on Ballymun Road. The DCU Glasnevin access road onto Ballymun Road is a single carriageway with a footpath on one side of the road. There is an RTPI sign at the campus end of the road to inform users of the expected arrival time of buses at the stop on the Ballymun Road, as illustrated in **Figure 26**.

Figure 26: RTPI on DCU Glasnevin access road

The southbound bus stop is located on the near side of the road approximately 50metres from the access road and is provided with a bus shelter. The northbound bus stop is located across the Ballymun Road, a dual carriageway. There is a stand-alone pedestrian crossing which facilitates movement between the bus stop and DCU Glasnevin.

Bus services at the DCU Ballymun Road stop include:

- Dublin Bus service 13, between Harristown and Grange Castle
- Dublin Bus service 11, between Wadelai Park and Sandyford

These services use Ballymun Road and Drumcondra Road Upper, both of which are provided with bus lanes. Bus service 11 uses Home Farm Road while bus service 13 use Griffith Avenue. These roads are not catered with bus lanes.

The bus stops on Drumcondra Road northbound and southbound both have bus shelter and RTPI provision.

There are stand-alone pedestrian signalised crossings close to the bus stops to facilitate movement across Drumcondra Road Upper to access and egress DCU Drumcondra and DCU All Hallows. DCU Drumcondra is accessed off Drumcondra Road Upper at either the main vehicular entrance or the DCU library entrance. Access to DCU All Hallows is off Church Avenue.

Table 23 summarises the inter-peak frequency, travel time, access time and total journey time of each bus between the DCU sites and ranks them according to the method explained in Section 2.5.4. The inter-peak frequency is used as it is expected that most of the trip between the campuses will take place over this period 10:00 and 16:00.

Table 23: Current bus service summary

		Inter peak frequency (per hour)	Journey Time* (min)	Nearest Access (mins)	Total Travel Time
44	DCU Glasnevin to Enniskerry	1	13	2	15
13	Harristown to Grange Castle	4	8	9	17
11	Wadelai Park to Sandyford	2	11	9	20

** Journey time between DCU Glasnevin and DCU Drumcondra bus stops*

The bus services with the best result are the services accessed from Ballymun Road stop, the 11 and 13 services. This is due to the balance between the frequency and travel time. The service from The Helix stop, while having the shortest access time has the most infrequent service. The opposite is seen with the Swords Road stop, this bus stop has the most frequent bus services but has the longest access time.

5.3 Potential Bus Service Improvements

5.3.1 Connectivity to the bus stops

One of the bus stops serving DCU Glasnevin is remote from the campus core. Therefore, the possibility of reducing the walk distance by exploring potential short-cuts was investigated. However the Ballymun Road stop avails of the most direct connection with the campus along the campus access road. The scope for improvement is therefore very limited.

Improvement to the waiting facilities at the bus stop was also considered. Shelters could be extended at the bus stops in DCU, Ballymun Road and Drumcondra Road Upper to cater for peak times.

5.3.2 Route improvements

The potential to reduce the journey time between the campuses through alterations to the existing routes was also explored. Most services take the most direct route, with the exception of service 44, which includes a loop along Larkhill Road to the north of Collins Avenue West.

Should this service run directly along Collins Avenue West, rather than taking the loop along Larkhill Road, a journey time saving of approximately 3 minutes would be achieved, corresponding to about 23% of the existing journey time between the two campuses.

5.3.3 Frequency improvements

Dublin Bus service 44 would also be the most logical subject of improved frequencies. As discussed, it is the only bus that connects directly DCU Glasnevin with DCU Drumcondra and All Hallows, but it provides presently an infrequent service (one bus per hour during the day). Thus, increasing the frequency to suit the needs of the University, perhaps coupled with the journey time savings described in section 5.3.2, would further improve the attractiveness of the service.

The 11 and 13 bus services at the Ballymun Road stop also provide relatively low frequencies during the day and could potentially be improved by increasing the frequency. This improvement would also enhance the attractiveness of the route, which avails of relatively good access from the DCU Glasnevin campus.

5.3.4 Shuttle Service

As an alternative to the regular services, and to ensure that the public transport connection between the campuses is as much aligned with DCU's needs, there is the possibility to provide a shuttle bus that would serve all three DCU sites.

