BUS CONNECTS

TRANSFORMING CITY BUS SERVICES

NTA

Údarás Náisiúnta Iompair
National Transport Authority

# 8 How Would the Network Make Public Transport More Useful?

# Measuring the Usefulness of the Proposed Network

## Goals

As stated at the outset of Chapter 7, some of the overarching principles guiding the revised network proposal include:

- Expand people's ability to get more places, sooner, taking advantage of interchange on a frequent network.
- Continue to serve the entire area now served, including urban, suburban and semi-rural areas.
- Retain direct service to the City Centre in as many areas as practical.

***Note:*** *The analyses presented in this chapter are based on weekday service levels, in the middle of the day (i.e. speeds and frequencies between 10:00 and 15:00). This is because:*

- *Midday service is a baseline. This is when frequencies are the lowest between 7:00 and 19:00. If you have a certain frequency at midday, it's almost always the same or better at peak.*
- *Aside from about one hour in the morning representing about 10% of daily bus patronage, peak and midday bus speeds are not very different. As of late 2018, midday bus operating speeds averaged 17.7 km/h vs. 16.5 km/h at peak hours. The average difference in how far you could go in a half-hour is 600m.*
- *Most peak-only services don't have a "frequency" in the sense of a regular interval of time between buses for several hours. They come just a few times each morning and evening, and not necessarily at regular intervals between buses.*

## Measures

To assess the performance of the network based on the goals above, we rely on three main methods:

- A **coverage analysis**, showing the number of people within reach of different categories of public transport services. This analysis allows us to assess whether we have increased or decreased.
  - » The number of people within 400m of any public transport service.
  - » The number of people within 400m of the most frequent services, which are useful for the largest number of trips.
  - » The number of people within 400m of direct service to City Centre.[1]
- An **access analysis**, showing the change in the number of jobs and students within reach of any point in Dublin in 30, 45 and 60 minutes using public transport.
  - » This is useful in understanding whether the proposed network could get people to more places in a reasonable amount of time. If you can get to more jobs and schools in the same amount of time, there's a good chance you can get to more shopping, social services, medical centres, recreational areas and many other useful places.
  - » This is also a way of understanding whether most trips would be shorter or longer. If many more jobs and schools are available within 45 minutes of you in future, that means most of your trips would be shorter.
- **Isochrone visualizations**. Isochrones are maps showing how far a person could go in a certain amount of time (e.g. 30, 45 or 60 minutes), starting from a given location, using public transport.
  - » This is useful to understand whether people can get to more places, sooner. New routes, increased frequencies or both can expand the area reachable in a given amount of time. Conversely, routes that are removed or changed, or where frequencies are removed may cause the area to contract.

1 By "direct service to City Centre", we refer to service where it is possible to reach City Centre via a one-seat ride, with no interchange. We are not referring to whether the service takes an especially direct path. Many existing routes, and a few proposed routes, go to City Centre, but via paths that are not straight and involve one or more deviations.

## Key Outcomes

While the rest of this chapter presents the results of these analyses in detail, the following points provide a selection of several of the most important high-level outcomes of the Proposed Network.

- The number of residents within 400m of any all-day local public transport service[2] in Dublin would increase by 2%, from approximately 1.29 million to 1.32 million.
  - » **The number of residents within 400m of all-day frequent service[3] would increase by 25%,** from approximately 832,000 to over 1.04 million.
- The number of residents within 400m of all-day direct service to City Centre would decrease by 5%, from approximately 1.19 million to 1.135 million.
  - » **The number of residents within 400m of frequent service to City Centre would increase by 16%,** from approximately 800,000 to 925,000.
  - » Nearly all of the areas losing all-day direct service to City Centre would either retain peak-only direct service to City Centre, or would be located on a local route at higher frequency than existing radial service, or both.
- **The average Dublin-area resident could reach 27% more jobs and student enrolments in 30 minutes or less**, and 21% more jobs and student enrolments in 45 minutes or less.
  - » Access benefits would extend far beyond the urban core. The average resident living beyond the M50 could reach 26% more jobs and student enrolments in 45 minutes or less.
  - » Access benefits would not be universal, but would be very widespread. Approximately 65% of Dublin-area residents would experience a measurable increase in job access within 45 minutes, while 5% would experience a measurable decrease[4].

2 Excluding Bus Éireann and private bus companies.

3 Service every 15 minutes or better from at least 7:00 to 19:00 on weekdays. Note that in the proposed network, these routes would continue operating every 15 minutes or better until 23:00 on weekdays, and there would also be frequency improvements on weekends.

4 Where "measurable increase" means an increase of +10% or better, and "measurable decrease means a decrease of -10% or worse.

# Geographic Coverage

## What are we measuring?

By geographic coverage, we mean the number of people, jobs, or other type of destination within a typical walking distance of public transport. This is useful to understand for two reasons:

- It helps us understand the potential for the network to meet basic needs. Providing some amount of service to as many places as possible reduces the isolation of people with very limited choices.
- It may help us understand the potential for the network to achieve high patronage. When more people and jobs are located near useful, convenient, and reliable service, the network is likely to attract far more customers.

**The chart across compares the number of people within 400m as the crow flies of all-day service[5] at different frequencies,** either existing or proposed. The chart shows:

- Existing service, and the revised network proposal, as they both stand in 2019.
- In lighter colours for reference, the existing service at the beginning of this study (2016) and initial network proposal (2018).

## Change in Coverage - Overall

The vast majority of the developed area of Dublin currently has access to at least a limited level of public transport service, and this carries through to the Proposed Network.

**The revised network proposal would cover a small number of new areas, amounting to a 2% increase in the number of residents within 400m of service, from 1.29 to 1.32 million**. This includes:

- Some newly developing areas in places where it is readily possible to extend routes to City Centre. Examples include the vicinities of Clongriffin, Adamstown, Applewood (Swords), Oldcourt Rd (between Knocklyon and Tallaght)
- Some outer suburban areas that currently receive peak-only or occasional services, such as west Celbridge, or Palermo and Southern Cross Road (Bray).
- Areas where entirely new routes would create incidental coverage through undeveloped or semi-rural areas, such as parts of orbital Route W8 through semi-rural areas between Celbridge, Newcastle and Citywest.

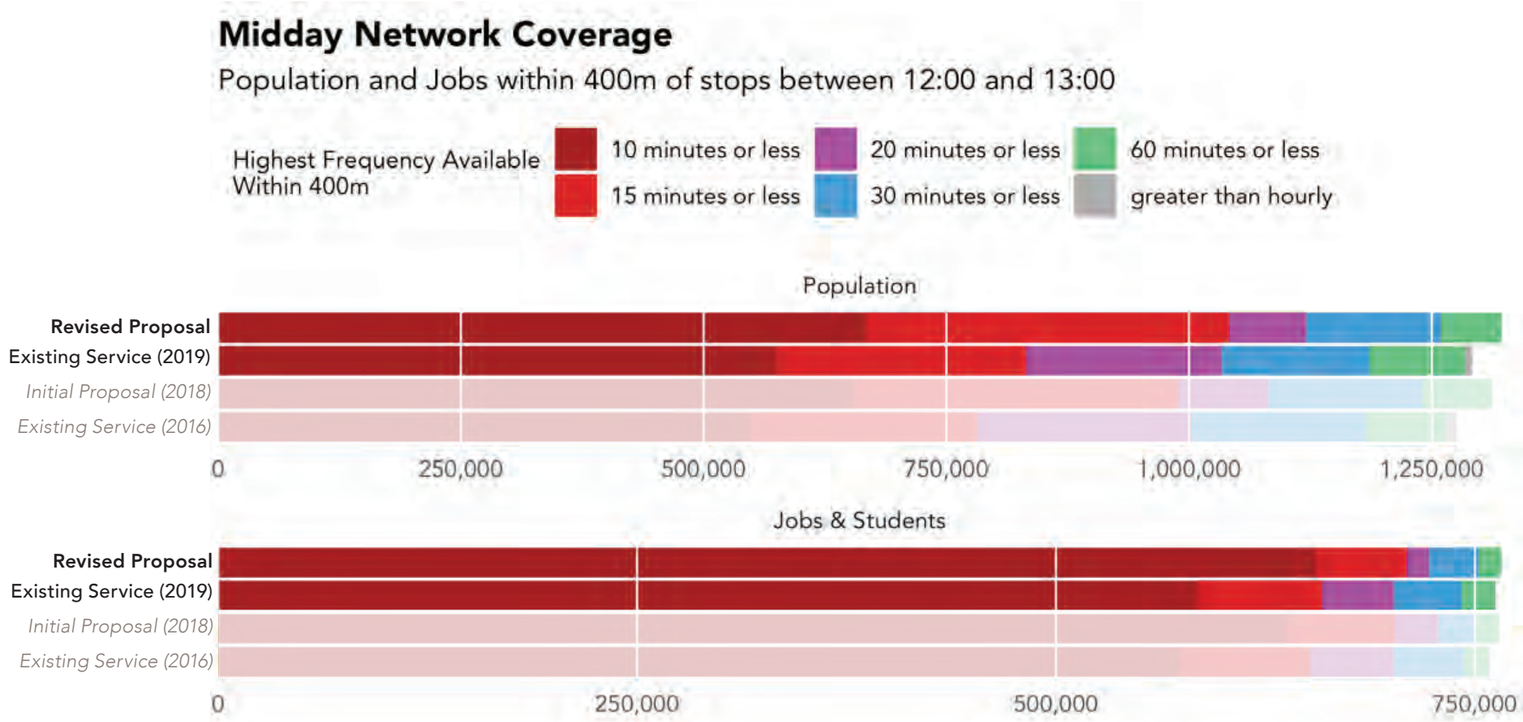



**Figure 122: The chart above shows the change in the number of residents (top) and jobs and students (bottom) located within 400m as the crow flies from local public transport service at various frequencies, indicated by the colour of the bar. Overall, the revised proposed network would increase both total network coverage and coverage by frequent routes.**

## Change in Coverage - Frequent Service

There is a much more significant increase between the existing and proposed networks in the number of people within 400m of frequent service.

**In the revised network proposal, the number of residents near public transport with all-day service every 15 minutes or better would increase by 25%, from about 832,000 today to over 1.04 million.**

Of the million residents on the proposed Frequent Network, nearly 670,000 would have access to service every 10 minutes or better. This illustrates the expansion in the reach and intensity of the Frequent Network, extending the benefits of short waits and reliable transfers to a much larger share of Dublin's population.

5 Operating continuously from 7:00 to 19:00, in almost all cases every 60 minutes or better.

## Change in Coverage - Radial Service Only

A notable characteristic of the existing bus network in Dublin is the high amount of service that carries through from outer suburbs to the City Centre.

As noted in Chapter 4, this is advantageous in some ways and disadvantageous in others. On the one hand, City Centre is the single largest and most useful destination in the Dublin area, so it makes sense to focus most service there. On the other, concentrating almost exclusively on radial service forces many trips through City Centre that don't need to go there, has limited the amount of orbital service, and resulted in relatively low frequencies and awkward routing patterns in many suburban areas.

**The chart across compares the number of people within 400m as the crow flies of all-day direct service to City Centre[6] at different frequencies,** either existing or proposed. The chart shows:

- Existing service, and the revised network proposal, as they both stand in 2019.
- In lighter colours for reference, the existing service at the beginning of this study (2016) and initial network proposal (2018).

By this measure, the total number of Dublin area residents near direct service to City Centre has remained nearly the same from 2016 to 2019, at approximately 1.19 million. The initial network proposal would have reduced the number of people with all-day direct service to City Centre by over 15%, to 1.01 million.

Losses of direct service to City Centre were the single largest concern expressed in the summer 2018 public consultation. **The revised network proposal would result in a 5% reduction in the number of residents with direct service to City Centre, from about 1.19 million to 1.135 million.** In almost all cases, this is mitigated by one or more of the following:

- A suburban local service scheduled every 10 to 15 minutes, such as in Damastown, Dunboyne and Ballywaltrim (Bray).
- A suburban local service that is not frequent, but comes more often than existing direct service, as on the southern Howth peninsula, on Feltrim Road (Swords), in River Forest and Castletown (Leixlip), Dodsborough (Lucan) or Blessington.
- Peak-only direct service, such as in northern Fingal, Dunboyne, River Forest and Castletown (Leixlip), Dodsborough (Lucan), Newcastle, and Blessington.

6 Operating continuously from 7:00 to 19:00, in almost all cases every 60 minutes or better.

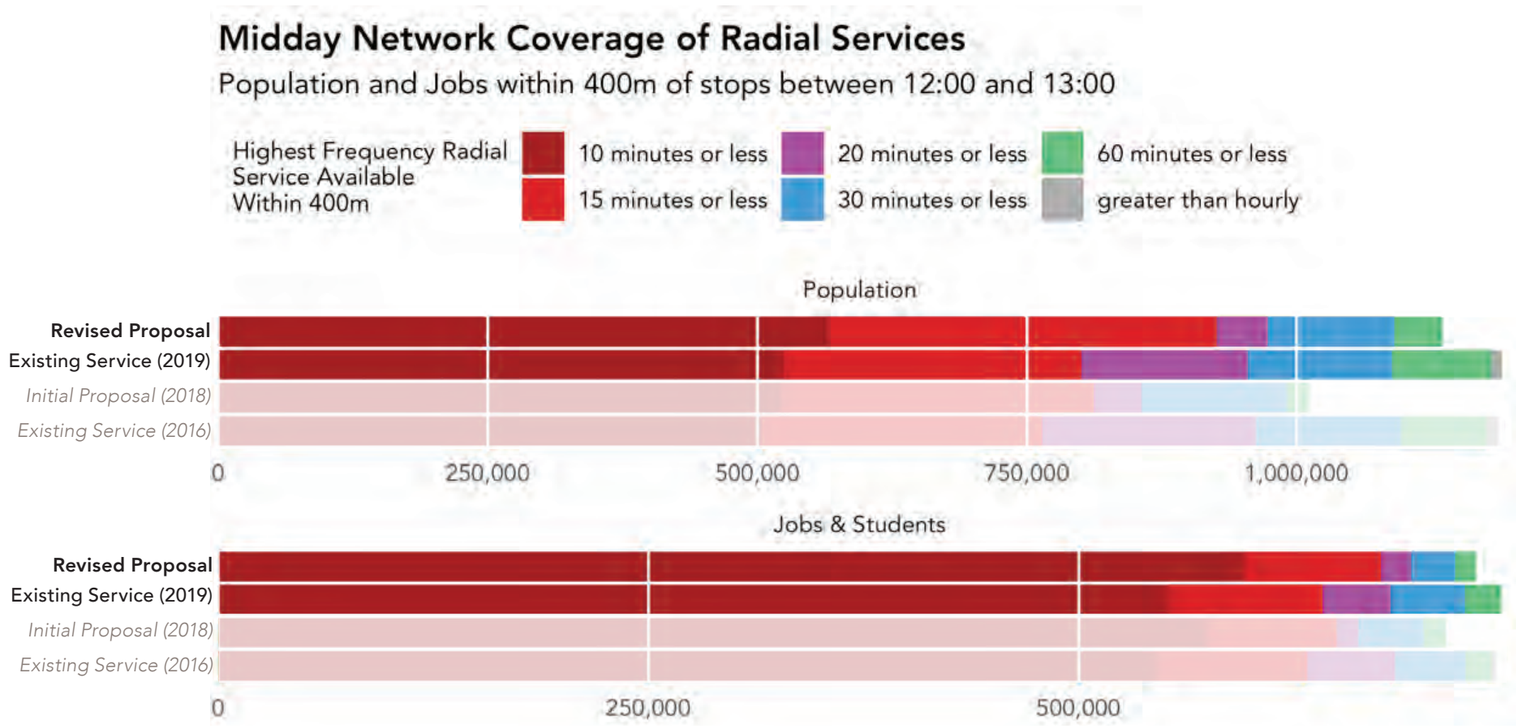



**Figure 123: The chart above shows the change in the number of residents (top) and jobs and students (bottom) located within 400m as the crow flies from direct service to City Centre at various frequencies, indicated by the colour of the bar. Overall, the revised proposed network would slightly reduce the number of people near any kind of direct service to City Centre, but would increase the number of people near frequent service to City Centre.**

## Change in Coverage - Frequent Radial Service

Unlike overall service to City Centre, there would be a significant increase in the number of people with frequent service to City Centre.

**In the revised network proposal, the number of residents near public transport with all-day direct service to City Centre every 15 minutes or better would increase by 15%, from about 800,000 today to 925,000.**

This is consistent with the overall level of increase in frequent service in the revised network proposal (see prior page). This also shows that the increase in frequent service is not by and large an artefact of converting radial service to orbital service, as was often the case in the initial proposal.

# Travel Times and Access to Opportunity

## What are we measuring?

**This section describes the changes in access to opportunity – the number of jobs and student enrolments reachable in a given time – that the revised network would produce.** Specifically, we are seeking to show the degree to which the network proposal is useful, by measuring how much more it would connect people to places they need to travel.

With the data available in Dublin, we measure the number of jobs and student enrolments that can be reached in 30, 45 and 60 minutes. It's harder to measure other opportunities, like shopping and socializing, but an improvement in access to jobs and universities is a signal that access to many other activities would improve as well. We carried out the following analysis:

- On a map, we divided the Dublin area into hexagons, where each hexagon has an in-circle radius of 200m. In other words, the centres of hexagons are located on a 400m grid.
- We calculated the total number of jobs and student enrolments accessible within 30, 45 and 60 minutes from the centre of each hexagon, via public transport and walking.
  - » **The travel times used in this analysis represent a door-to-door trip.** They include not just time on a bus or train, but also time spent walking, waiting and (where necessary) interchanging[7].
- We calculated the population inside each hexagon, based on the 2016 population of Census small areas.
- We calculated a weighted average of change in access based on the change at each hexagon centre, multiplied by the population in the corresponding hexagon.

## Access to Opportunity - Average Change

The chart across shows the average percent change in access to opportunity in 30, 45 and 60 minutes for Dublin residents.

**If the revised network proposal were implemented, the average resident of the Dublin area could reach +28% more jobs and student enrolments within 30 minutes, +21% within 45 minutes, and +16% within 60 minutes.**

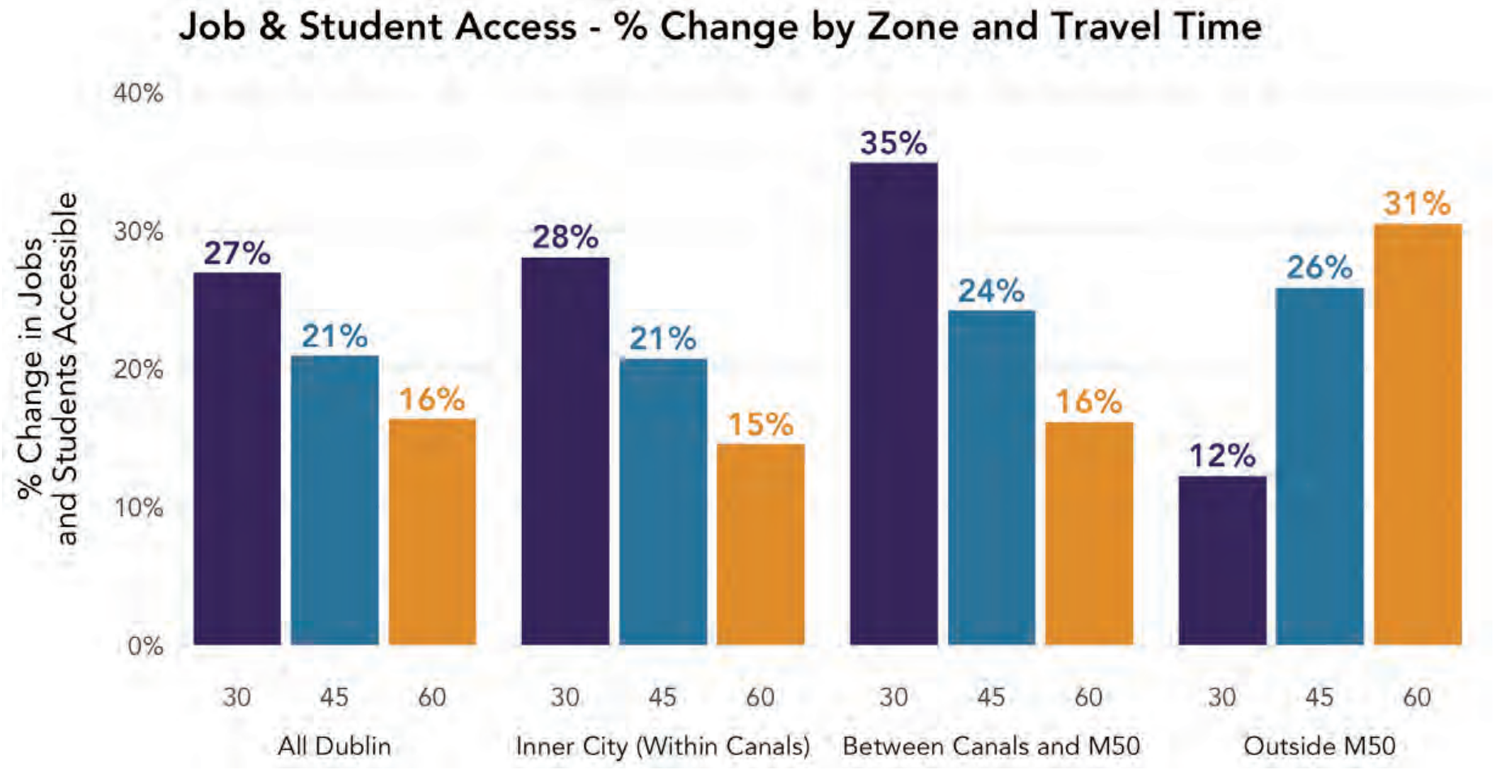



**Figure 124: The chart above shows the percent change in the number of jobs and student enrolments accessible to the average Dublin resident, and how that change varies for residents of the inner city (within the canals), the area between the canals and the M50, and the outer suburbs beyond the M50.**

This shows that the added service, and the emphasis on expanding the Frequent Network, would allow more people in Dublin to reach more places in similar amounts of time. Or, in other words, that trips to reach the same places would usually be shorter.

Of course, the level of change varies according to where people are located. One of the biggest determinants of how useful public transport can be is distance from the City Centre. For this reason, we've split the results into three broad areas:

- **Inner City (Within Canals).** This area corresponds broadly to City Centre, most of the Docklands and the older residential neighbourhoods immediately to the west and north of the centre. For the average resident in this zone, the change in access to opportunity would be +28% within 30 minutes, +21% within 45 minutes, and +15% within 60 minutes. This is very similar to the regional average.
- **Between the Canals and the M50.** This zone encompasses areas mostly within 2 to 8 km from City Centre, and some areas further out in the southeast (much of Dun Laoghaire-Rathdown). This area encompasses roughly half the population and nearly half the jobs and student enrolments in Dublin. The average change in access to opportunity in this zone would be +35% within 30 minutes, +24% within 45 minutes, and +16% within 60 minutes. The above-average improvements to access within 30 and 45 minutes or less reflects the focus on expanding the frequent network, particularly the new frequent orbitals and coordinated spine timetables for higher frequencies on main roads into City Centre.
- **Outside the M50.** In these areas, residences tend to be located much further away from major destinations. As a result, the average change in access to opportunity outside the M50 would be only +12% within 30 minutes, but +26% within 45 minutes and +31% within 60 minutes.

7 The formula is: *Travel Time = Walk Time from origin + Wait Time + In-Vehicle Time + Walk Time to destination*. Walk times are calculated based on distance along the street network as mapped in OpenStreetMap, and an average walking speed of 0.93 m/s. Research suggests this speed is achievable by most children and older adults. Wait times are assumed to be half of service frequency. In-Vehicle Time means the time during which one is actually on board a bus or train. In cases where interchange is required, the travel time also includes any added wait, walk and in-vehicle time required for the second leg of the public transport trip.

## Access to Opportunity - Maps of Dublin

The following pages present maps of Dublin comparing access to opportunity between the existing and proposed networks.

These maps show Dublin divided into hexagonal areas, as described on page 173. We calculated access to jobs and student enrolments from the centre of each hexagon, comparing the situation under existing service, to a future situation where the revised network proposal would be implemented in full[8].

**On these maps, green areas indicate improvements in access due to the proposed network, and brown areas indicate degradation in access.** If a hexagon on these maps is green, a person starting from its centre could reach more jobs and schools in the same amount of time if the proposed network were implemented. If a hexagon is brown, then a person could reach fewer jobs and schools in the same amount of time.

## Within 30 Minutes

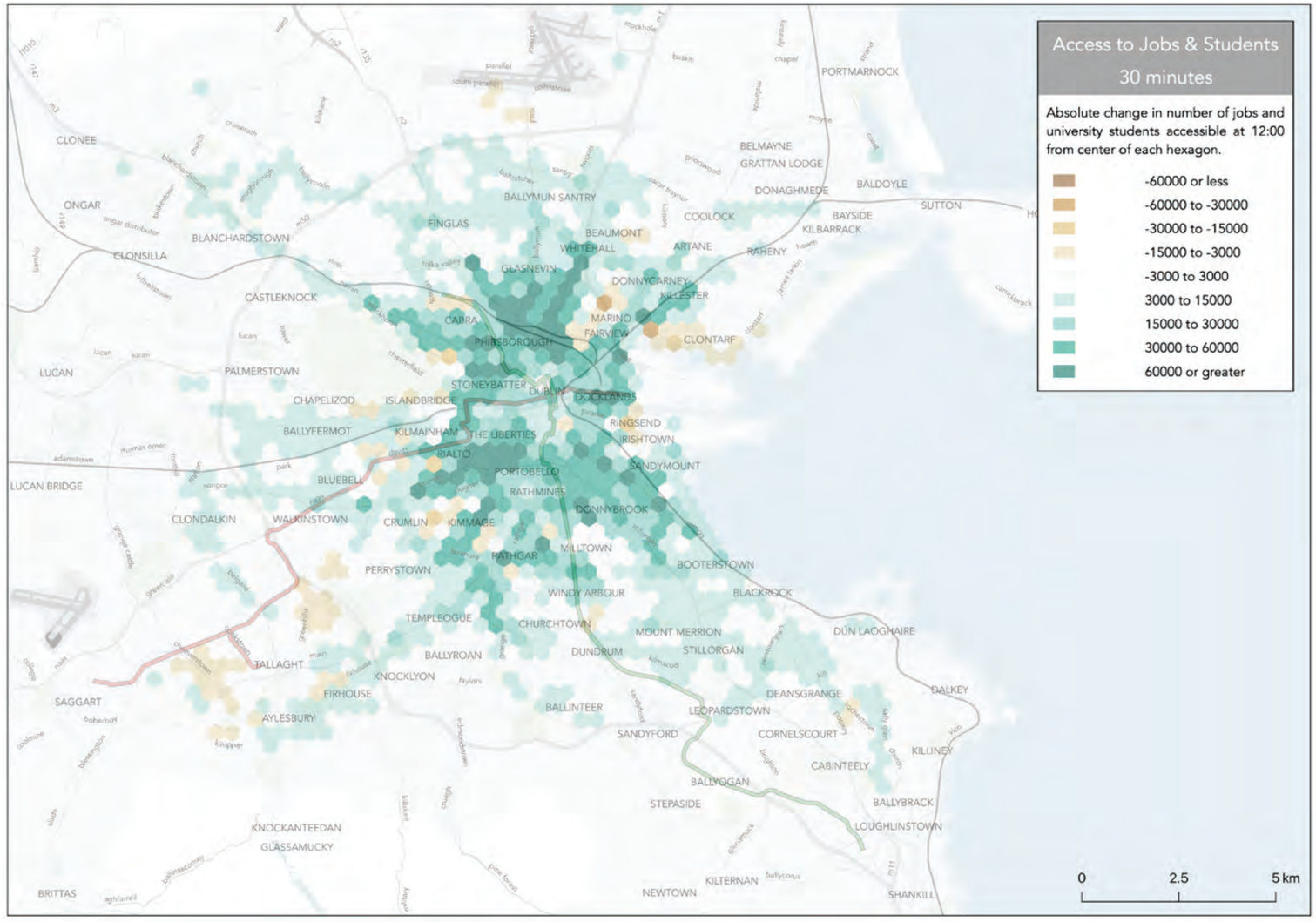
30 minutes door-to-door is a relatively short time to travel by public transport; walking and waiting can easily take up 15 minutes of a typical trip. As a result, relatively few trips are viable in this amount of time.

Nonetheless, more would be viable in 30 minutes or less under the proposed network, largely as a result of higher frequencies. **Nearly all locations within four kilometres of the O'Connell Bridge would experience a significant improvement in access within 30 minutes.**

Locations that would experience a degradation in access within 30 minutes are almost all places where midday frequencies would be reduced. Examples include places like Marino and Clontarf, where midday frequency would be reduced from every 10 minutes to every 15 minutes.

Overall, we estimate that, among Dublin residents:

- **749,000 live where access to opportunity within 30 minutes would improve by +10% or better.**
- **143,000 live where access to opportunity within 30 minutes would degrade by -10% or worse.**



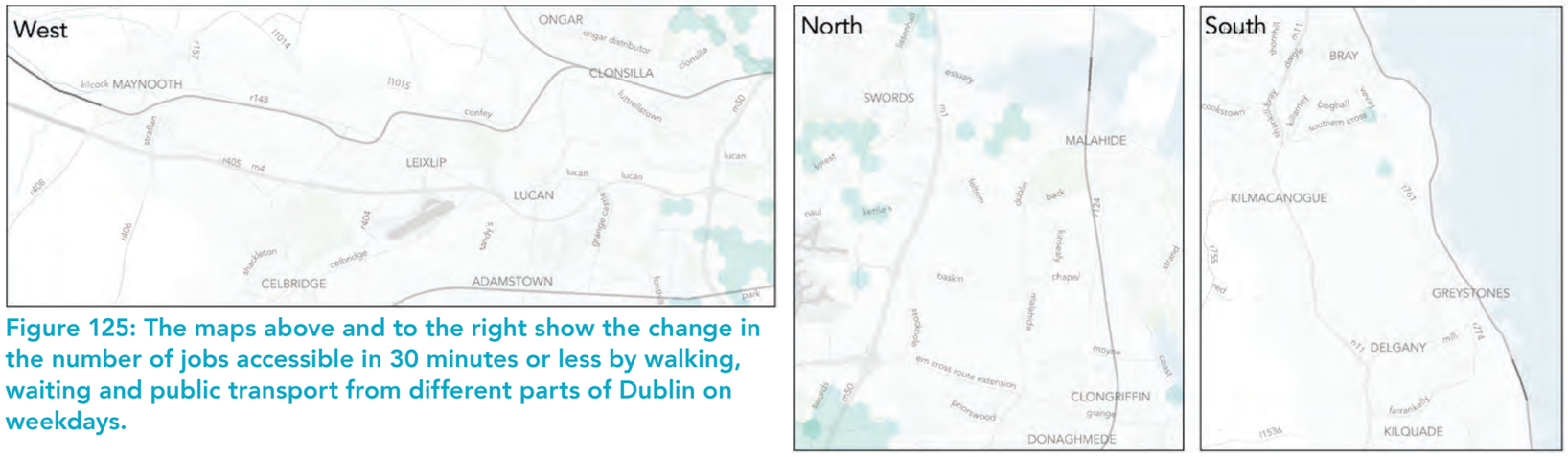




**Figure 125: The maps above and to the right show the change in the number of jobs accessible in 30 minutes or less by walking, waiting and public transport from different parts of Dublin on weekdays.**

8 Note that this analysis does not include any possible improvements to bus speeds as a result of infrastructure improvements in the Core Bus Corridors or any other projects. Any improvements or degradation in access measured here are purely the result of changes to frequency and routing.

## Within 45 minutes

For a city at Dublin's scale and density, far more trips are possible within 45 minutes than within 30 minutes. 45 minutes is enough time for a trip from 5 to 10 kilometres long, meaning for example most trips from within the M50 to City Centre[9].

As a result, the range of places experiencing significant improvements in access to opportunity within 45 minutes is considerably greater than within 30 minutes. **Nearly all locations within the M50 would experience a significant improvement in access within 45 minutes.**

This is a result of the combination of several factors:

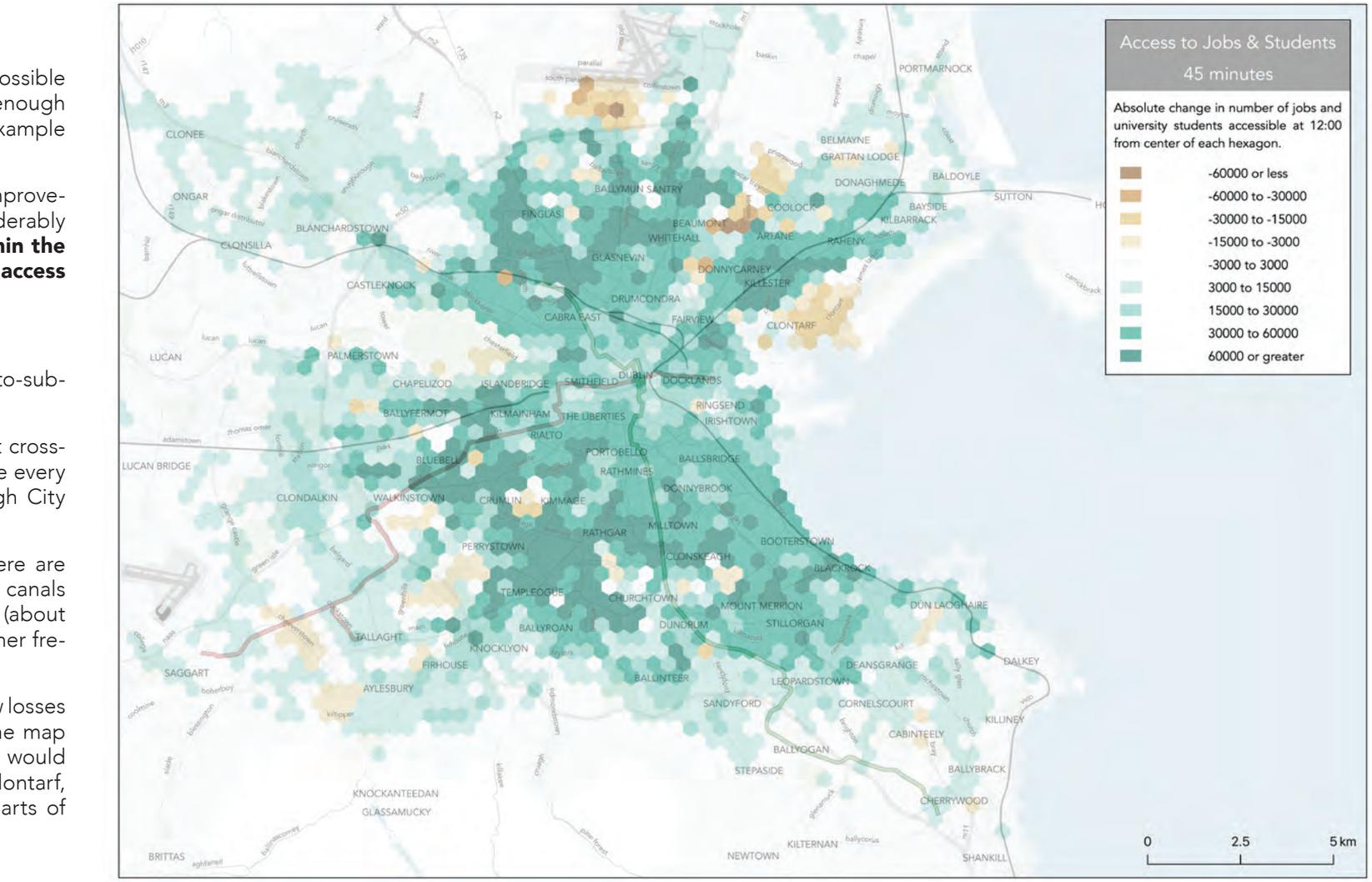
- Frequent orbital routes would make far more suburb-to-suburb trips viable within 45 minutes or less.
- Many more locations would have access to frequent cross-city service connecting north and south Dublin, since every spine branch would operate not just to but through City Centre.

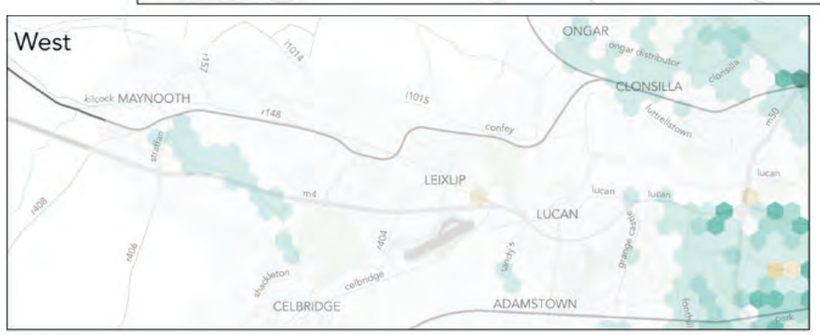
These two factors are extremely significant because there are actually more jobs and student enrolments between the canals and the M50 (about 320,000) than within the canals (about 210,000). Furthermore, some areas would experience higher frequencies and more direct routing to City Centre.

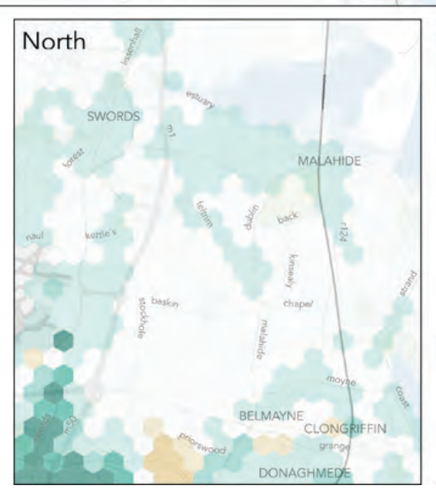
Again, there are also a number of locations that would show losses of access within 45 minutes. The most visible ones on the map to the right represent places where midday frequencies would be reduced, such as from every 10 to 15 minutes (e.g. Clontarf, Darndale), or from every 20 to every 30 minutes (e.g. parts of Kilmore, Tymon North, Killinarden).

Overall, we estimate that, among Dublin residents:

- **958,000 live where access to opportunity within 45 minutes would improve by +10% or better.**
- **74,000 live where access to opportunity within 45 minutes would degrade by -10% or worse.**



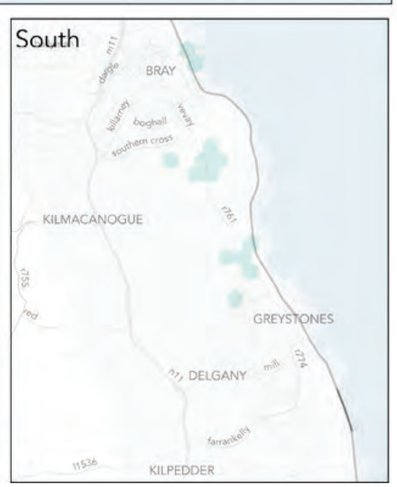




**Figure 126: The maps above and to the right show the change in the number of jobs accessible in 45 minutes or less by walking, waiting and public transport from different parts of Dublin on weekdays.**

9 This is true on average, but obviously not in all cases. Actual travel times vary depending on the actual locations of travel. Certain roads, certain hours, and even certain individual bus trips will be slower than others.

## Within 60 minutes

A 60 minute door-to-door travel time would put most major sub-urban centres within reach of each other, and within reach of a large portion of the inner city.

As a result, the benefits of the proposed network to outer suburban areas are most apparent at this time horizon. **This is where significant improvements in access to opportunity would appear in most locations within 5 to 8 kilometres outside the M50.**

Most areas beyond the M50 have relatively limited options in terms of radial service to City Centre. In some cases, the proposed network provides a slightly more frequent or more direct radial route. But this is not true everywhere, and its effect on access to opportunity is limited. Many outer suburbs can already reach City Centre within an hour.

Furthermore, the increase in cross-city services would certainly provide more direct trips from outer suburbs to destinations on the other side of City Centre, but very few of those trips could be completed in an hour. This underscores how critical infrastructure improvements in the Core Bus Corridors are: they are the only way to achieve any significant improvements in radial and cross-city mobility from the outer suburbs.

**From a network design perspective, the key to access improvements within 60 minutes from outer suburban areas is the higher number and frequency of orbital routes.** Some examples of trips that would become possible in an hour (including waiting time):

- Swords to Charlestown Shopping Centre.
- Dublin Airport to Finglas Village.
- Blanchardstown Shopping Centre to DCU St. Patrick's College.
- Liffey Valley Shopping Centre to Crumlin Hospital.
- Tallaght to Dundrum.

Overall, we estimate that, among Dublin residents:

- **957,000 live where access to opportunity within 60 minutes would improve by +10% or better.**
- **37,000 live where access to opportunity within 60 minutes would degrade by -10% or worse.**

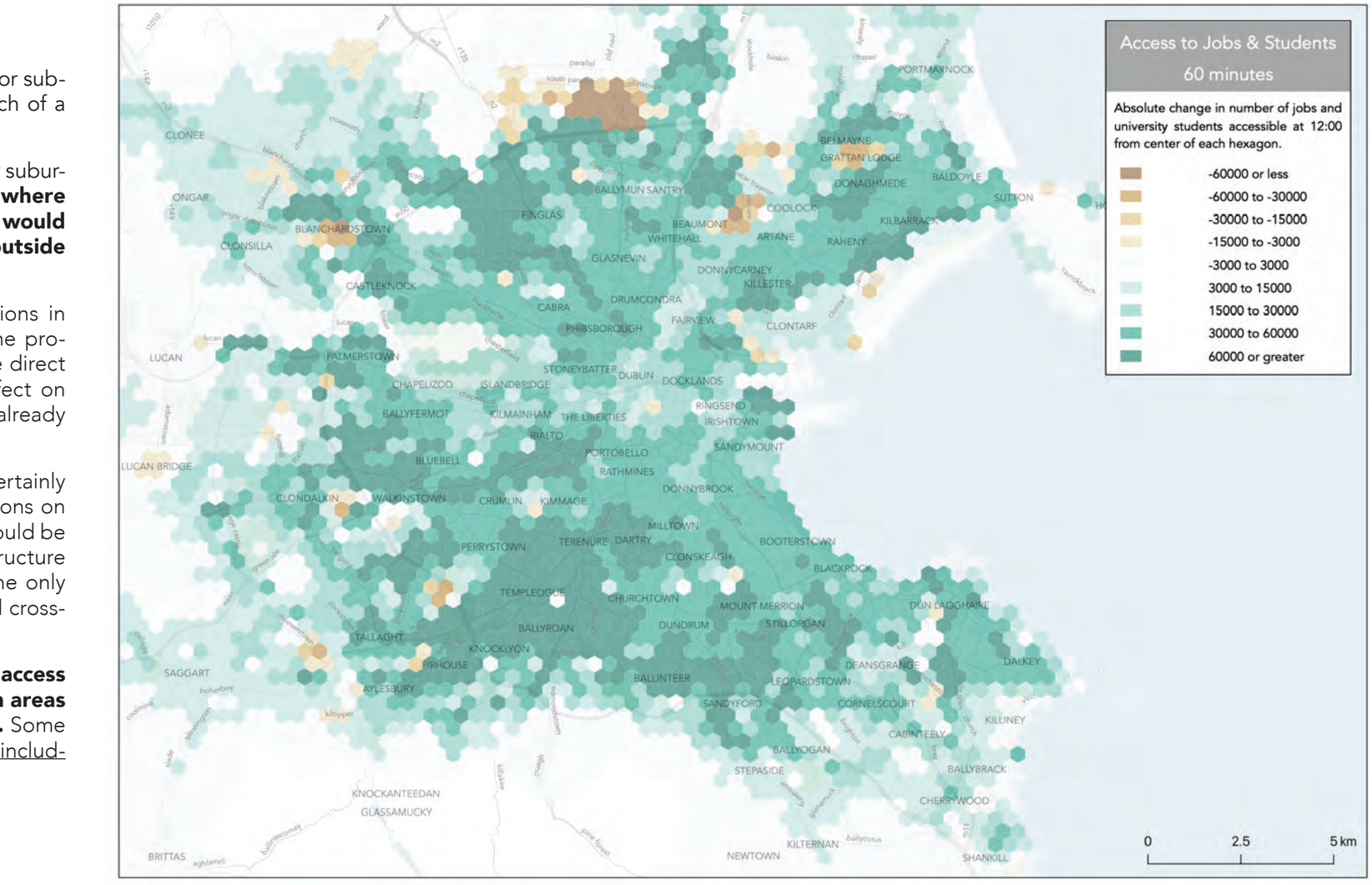



Figure 127: The maps above and to the right show the change in the number of jobs accessible in 60 minutes or less by walking, waiting and public transport from different parts of Dublin on weekdays.