To ensure its viability, it needs to provide a service that is more attractive than the current Dublin Bus services. There are four aspects that need to be met:

- **Directness:** This service needs to connect the core of DCU Glasnevin with the bus stops closest to DCU Drumcondra and DCU All Hallows.
- **Frequency and Journey Time:** The shuttle needs to run at attractive intervals, so as to match the needs of DCU staff and students, without long waiting times. Ideally, the shuttle would run more buses per hour than the service with the highest frequency, which would mean six services per hour (one bus every 10 minutes), which would require two vehicles.
- **Cost:** The service needs to be competitive when compared with the prevalent public transport costs. (€100,000 per year potentially, which could be invested in walking, cycling routes)
- **Comfort and Reliability:** The shuttle should provide a comfortable and reliable journey, which is at least perceived as a step change from the existing bus service provision.

With regards to the routing, it is proposed that the shuttle service would run on a circular route, availing of the shorter journey time southbound along Ballymun Road and Griffith Avenue. Since no right-turn is available at the Ballymun Road access to DCU Glasnevin, it is suggested that the northbound route would be via Drumcondra Road Upper/Swords Road and Collins Avenue West.

In order to serve DCU All Hallows and avail of a turning facility, it is proposed that the shuttle is routed via Church Avenue where the back gate to this campus is located, and return to Drumcondra Road via Ormond Road. This proposed route is illustrated in **Figure 27**.

The advantages of a circular route would include the reduction of right-turn movements, the possibility of availing of shorter journey times, and the reduction of need for double bus stops at DCU Glasnevin and at DCU All Hallows. The only requirement for two stops (southbound and northbound) would be on Drumcondra Road Upper, serving DCU Drumcondra directly.

It is estimated that the southbound journey would take about 9 minutes to DCU Drumcondra, the All Hallows loop would take about 3 minutes and the northbound journey would take 10 minutes.

Figure 27: Proposed DCU shuttle bus route

5.4 Conclusion

A number of costs are required to implement and maintain the shuttle service. This cost will be borne by DCU and the shuttle bus will be restricted to DCU staff and students only.

The proposed improvements to the existing Dublin Bus services would incur less direct cost to DCU, while at the same time providing a level of service close to what the shuttle bus would offer. Furthermore, this proposal would provide a wider benefit to the Dublin Bus network by increasing the frequency.

In view of the above, the proposal to lobby Dublin Bus to make the suggested changes to the existing 44 bus service is considered to be the preferred option.

6 Conclusion and Recommendation

The pedestrian and cycle Route 9 which uses Albert Park, DCU Elmhurst and Home Farm Road offers the most benefits while the 44 bus service (The Helix stop) provides the most benefits for the public transport option.

6.1 Physical Infrastructure Requirements

A number of actions need to be taken to implement the suggested new route.

DCU internal discussion will need to take place, focusing on issues such as the re-structuring of the cycle parking locations within DCU Glasnevin, and the opening of the DCU All Hallows access to Church Avenue. DCU will also need to further investigate the various potential locations for connection with Albert Park.

A meeting with Dublin City Council needs to be held to investigate:

- The possibility of new opening times of the park, lighting upgrades and new entrance;
- The new access location and design onto Griffith Avenue from DCU Elmhurst and junction improvements at:
  - Griffith Avenue / Bantry Road;
  - Home Farm Road / Drumcondra Road Upper;
  - Church Road and Ormond Road with Drumcondra Road Upper; and
  - DCU Drumcondra entrance / Drumcondra Road Upper.

The NTA will also need to be consulted regarding the following aspects:

- The programme for implementation of the proposed cycle routes that run through DCU and Albert Park;
- The plans for the Swiftway Swords-Airport-City Centre; and

- Any proposed alterations to the bus services in the wider area that may be relevant to the bus connection between the campuses.

It will also be necessary to discuss with Dublin Bus the following proposals:

- Increasing the frequency 44 bus service
- Modifying the 44 bus service route into Larkhill Road (during term time).
- Review provision of bus shelters, look to extensions

Finally, consultation should be commenced with the relevant landowners and with the nursing home, with regards to the suggested use of the nursing home access lane as part of the pedestrian and cycle facility connecting the DCU campuses.

6.2 Soft Measures

The provision of physical infrastructure should be pursued in tandem with measure to encourage staff to walk, cycle or take public transport in their daily commute and particularly on their journey between DCU Glasnevin and DCU Drumcondra and DCU All Hallows.

For example, the University should explore measures such as the Cycle-to-Work scheme, or the Tax-Saver scheme, which encourage the regular use of bicycles and public transport by staff and students.

The provision of detailed information regarding journey times and options available should be further developed, potentially through the Transport for Ireland app or similar, as well as through real time passenger information and static wayfinding signs.

These measures, along with the provision of physical infrastructure such as the new route through Elmhurst, are most efficient when accompanied by measures to discourage car parking. These can be either the limitation or the charging of available car parking, particularly during core times.