# Travel Time Examples - Isochrones

## What is an isochrone?

**An isochrone is a map that highlights the areas an individual could reach from a specific place, in a given amount of travel time.**

Individual isochrones can be used to visualize changes in access available to and from particular places.

In the following pages, we provide a selection of isochrones that measure how far one could travel in 30, 45 or 60 minutes by walking and public transport from a set of 18 key locations, to provide a better sense of the ways in which the proposed network would change mobility in the Dublin area.

In each of these maps, the isochrone areas calculated for the existing and proposed networks are overlaid. As a result:

- Areas shown in purple can be reached within the stated time threshold in both the existing and proposed network
- Areas shown in blue would be newly accessible with the proposed network
- Areas shown in red can be reached in the stated time in the existing network, but would not be under the proposed network.

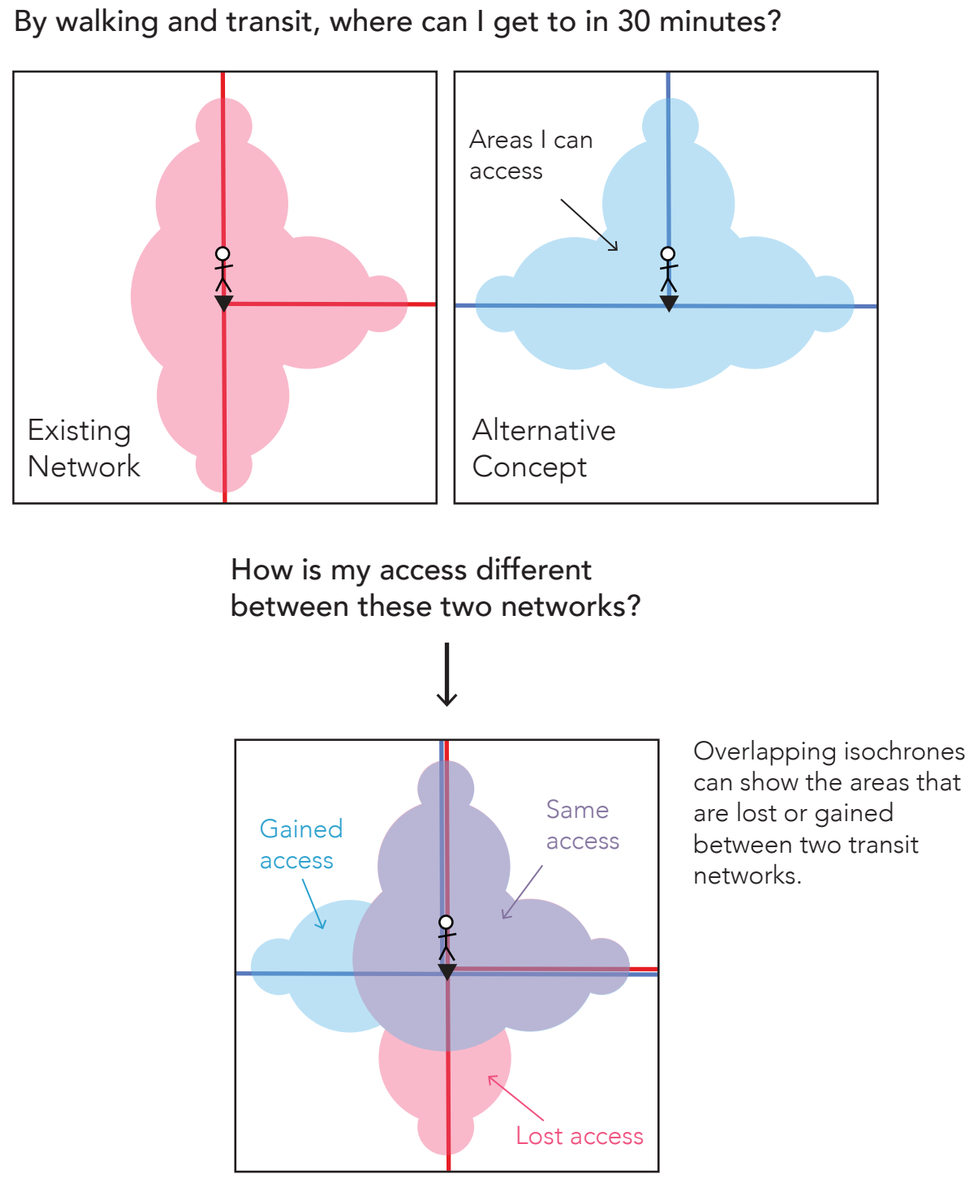
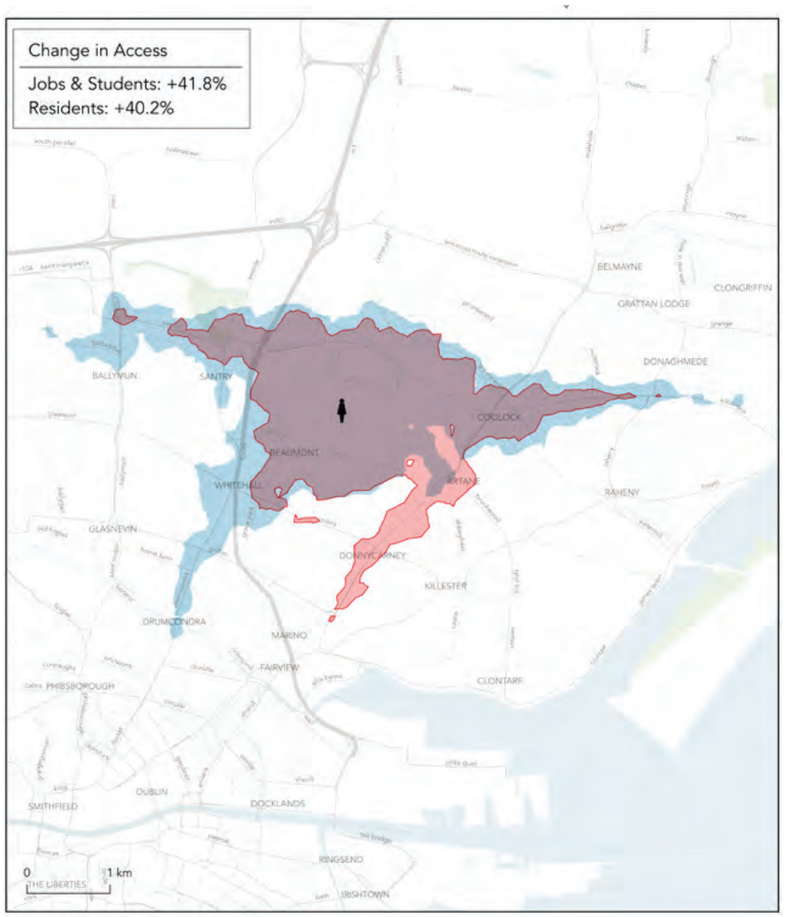



Figure 128: Examples showing how to read an isochrone map.

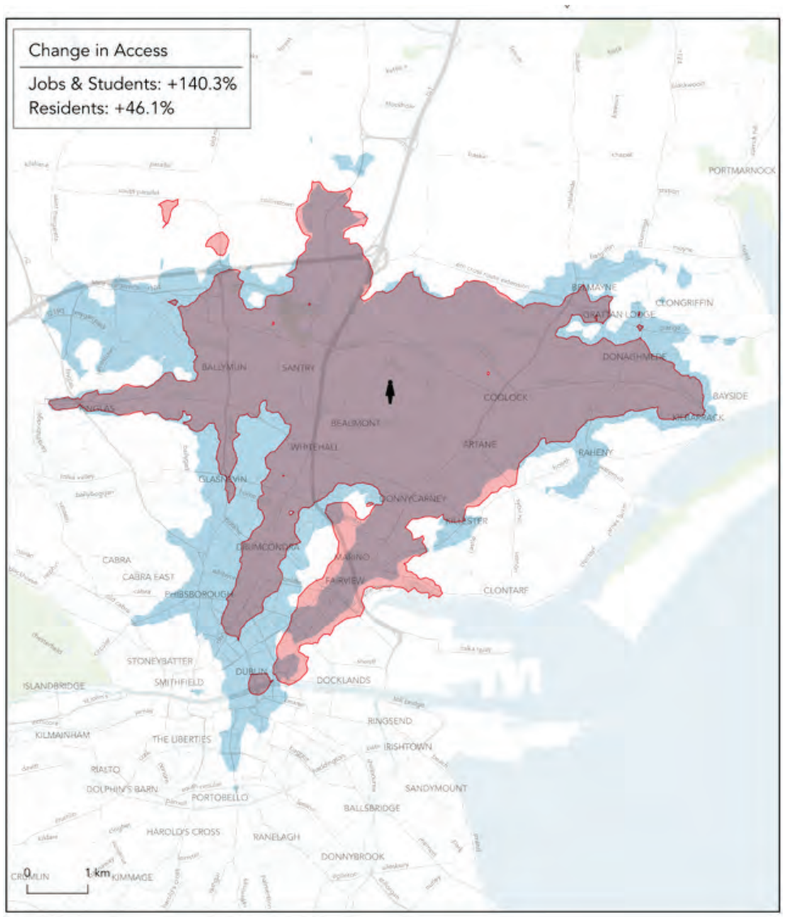
# How far could I travel from **Beaumont Hospital** in...

= start location


## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

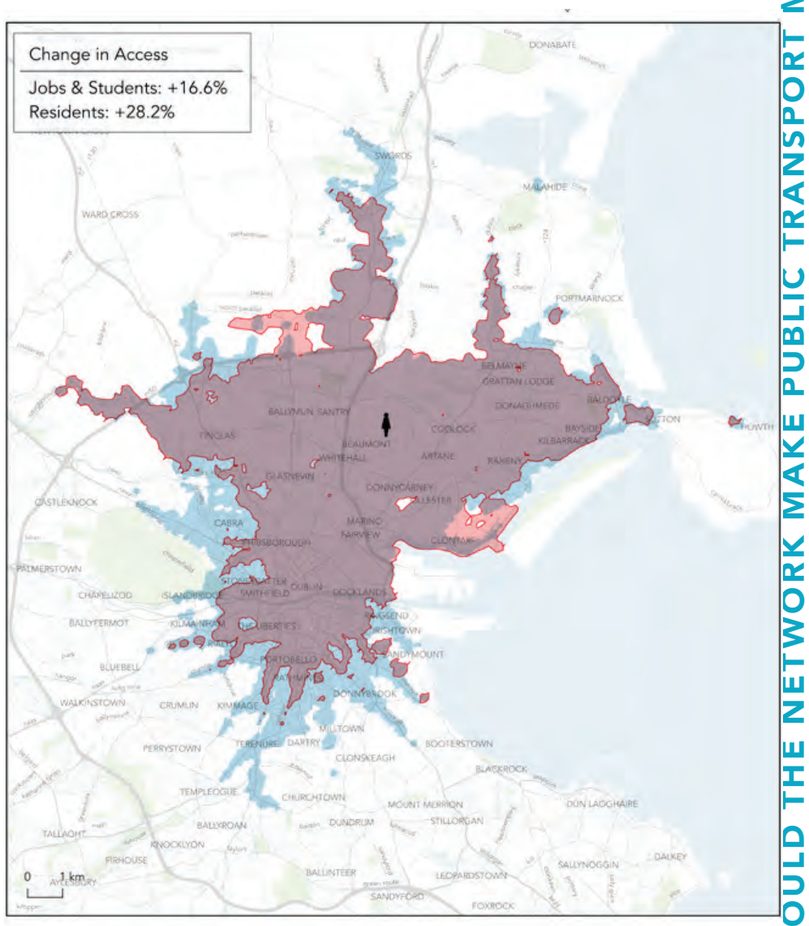


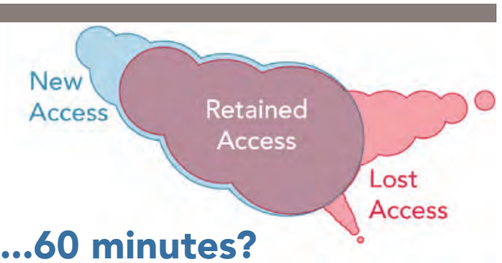

**Figure 129: Isochrone maps from Beaumont Hospital. The new Route A1 would connect Beaumont Hospital to the Swords Road and City Centre, while the new orbital Route N8 would operate at least twice as frequently as existing Route 17a. However, the new Route D4 would run every 30 minutes, compared to existing route 27b every 20 minutes. As a result, travel to and from Beaumont Hospital would become faster from all areas, except the Malahide Road between City Centre and the Artane roundabout.**

***Notes:***

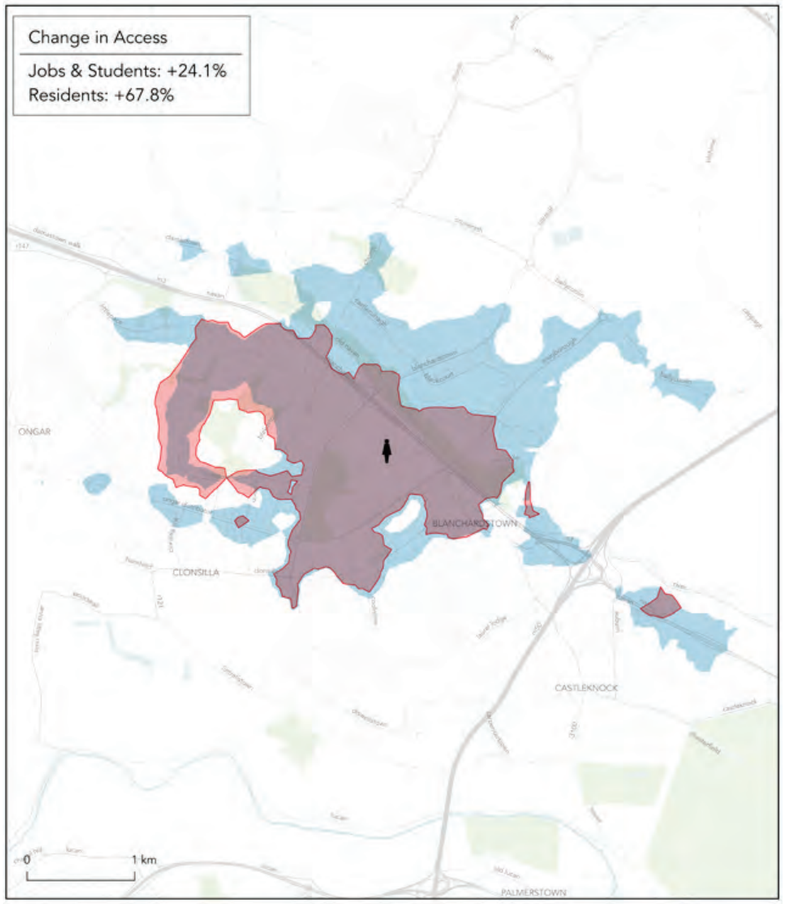
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Blanchardstown Shopping Centre** in...

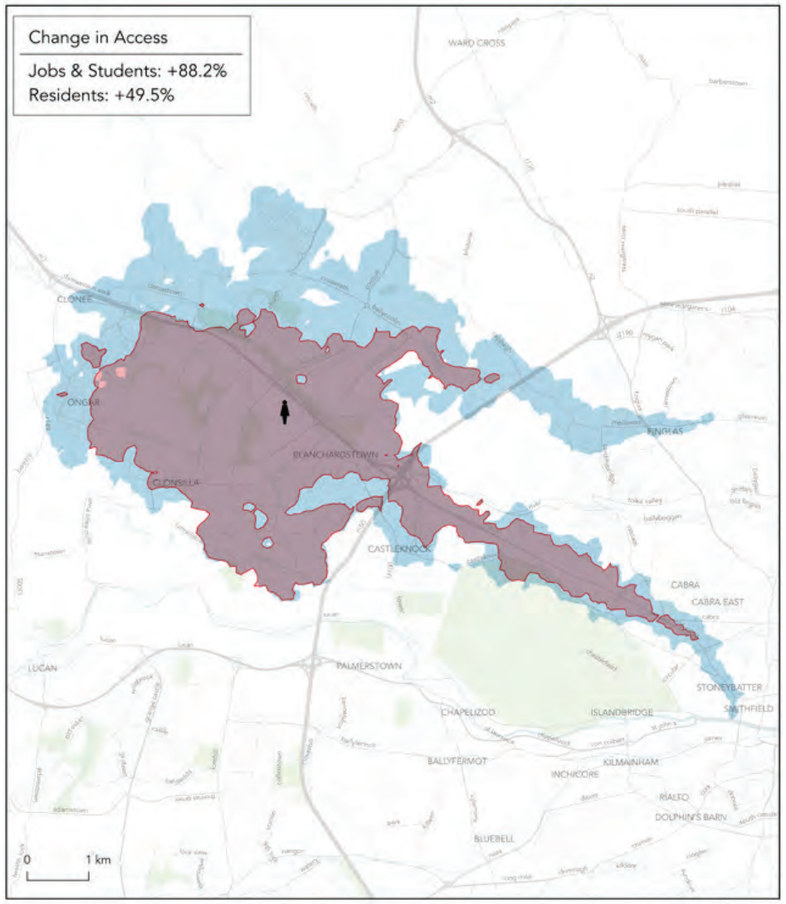
= start location




**...30 minutes?**




**...45 minutes?**




**...60 minutes?**

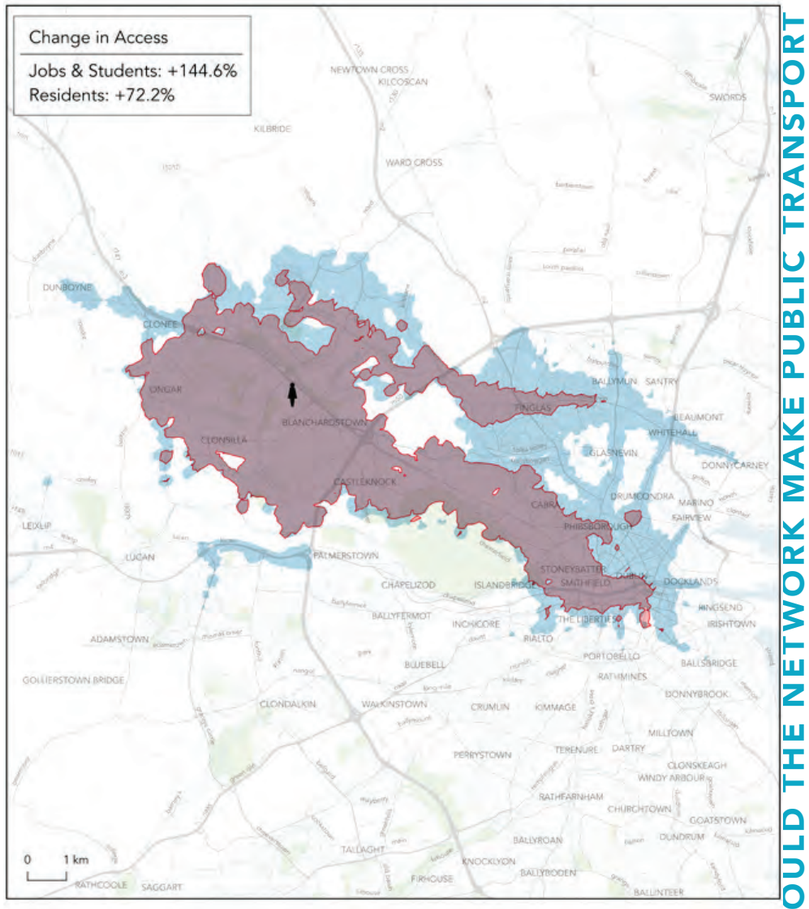



**Figure 130: Isochrone maps from Blanchardstown Shopping Centre. In the proposed network, this location would become a hub for many frequent radial, orbital and local services. As a result, travel to and from the shopping centre would become more convenient from nearly every direction. The biggest difference would be between areas north and south of the N3/Navan Road. Several proposed routes (B3, 261, 263) would provide frequent service between the shopping centre and areas to the north.**

***Notes:***

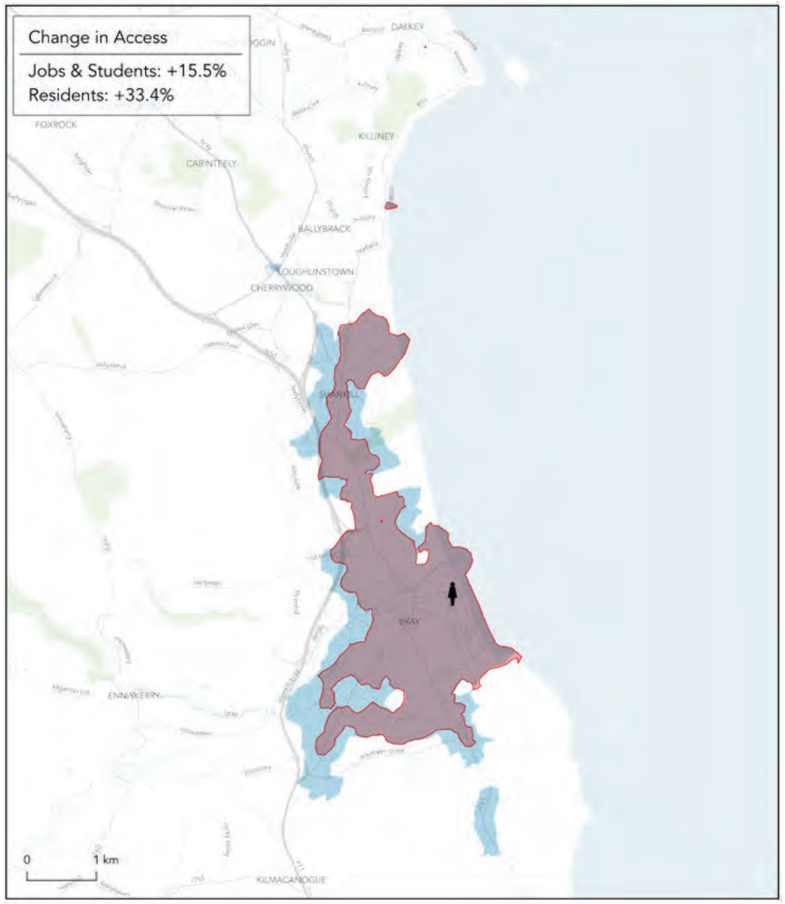
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

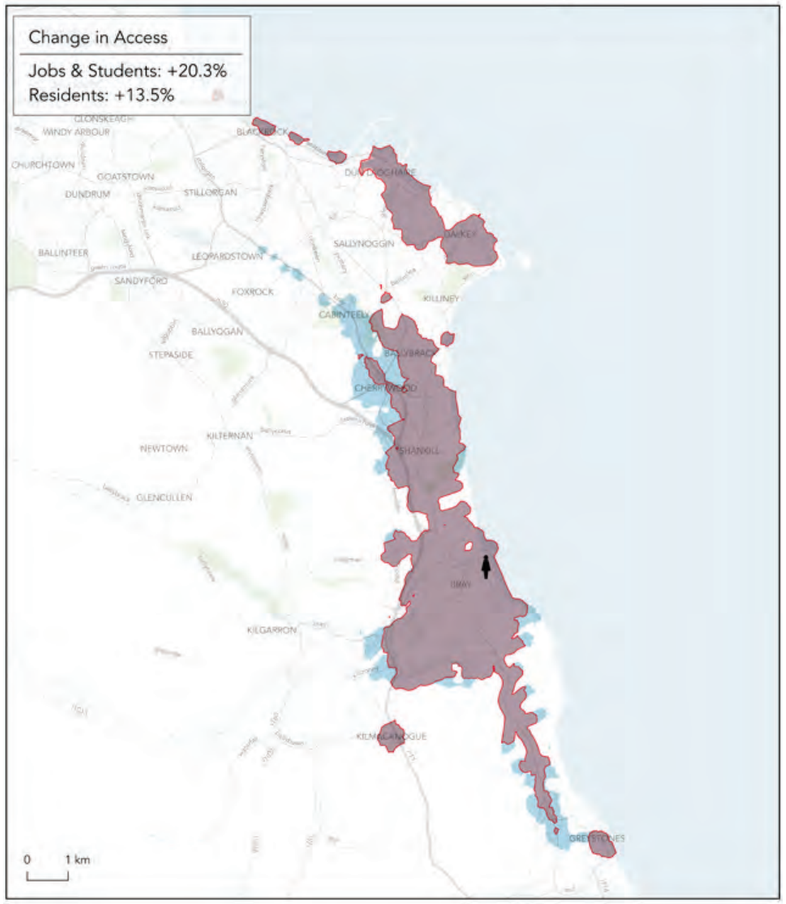
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Bray Daly Station** in...


## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

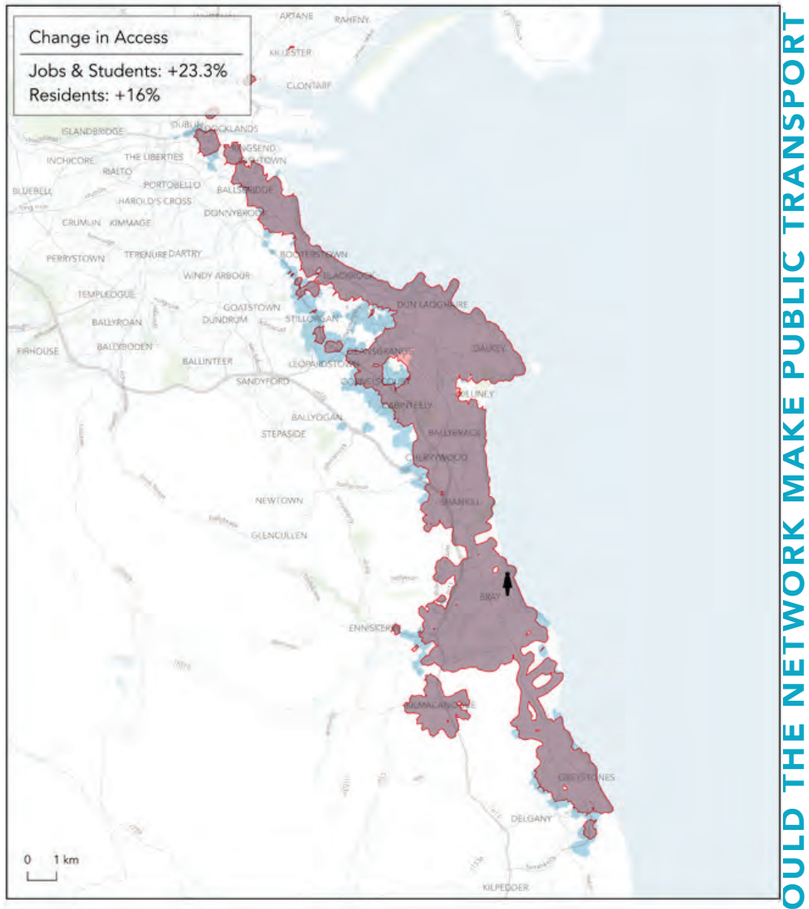


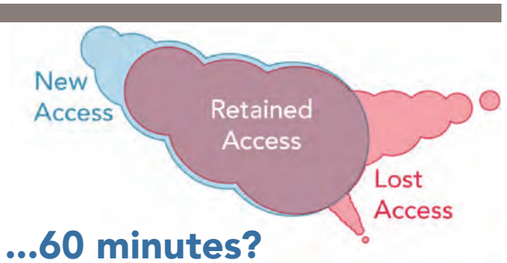

**Figure 131: Isochrone maps from Bray Daly Station. Daly station would continue to be on DART, but it would now also be on Route E1 to City Centre (via the N11/Dublin Road), and on several local routes (201, 202, 211, 212, 214, 215). This would result in better connections between Bray neighbourhoods and the station.**

***Notes:***

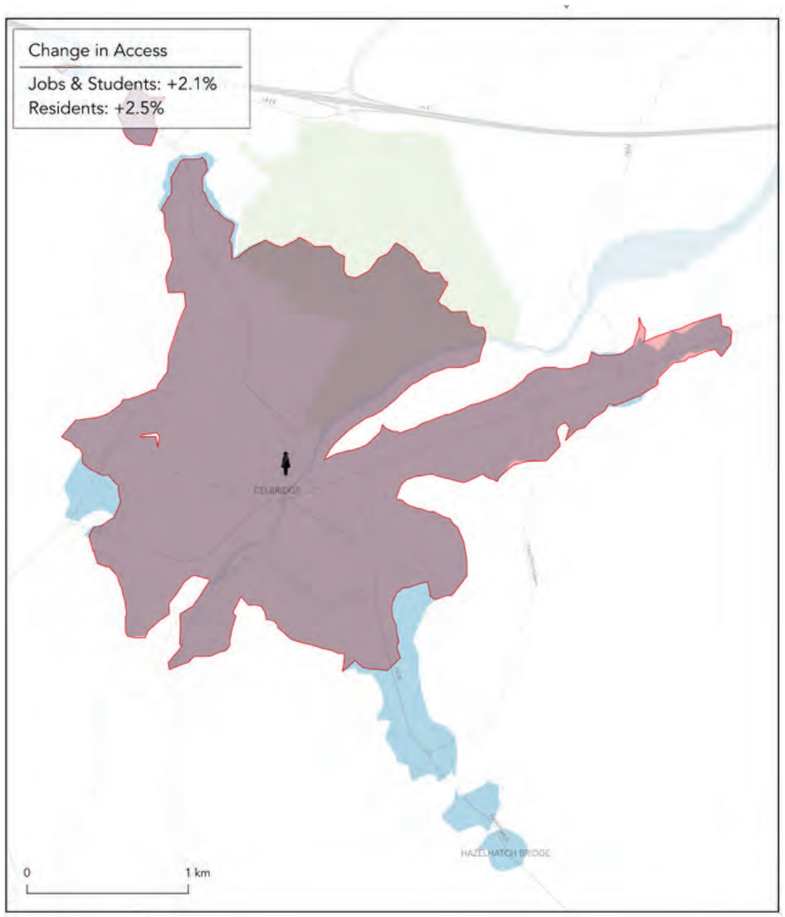
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Celbridge Main Street** in...

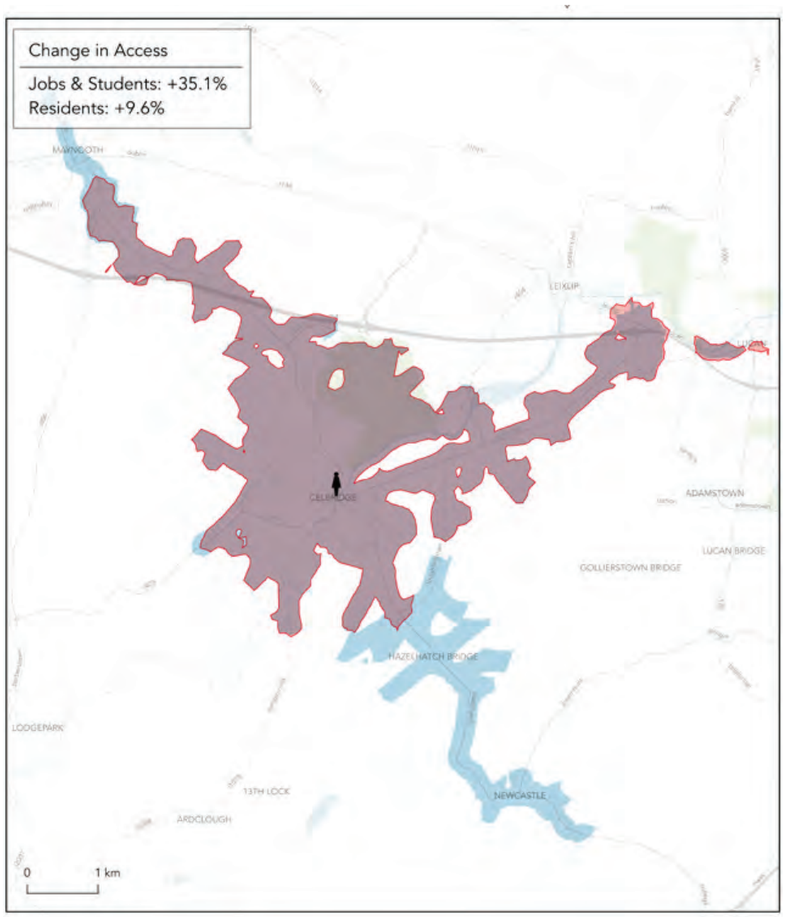
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

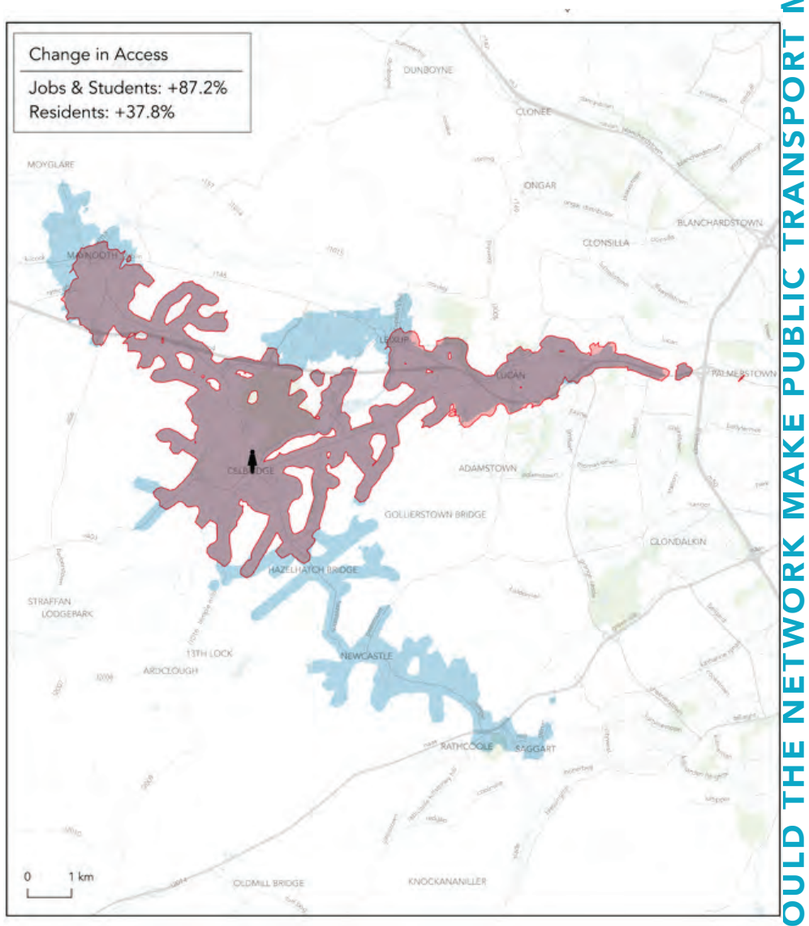



**Figure 132: Isochrone maps from Celbridge Main Street. Service frequency and speed in the direction of City Centre would not change. However, a new orbital Route W8 would provide new service every 30 minutes in the direction of Citywest and Tallaght, and a new local service (259) would provide a direct trip to Leixlip every 30 minutes via Glen Easton.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak conditions differ at this location due to express services (higher frequency and speed to City Centre).*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Clare Hall Shopping Centre** in...

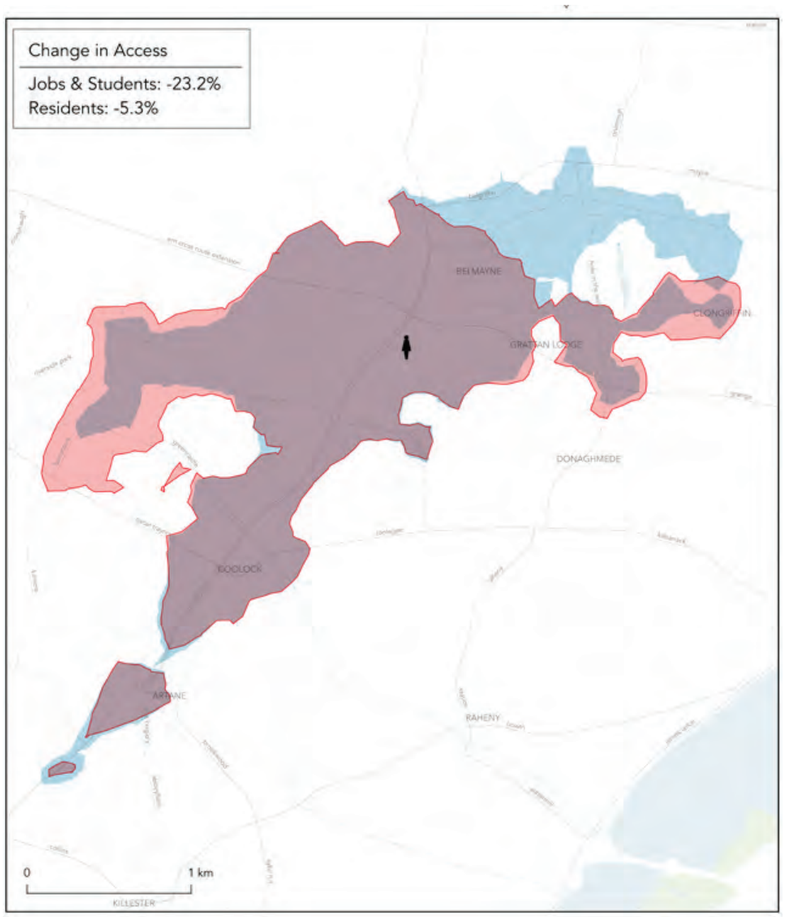
= start location

New Access

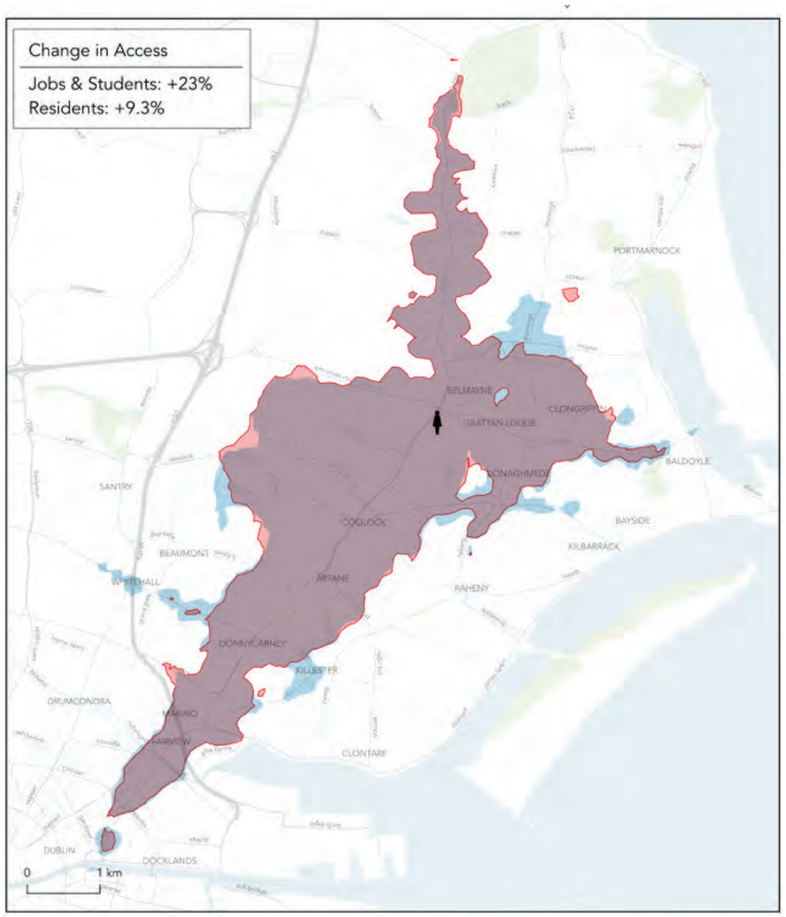
Retained Access

Lost Access

**...30 minutes?**




**...45 minutes?**




**...60 minutes?**

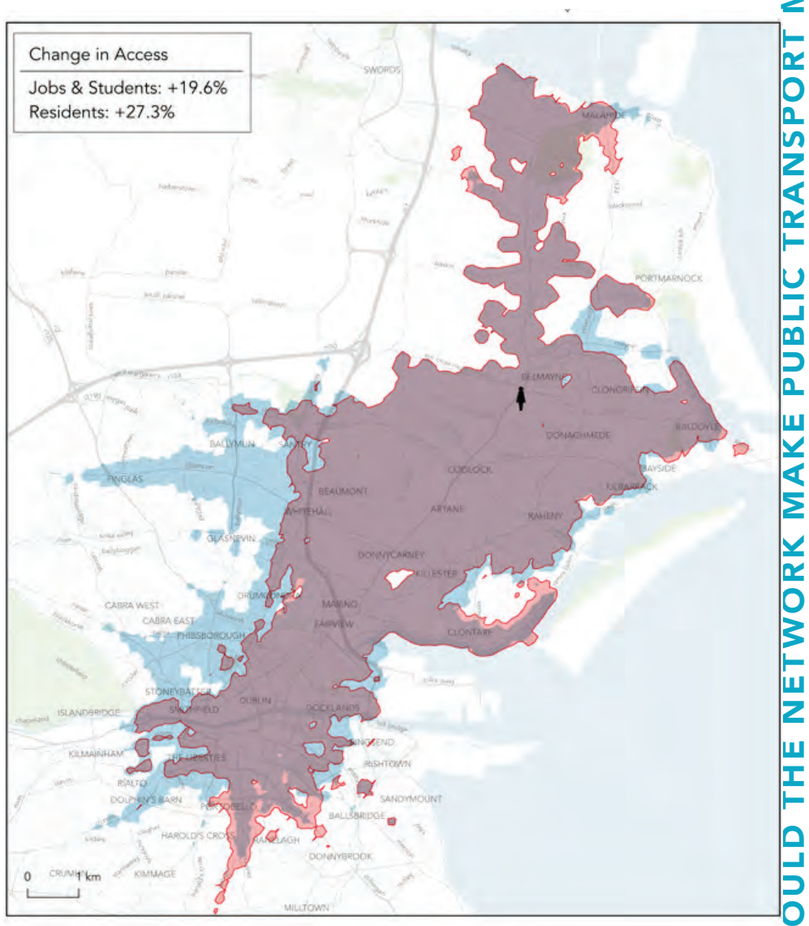



**Figure 133: Isochrone maps from Clare Hall Shopping Centre. This location would in future be served by most D buses (D1, D2, D3) and Routes 81 and 280. Because Route D2 would be less frequent than the existing 27, there would be a slight decrease in total access between this location and Darndale. However, at the 45 and 60 minute horizons, connections from D buses to the new frequent orbital Routes O, N4 and N8 would open up accesst to new parts north Dublin City. Concentrating frequent service on D buses means that travel to the Crumlin Road on the south side would be faster by up to 5 minutes, but travel to the Rathmines Road would require interchange, and so would be slower by 3-5 minutes.**

***Notes:***

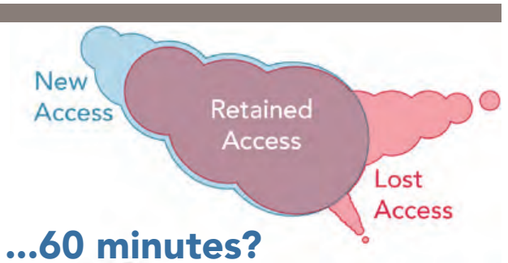
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

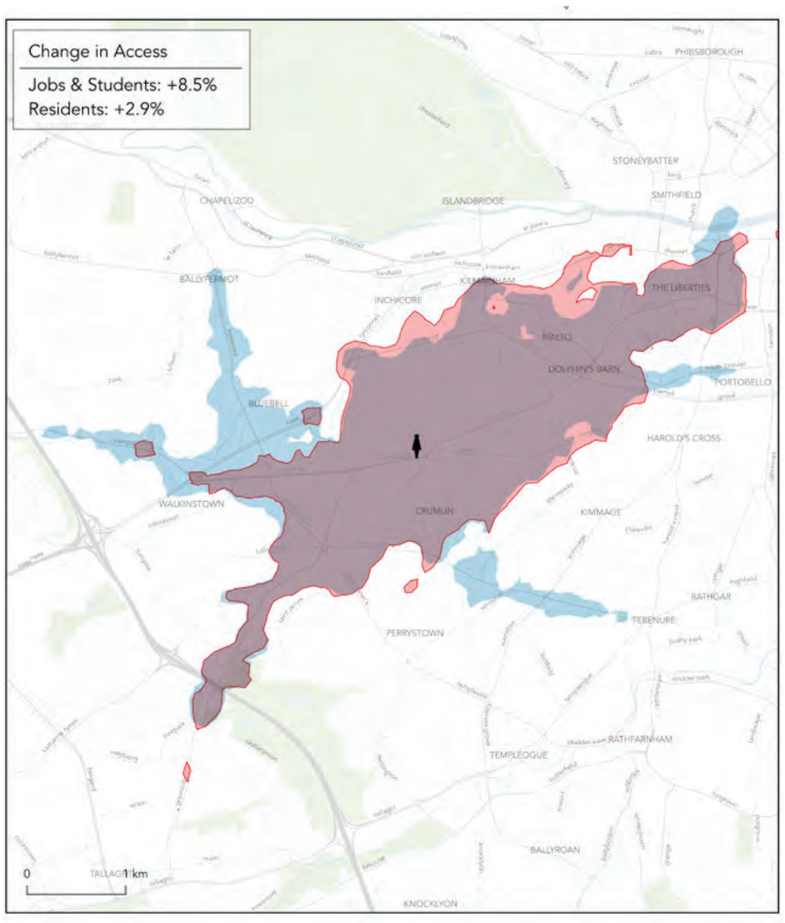
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Crumlin Hospital** in...

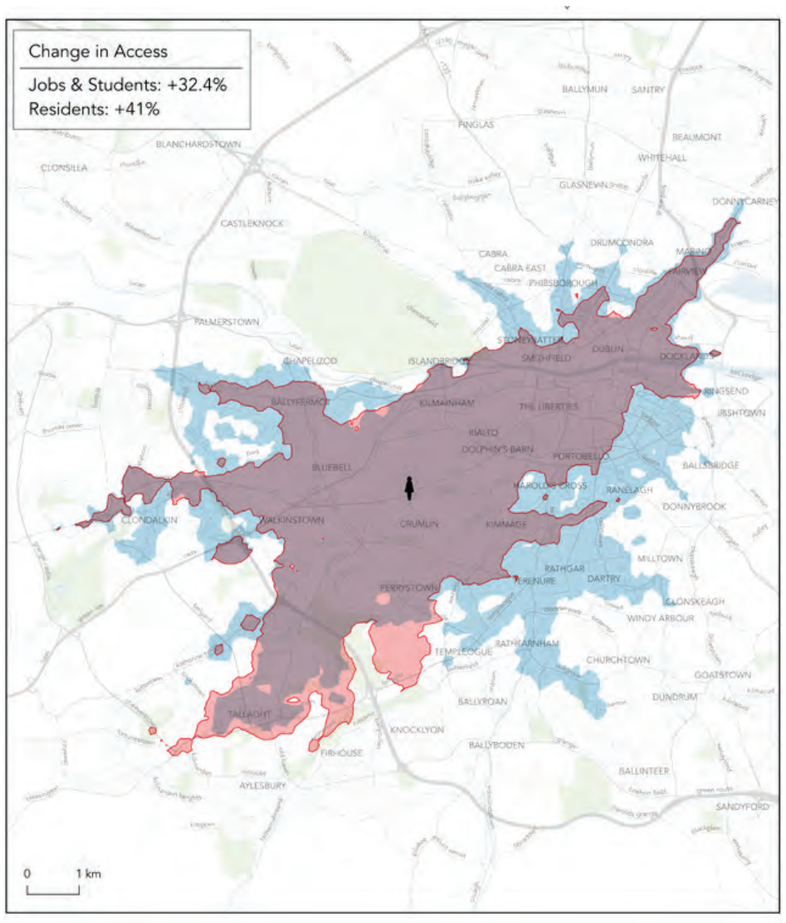
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

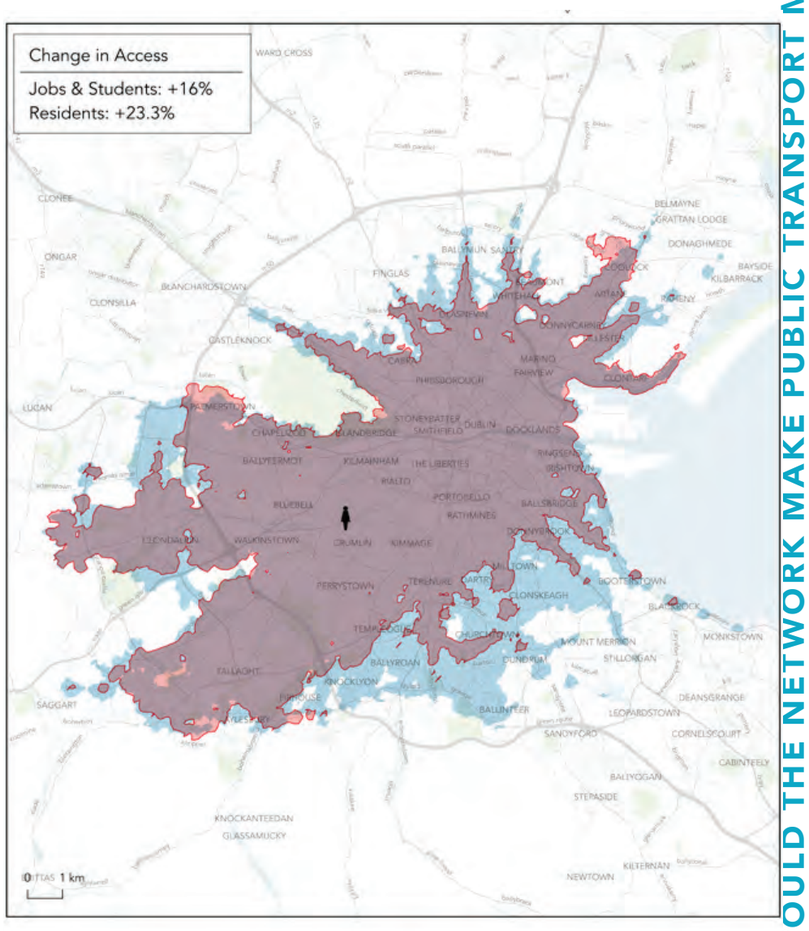



**Figure 134: Isochrone maps from Crumlin Hospital. The positive impact of new orbital Route S4 is evident at all three time scales, significantly expanding the range of south Dublin destinations reachable to/from Crumlin Hospital. There is also a slight improvement in travel to and through City Centre, due to slightly higher frequencies on the Crumlin Road (D spine) and interchange to other high-frequency spines in the City Centre. At the same time, access would decline to/from certain directions due to slightly lower frequencies (to Tallaght, proposed D2/4/5 vs. existing 27/77a) or significant routing changes requiring interchange (to Perrystown and Templeogue, proposed S4-to-F2 interchange, vs. existing 150).**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

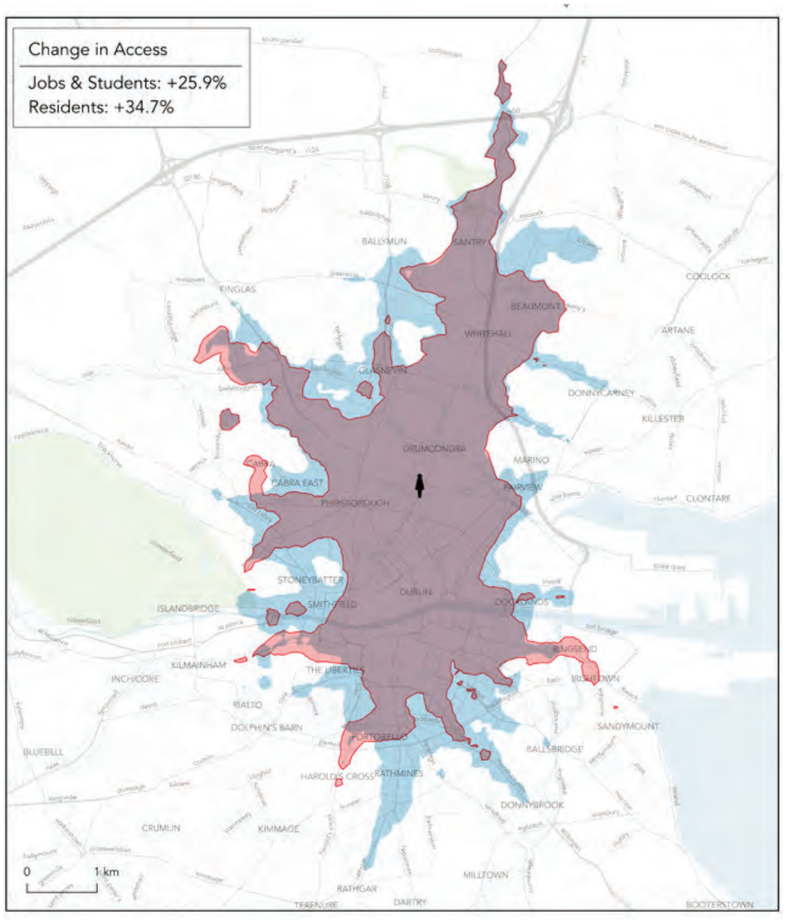
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Drumcondra Station** in...

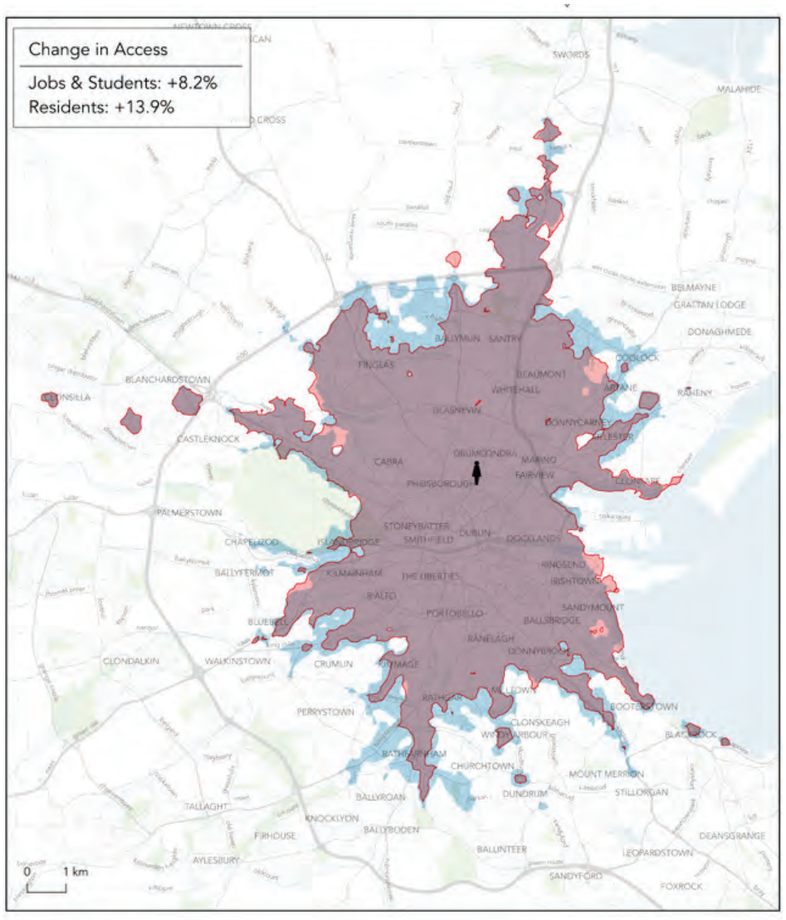
= start location

New Access
Retained Access
Lost Access

## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

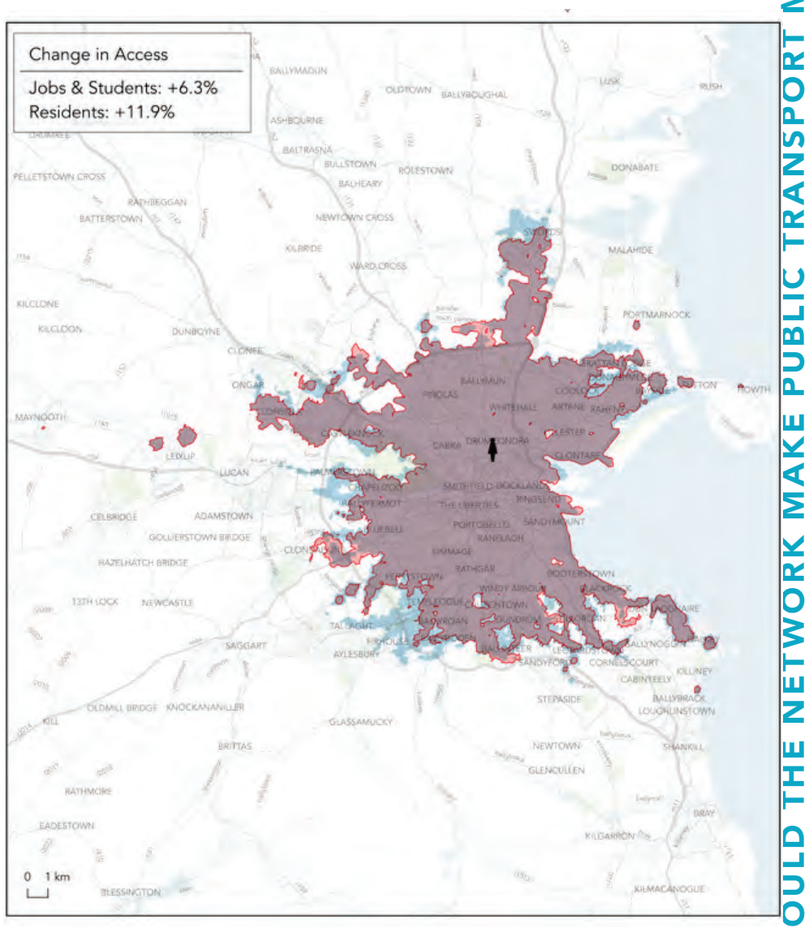



**Figure 135: Isochrone maps from Drumcondra Station. This is a central and highly accessible location today, and would become even more so as a result of the proposed changes to the bus network, because Drumcondra would be served at extremely high frequencies by both the A and F spines, while also being located near the orbital Route O. The positive impact is particularly noticeable at the 30 minute time scale. However, there would be slight increases in travel time between this location and areas where new interchanges would be required, notably Sandymount and Inchicore.**

***Notes:***

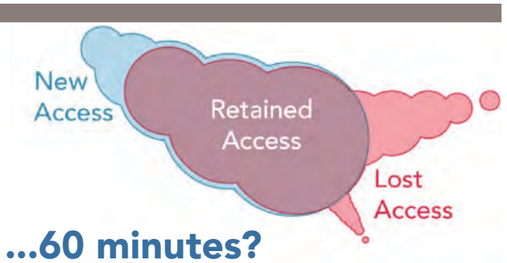
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

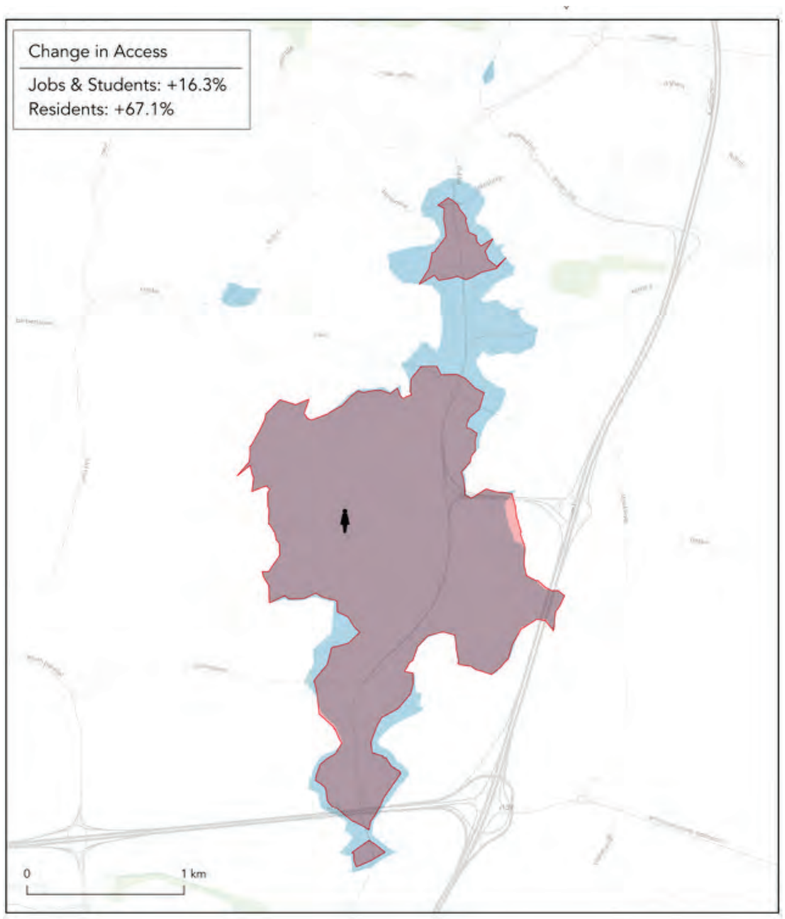
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Dublin Airport** in...

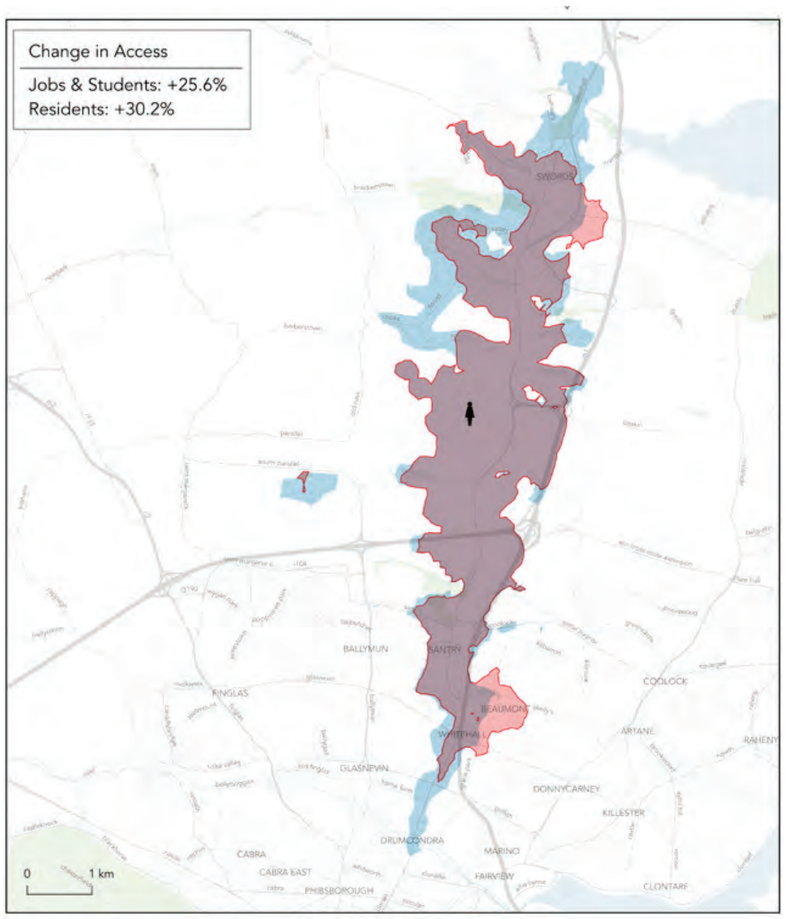
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

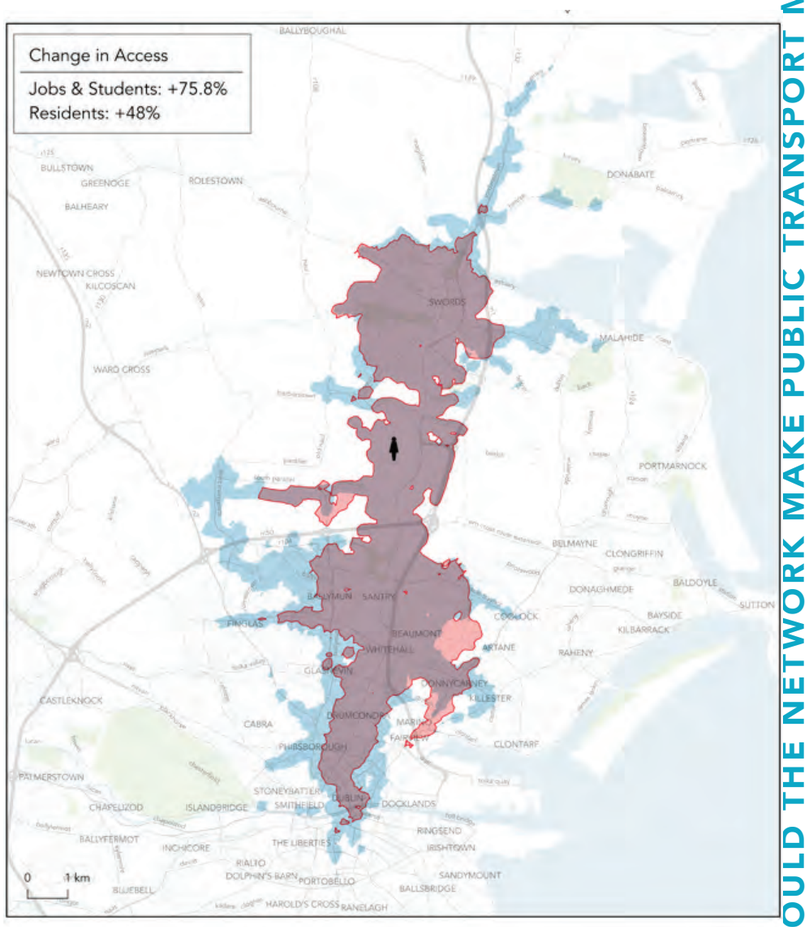



**Figure 136: Isochrone maps from Dublin Airport. At the 30 and 45 minute time horizons, these show improved travel times due to higher frequency to River Valley (proposed Route 281) and central and north Swords (proposed Routes 283 and 285). Service to City Centre would also be accelerated by a few minutes because proposed Route A2 would not deviate off the Swords Road in Beaumont. At the 60 minute horizon, orbital Routes O, N4 and N8 would provide improved access to parts of north Dublin City beyond Swords Road.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

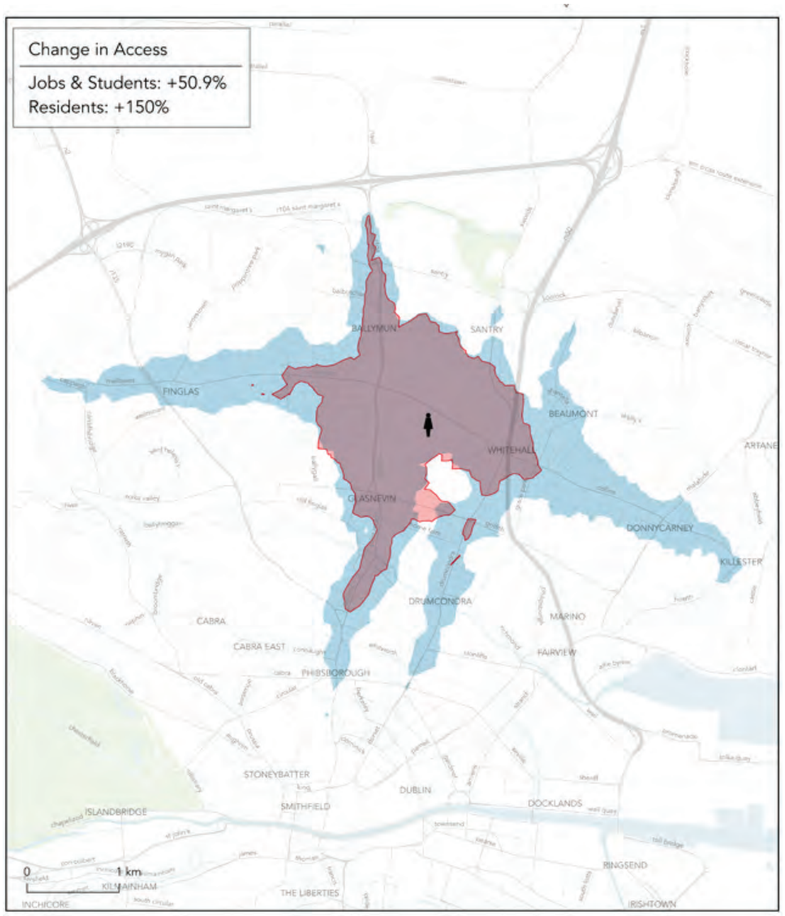
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Dublin City University - Main Campus** in...

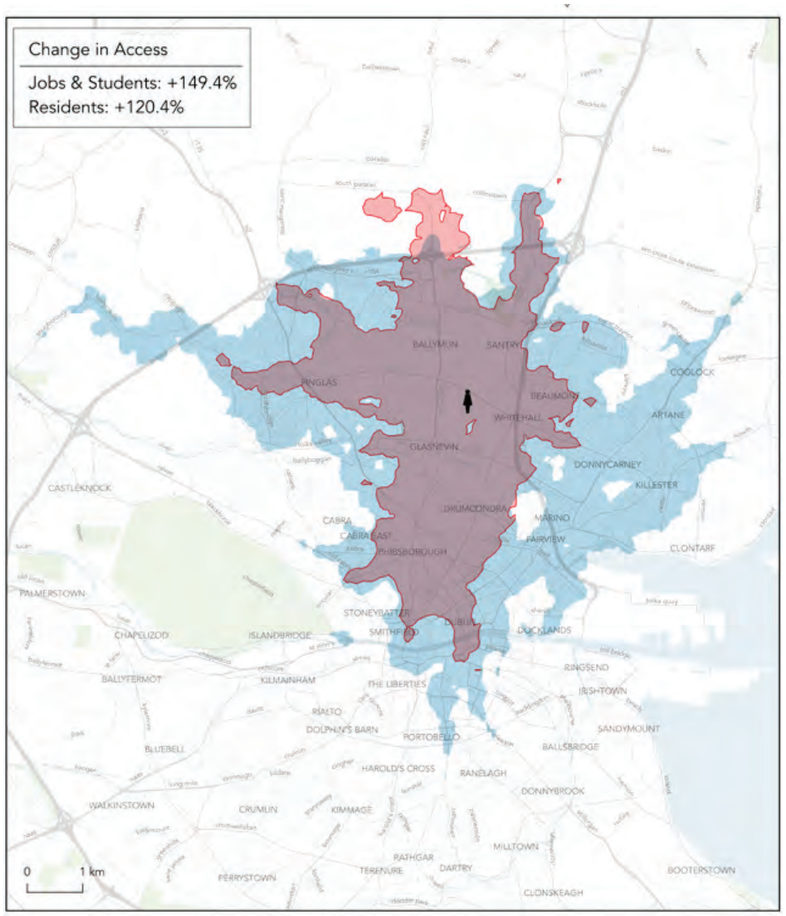
= start location

New Access | Retained Access | Lost Access

**...30 minutes?**




**...45 minutes?**




**...60 minutes?**

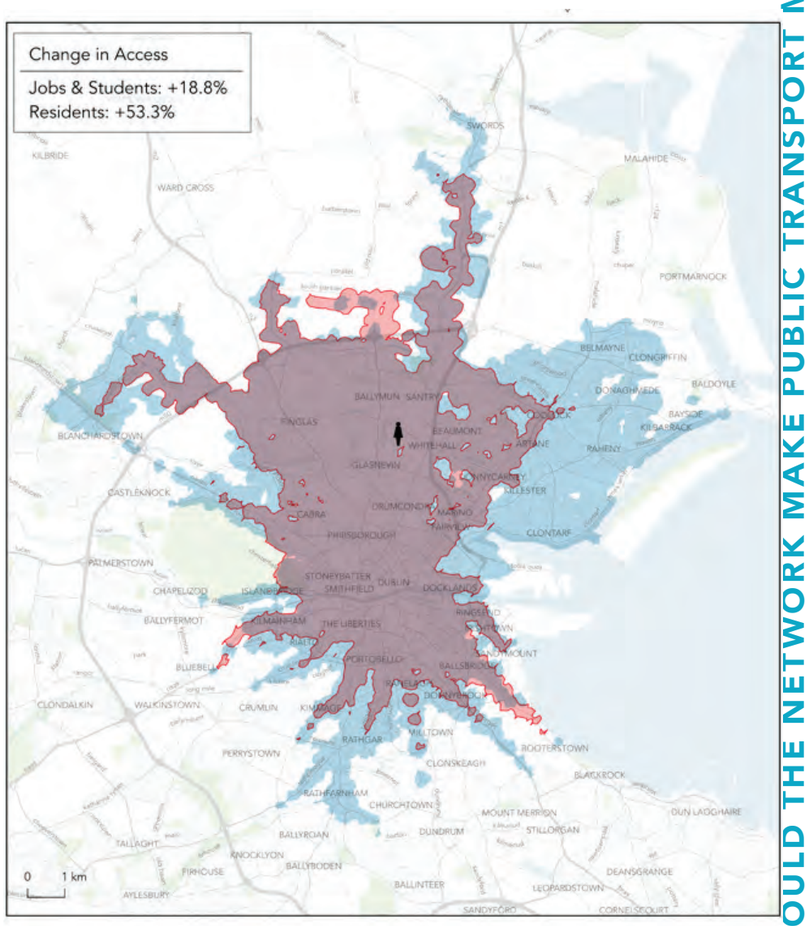



**Figure 137: Isochrone maps from Dublin City University. DCU would be served by more frequent service on the Ballymun Road (E Spine), and new frequent radial service (Route A3) to the Swords Road and new frequent orbital service (Route N4) along Collins Avenue. As a result, access would improve significantly in all directions. In other words, nearly all public transport trips to Dublin City University would take significantly less time.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Dún Laoghaire** in...

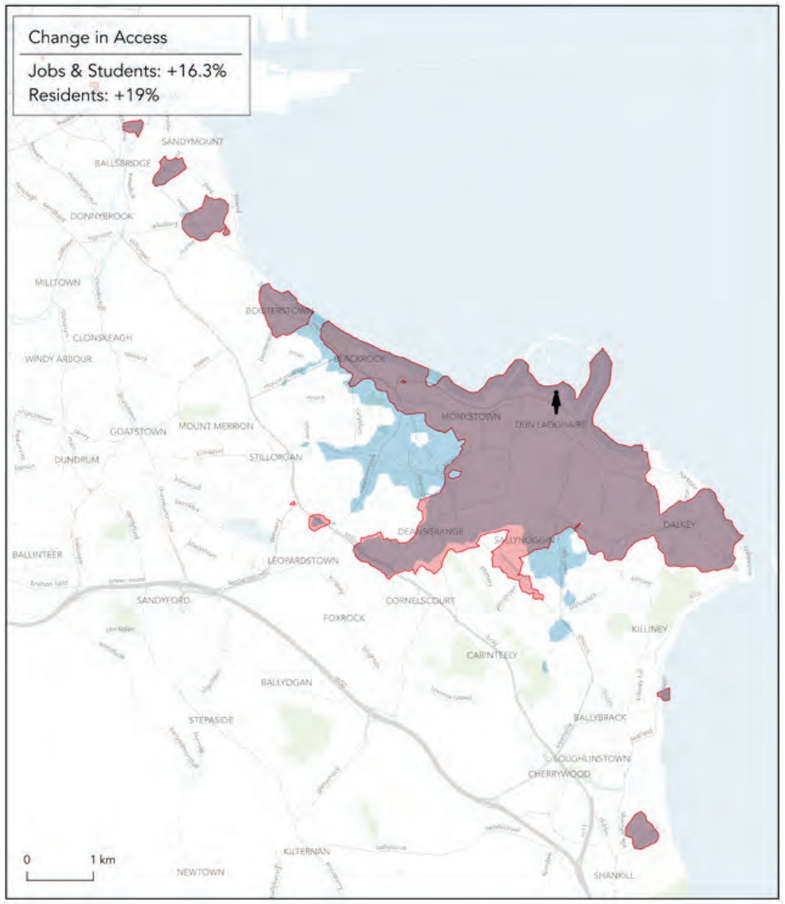
= start location

New Access

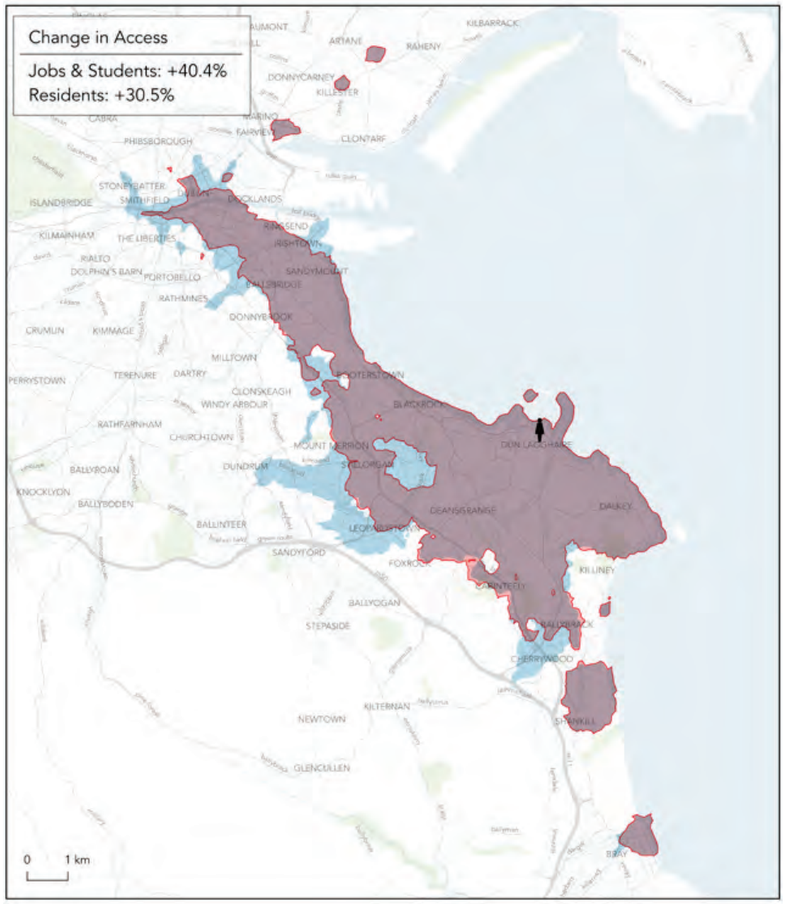
Retained Access

Lost Access

**...30 minutes?**




**...45 minutes?**




**...60 minutes?**

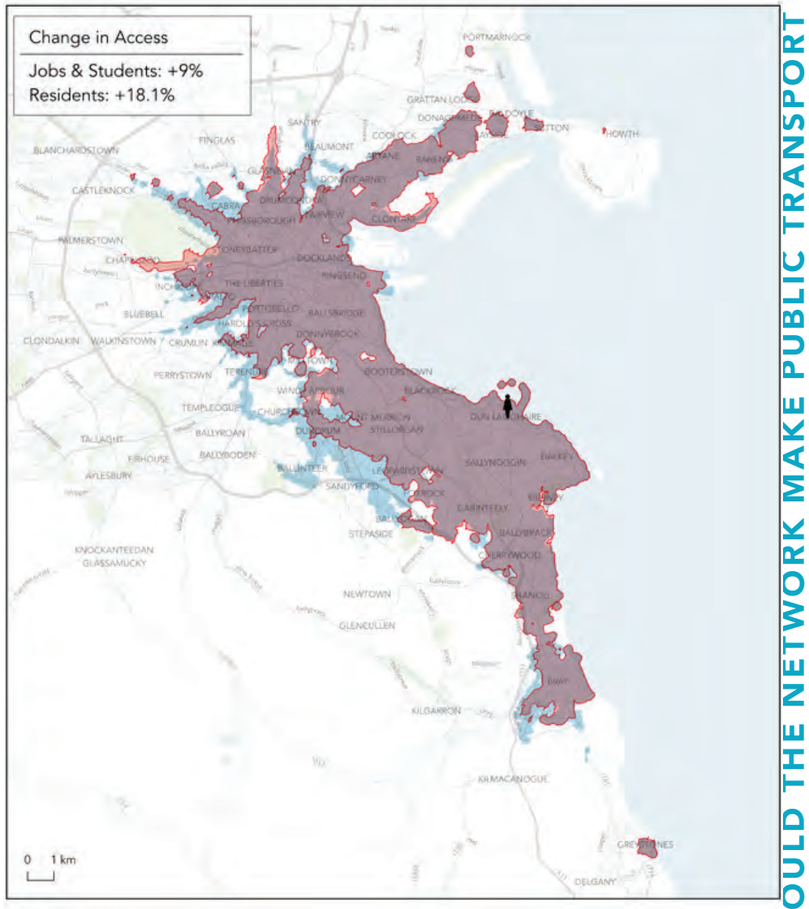



**Figure 138: Isochrone maps from Dun Laoghaire. DART would continue to be the fastest and most frequent service to City Centre from this location. The most visible improvements in access would be related to new local and orbital service, including Route S8 to Sandyford, Route 222 to Cherrywood and Route 225 to Dundrum. At 45 and 60 minutes, the maps also show slight improvements (3-5 minutes) for cross city trips, due to higher frequency interchange in the City Centre.**

***Notes:***

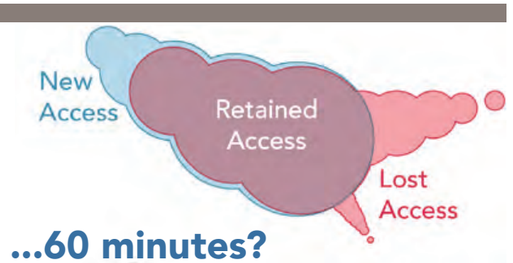
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

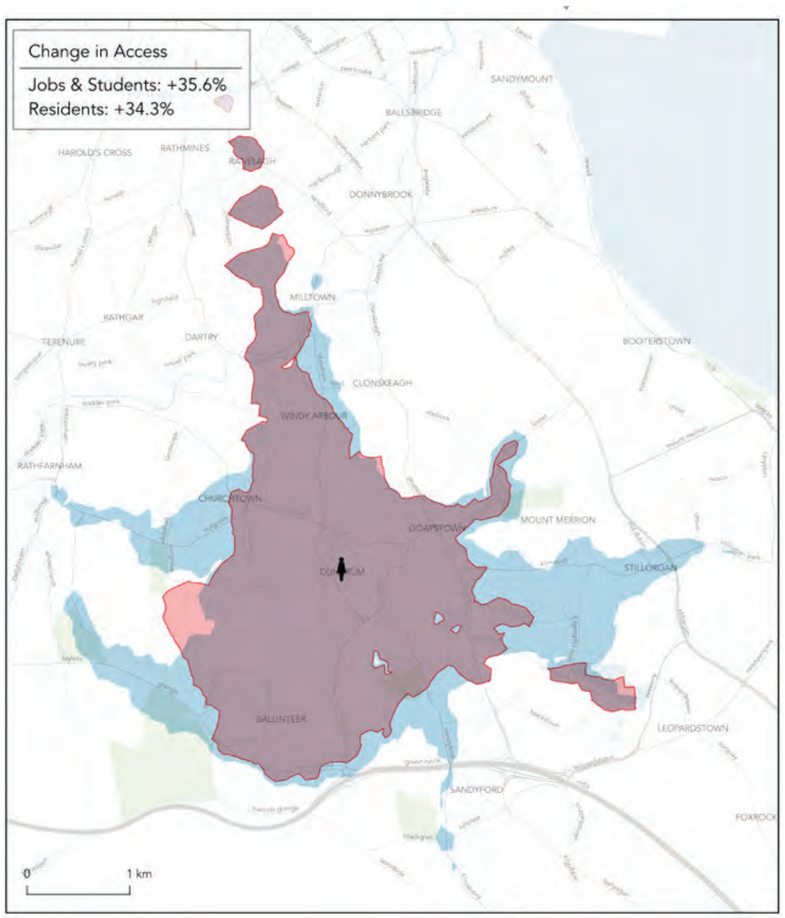
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Dundrum** in...

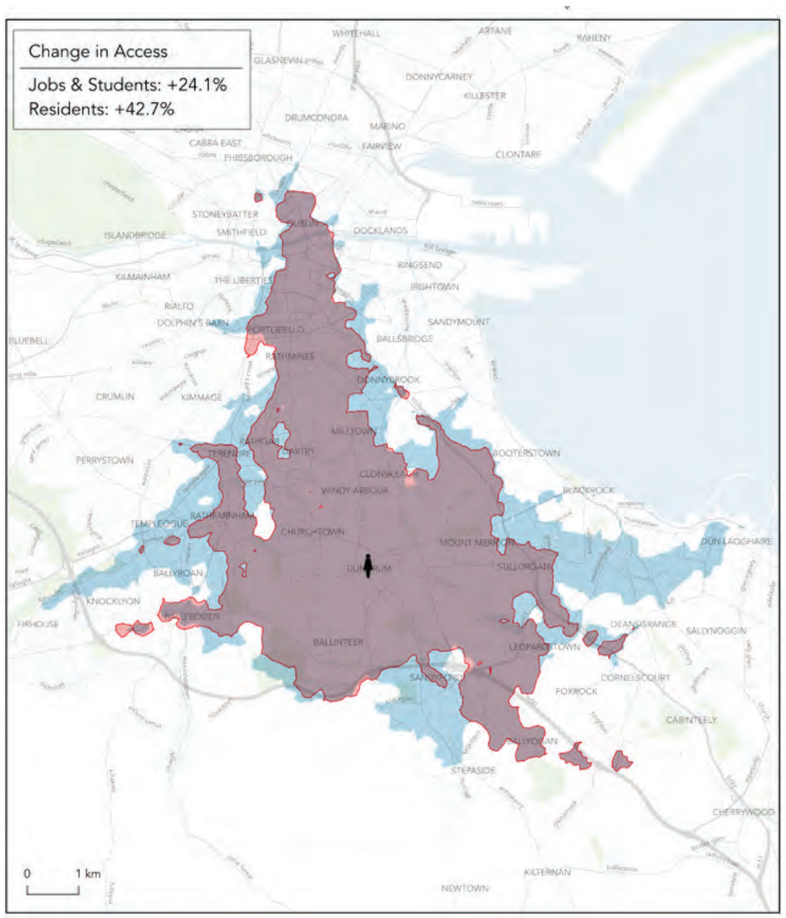
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

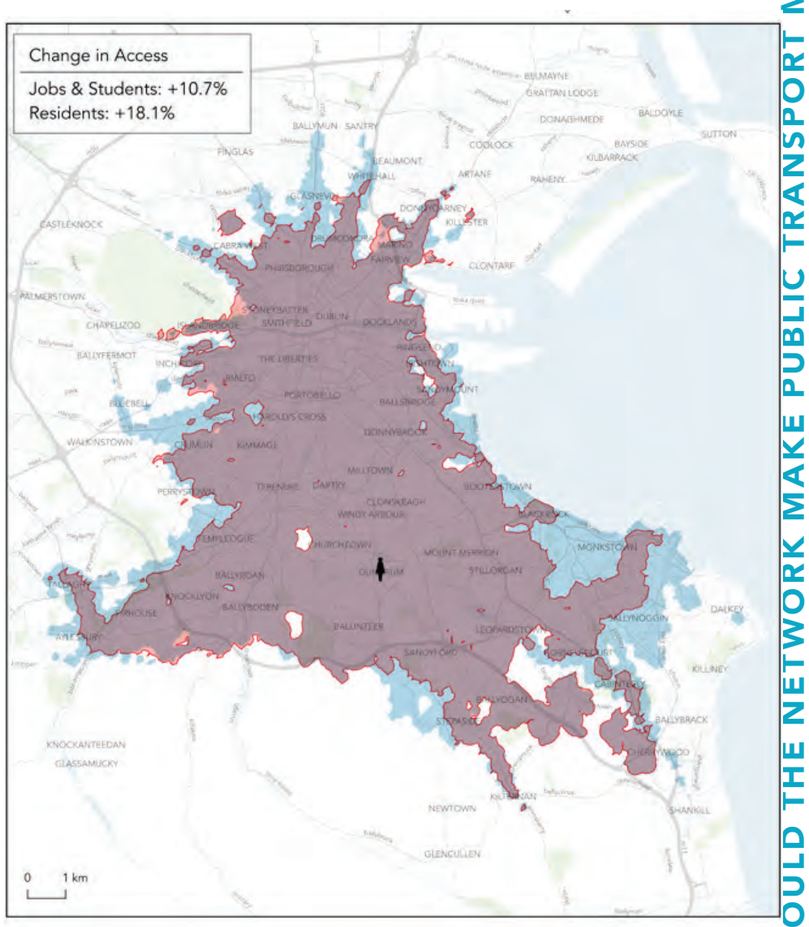



**Figure 139: Isochrone maps from Dundrum. The main service to City Centre from this location would remain the Luas Green Line, with no changes. However, orbital and local services would increase, including frequent Routes S6 (to Rathfarnham, Tallaght, UCD, Blackrock) and Route 225 (to Dun Laoghaire), resulting in significant increases in access to and from Dundrum within 30 and 45 minutes.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

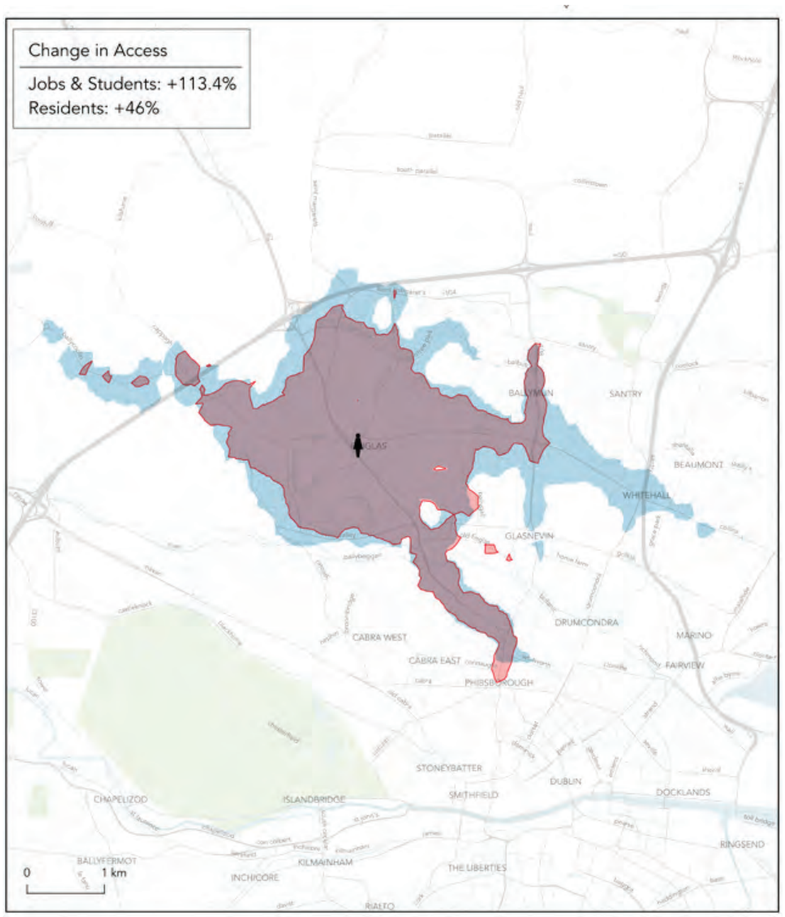
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Finglas Village** in...

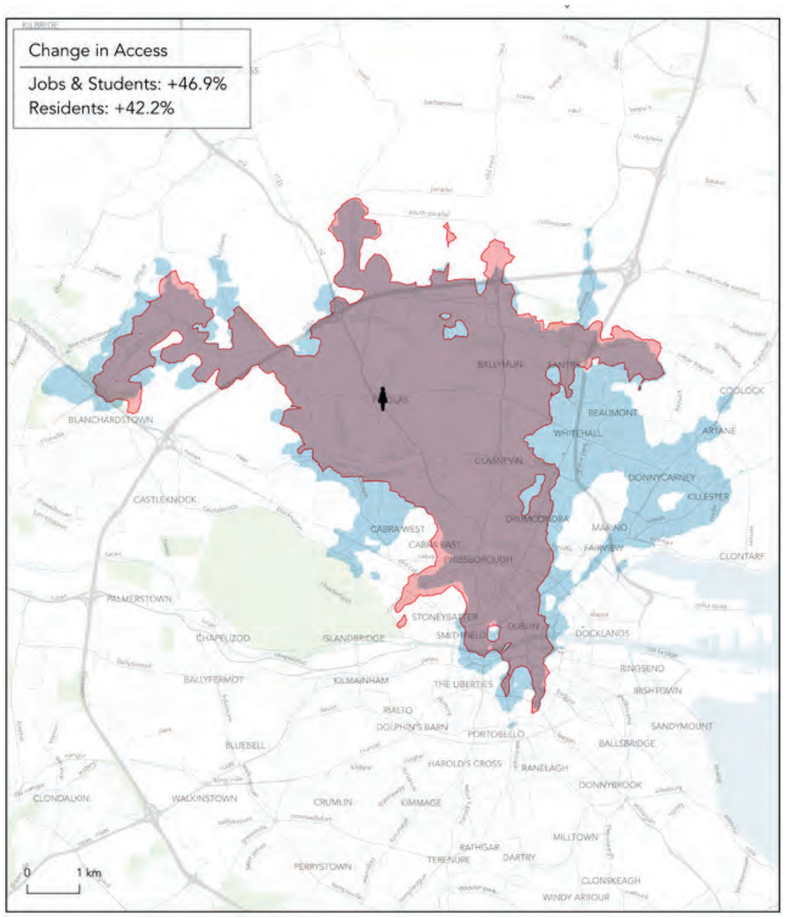
= start location

New Access
Retained Access
Lost Access

## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

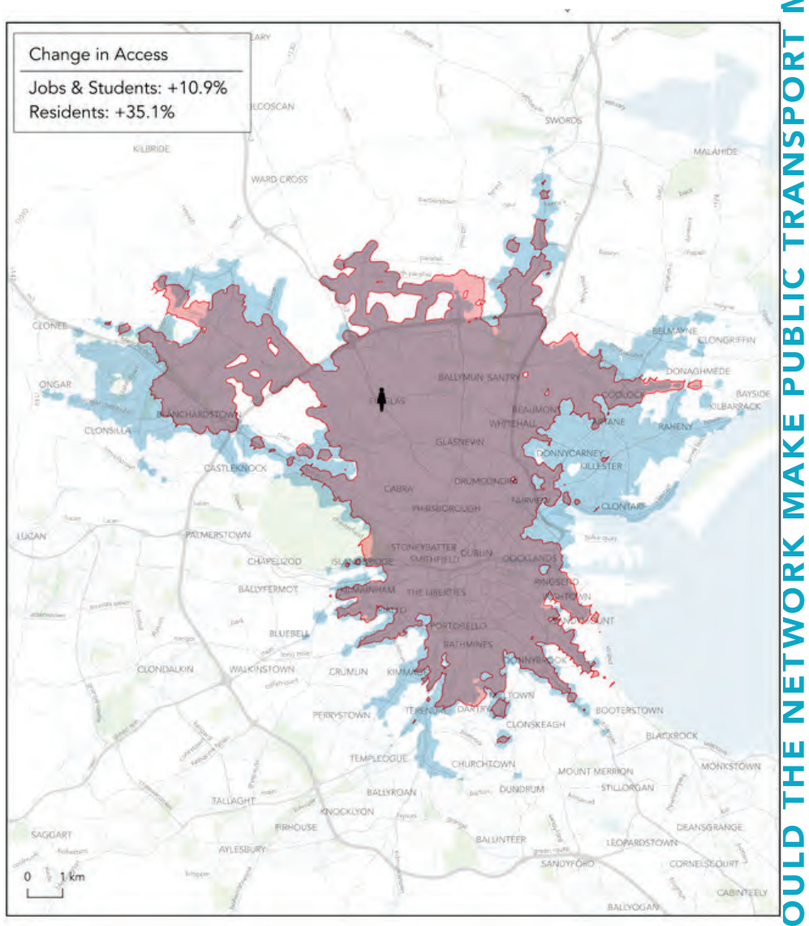



**Figure 140: Isochrone maps from Finglas Village. The main proposed radial routes in Finglas (F1, F2, F3) would have more direct routings than existing Route 40, and the proposed orbital Routes N4 and N8 would be both more frequent and direct than the existing Route 17a. As a result, travel times would improve in all directions, and access to and from Finglas Village would improve at the 30, 45 and 60 minute time horizons.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Heuston Station** in...

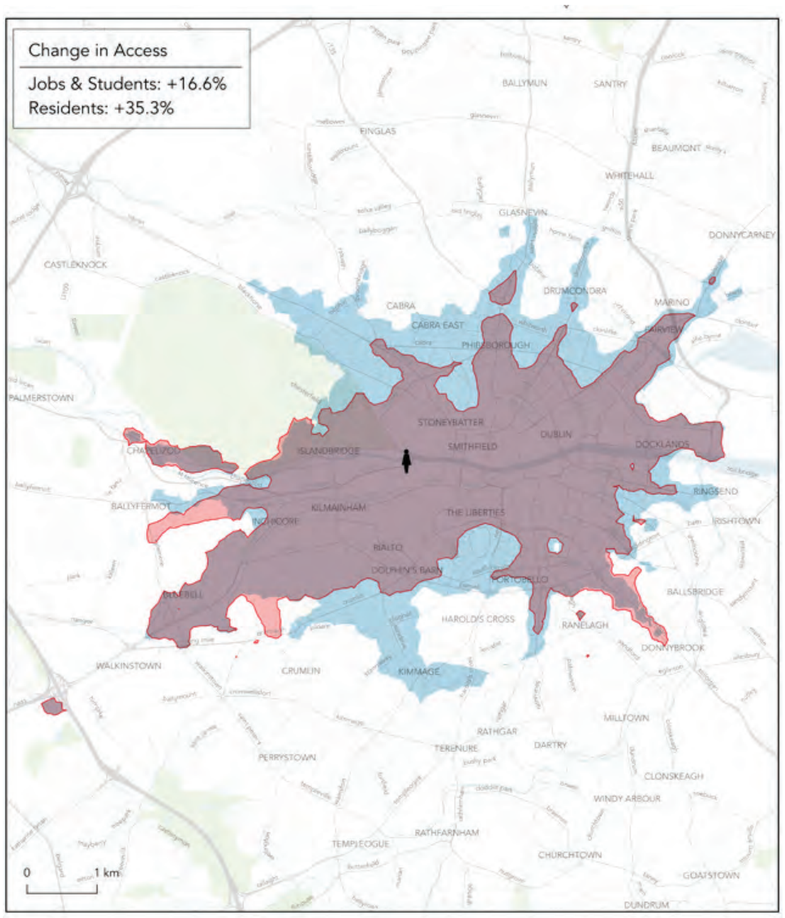
= start location

New Access

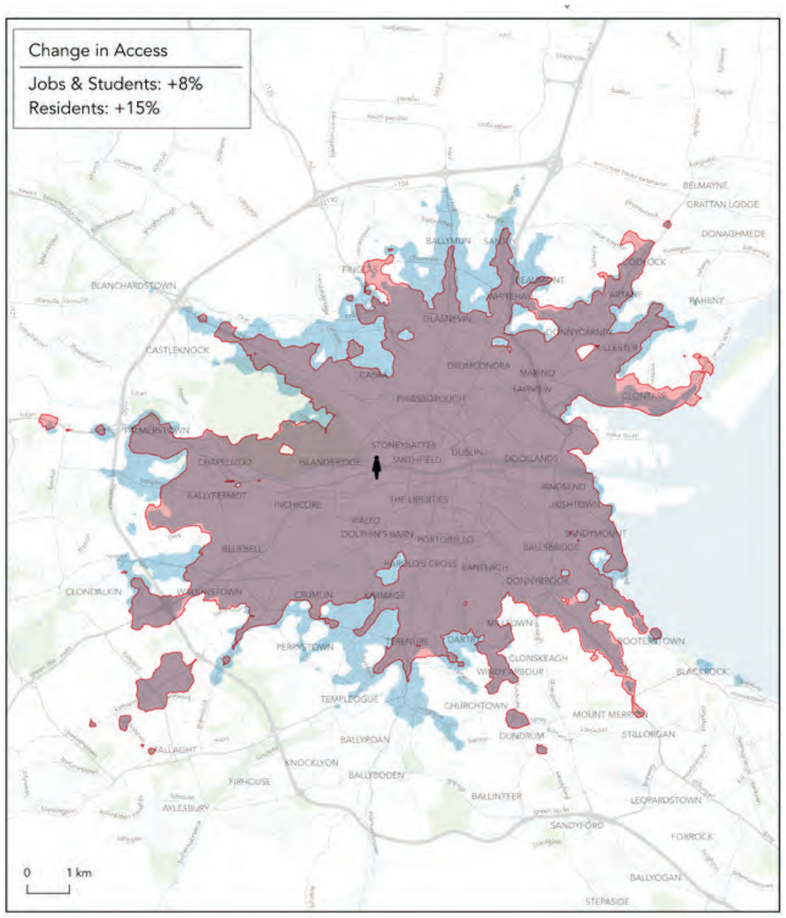
Retained Access

Lost Access

## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

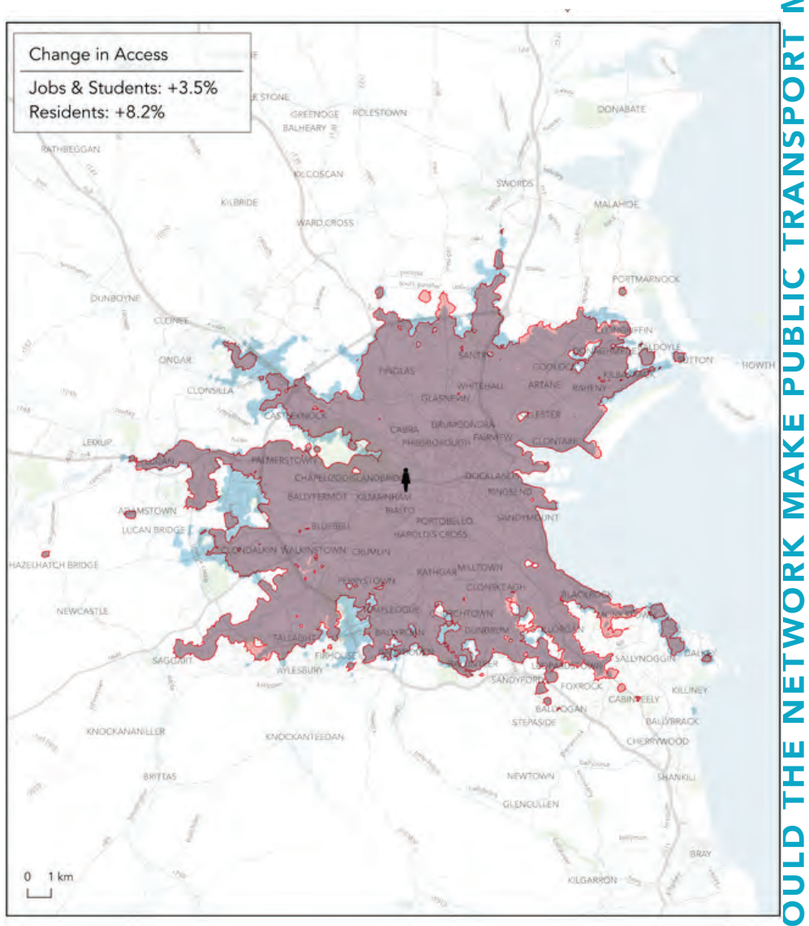



**Figure 141: Isochrone maps from Heuston Station. Because of its central location, Heuston Station is currently and would remain accessible within 60 minutes from much of the Dublin area. However, travel times between Heuston and areas of inner north and south Dublin would improve significantly as a result of the introduction of the orbital Route O, with service around the edges of the City Centre to Heuston every 8 minutes in both directions.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

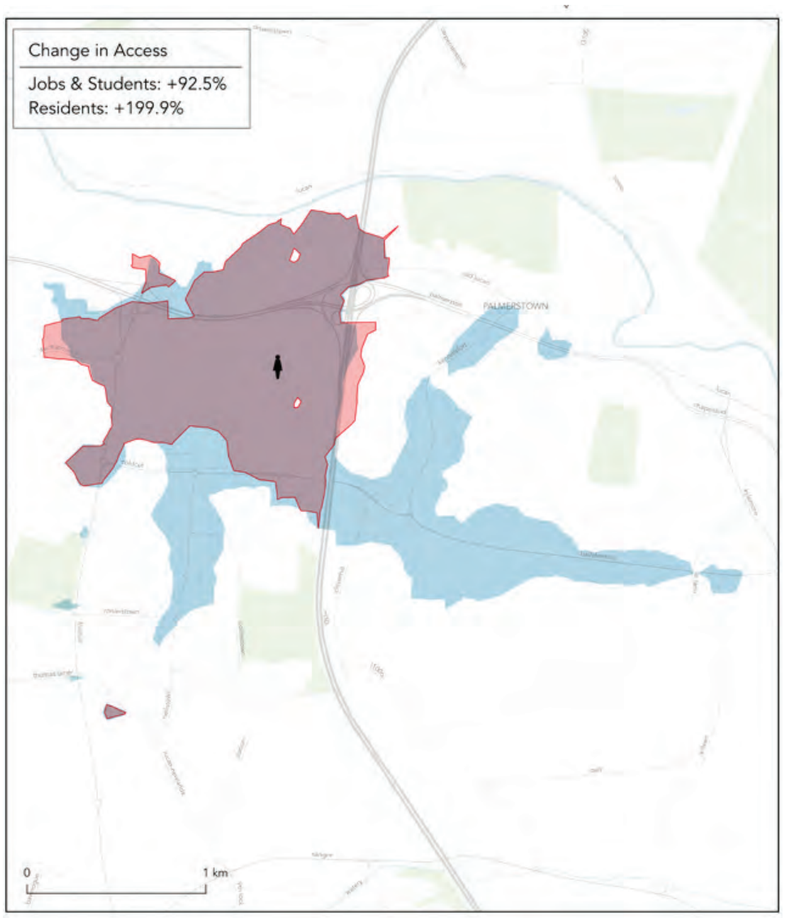
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Liffey Valley Shopping Centre** in...

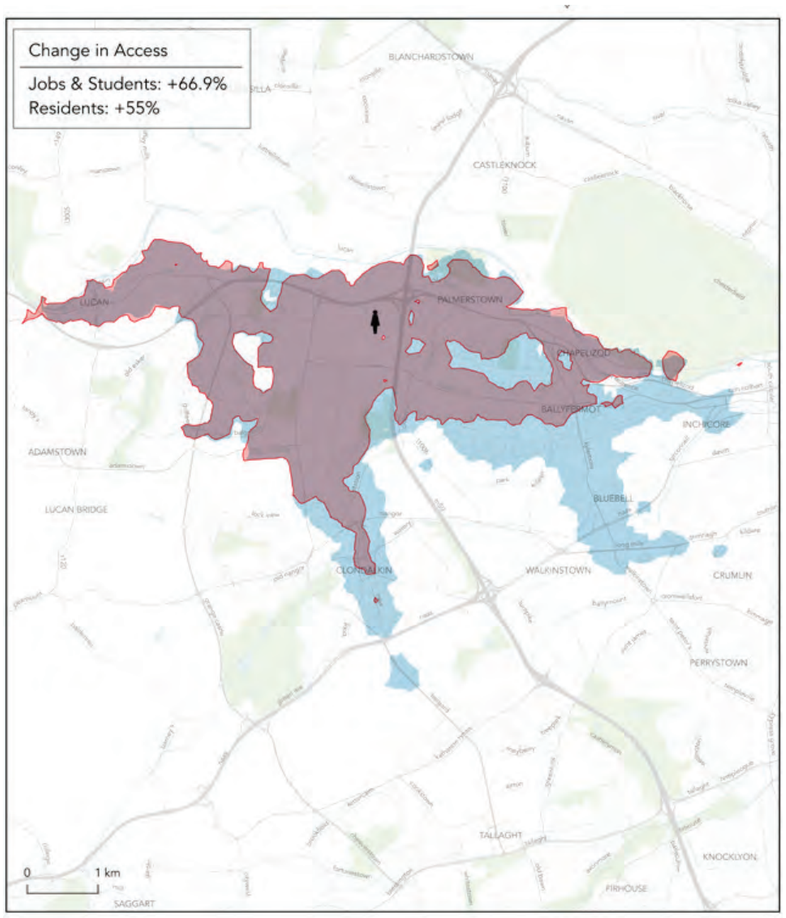
= start location

New Access
Retained Access
Lost Access

**...30 minutes?**




**...45 minutes?**




**...60 minutes?**

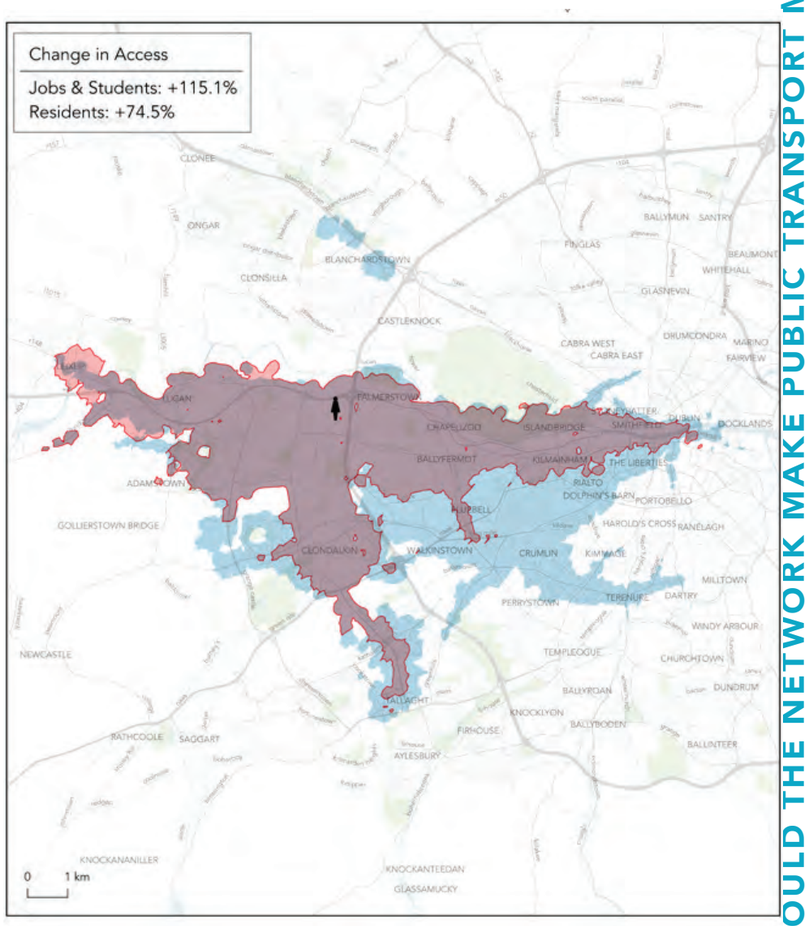


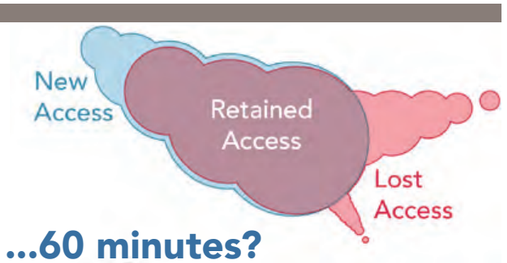

**Figure 142: Isochrone maps from Liffey Valley Shopping Centre. As a result of its location and design, Liffey Valley has traditionally been a heavily auto-oriented location, with few convenient public transport options, mostly service on the N4 motorway to and from Lucan and north Kildare. This would change in the proposed network, with new frequent service to Clondalkin and Tallaght (Route W2), Ballyfermot and much of inner south Dublin (Route S4).**

***Notes:***

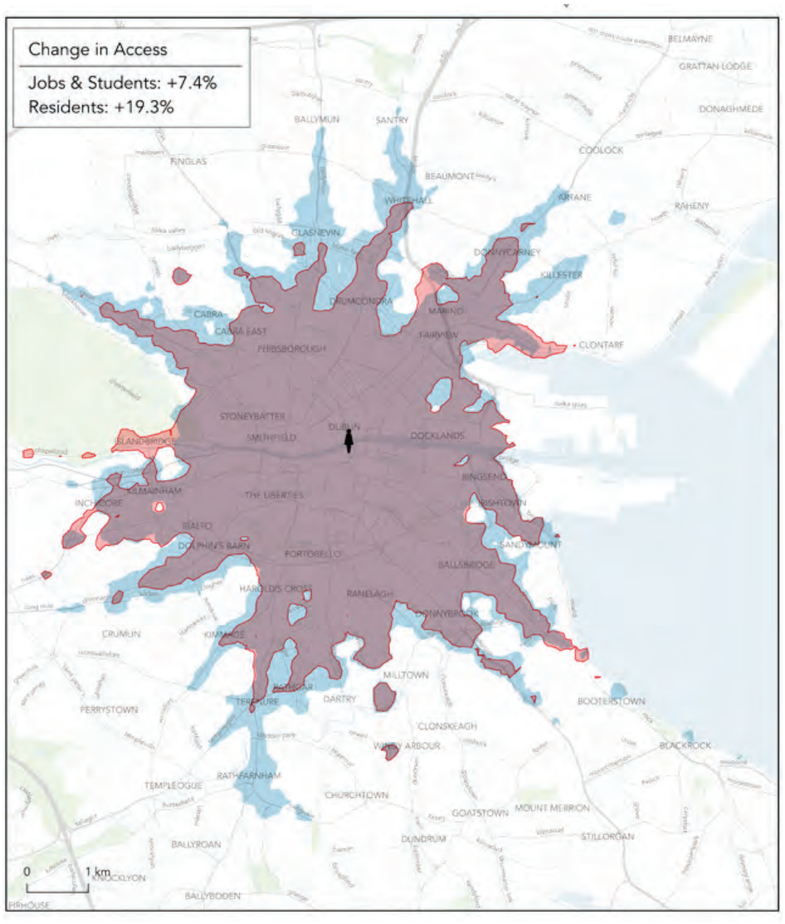
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from the **O'Connell Bridge** in...

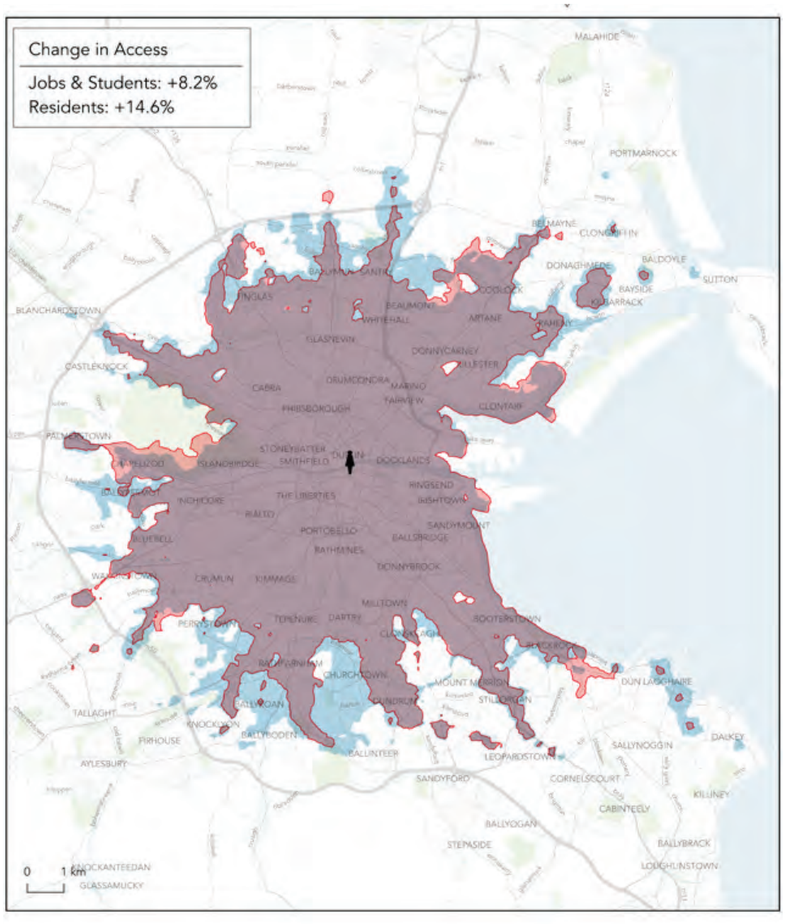
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

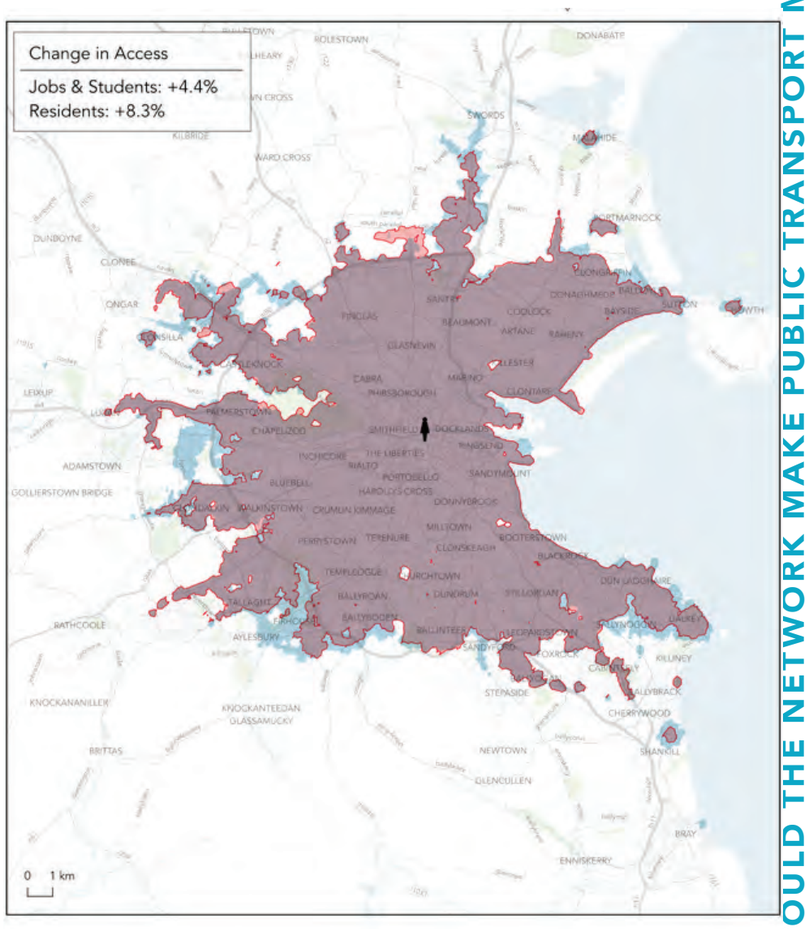



**Figure 143: Isochrone maps from the O'Connell Bridge. This location has been and would remain the very centre of the bus network in Dublin, and would remain accessible to most of the Dublin area within 60 minutes. Nonetheless, the number of places within 45 minutes or less of O'Connell Bridge would still increase, due to the increased frequency, and directness of most of the proposed spines and branches, relative to the main existing bus routes.**

***Notes:***

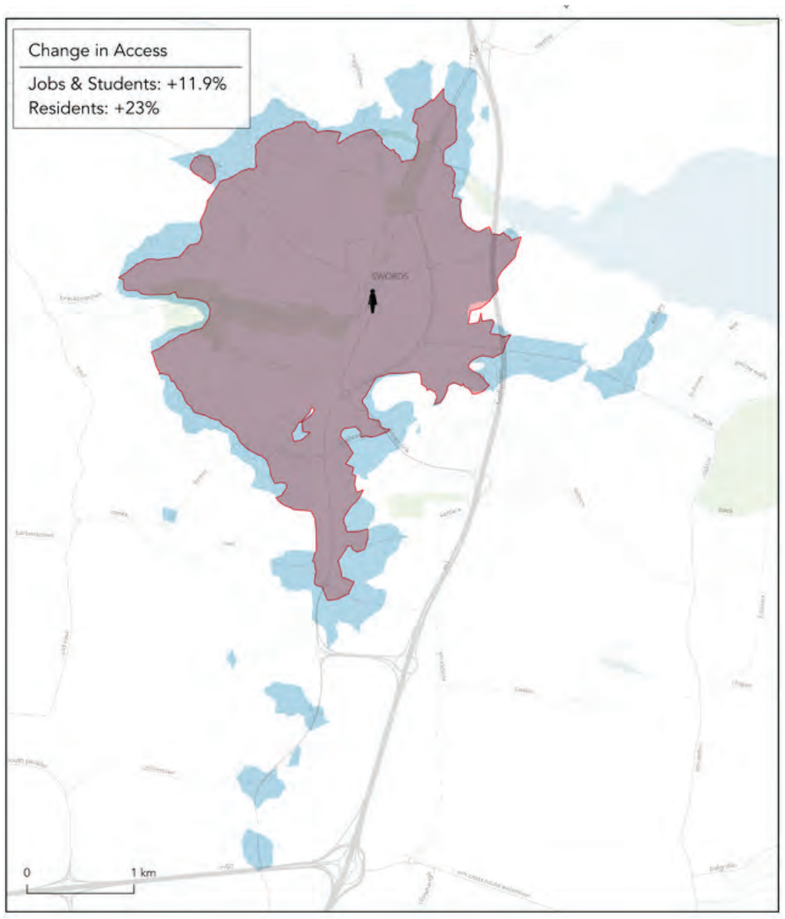
*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*
*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **Swords Main Street** in...

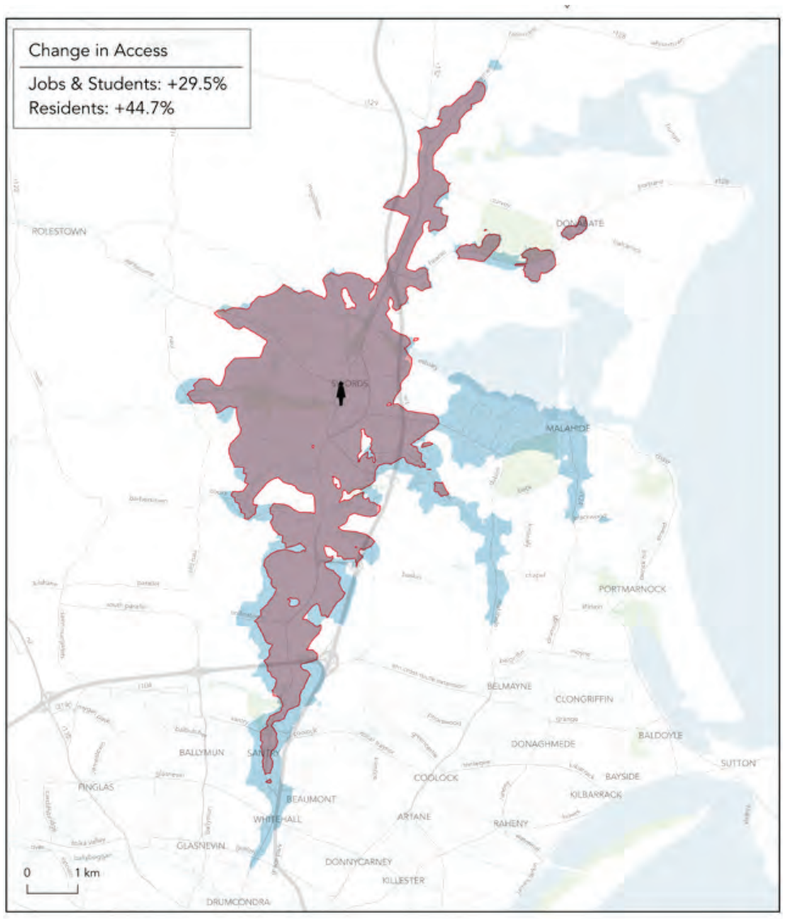
= start location

New Access
Retained Access
Lost Access

## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

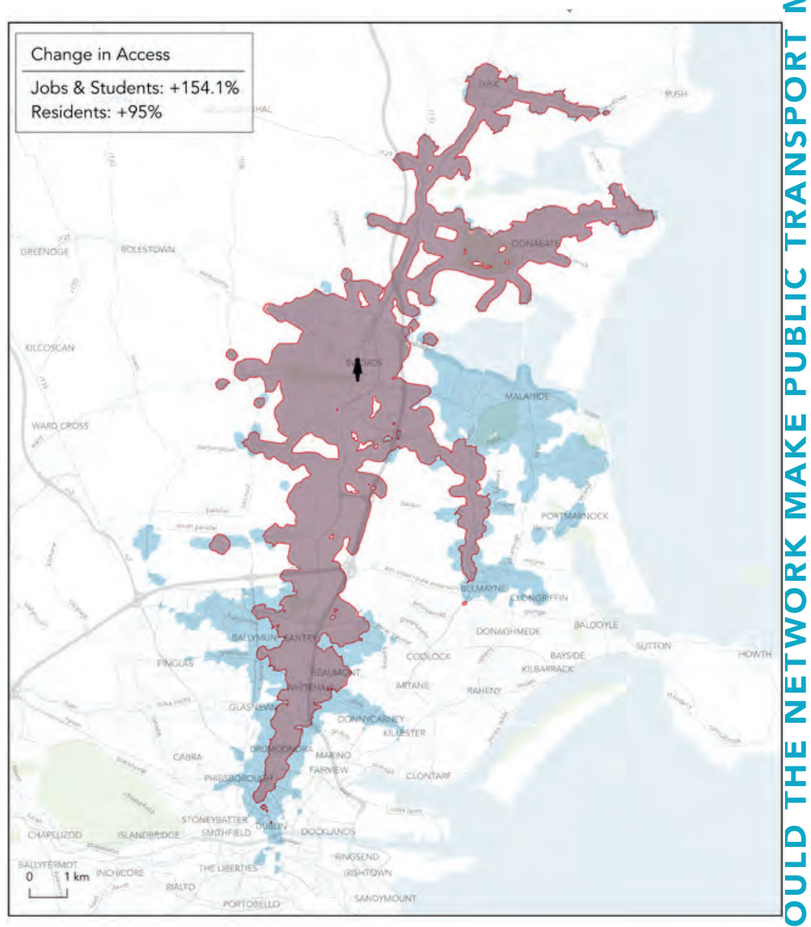



**Figure 144: Isochrone maps from Swords Main Street. Service between Swords and northern Fingal would remain similar, as local routes operating every 30 minutes. However, service to the Airport, north Dublin City, City Centre and Malahide would generally become more frequent and direct. As a result, access to and from Swords Main Street would improve in 30, 45 and 60 minutes. In 60 minutes, the maps also show the effects of improvements to orbital service in north Dublin City on proposed Routes N4 and N8.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher, and from some locations faster travel times may be available on peak express routes.*

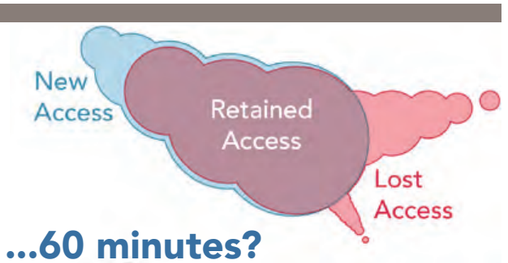
*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

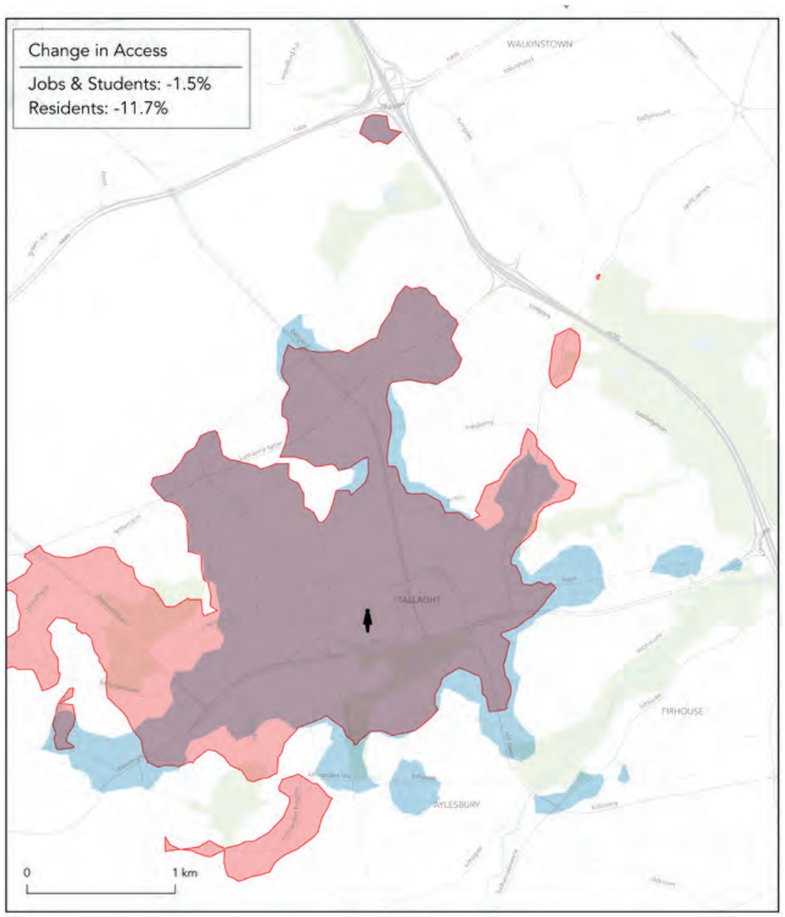
*4. This analysis is only on the public bus network. It does not take into account private express bus services, such as Swords Express.*

# How far could I travel from **Tallaght - The Square** in...

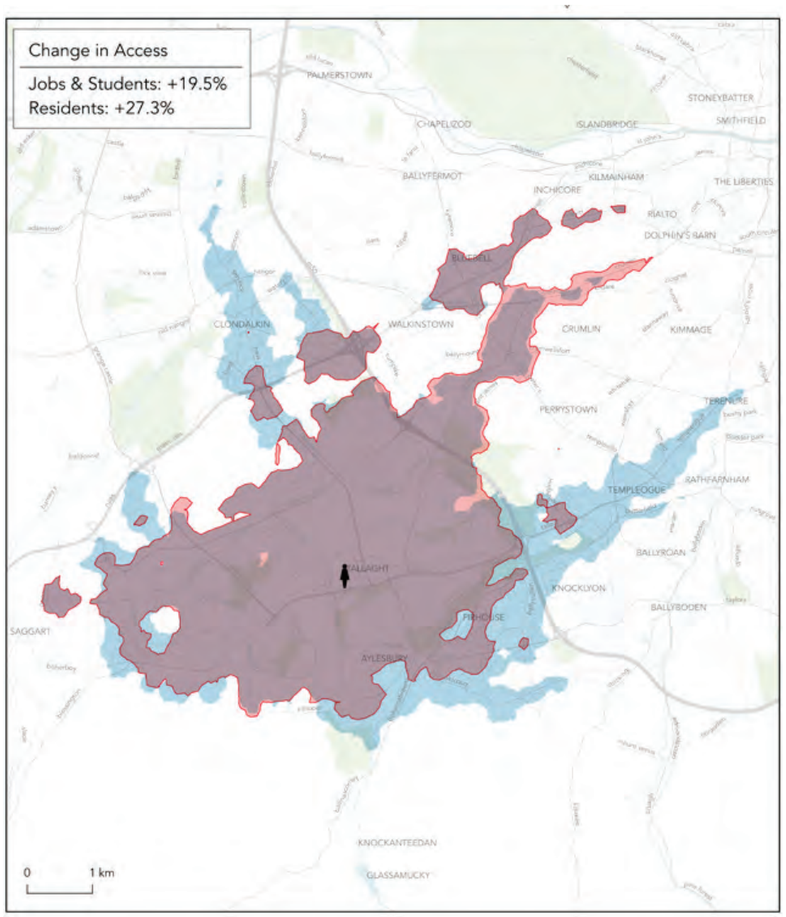
= start location




## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

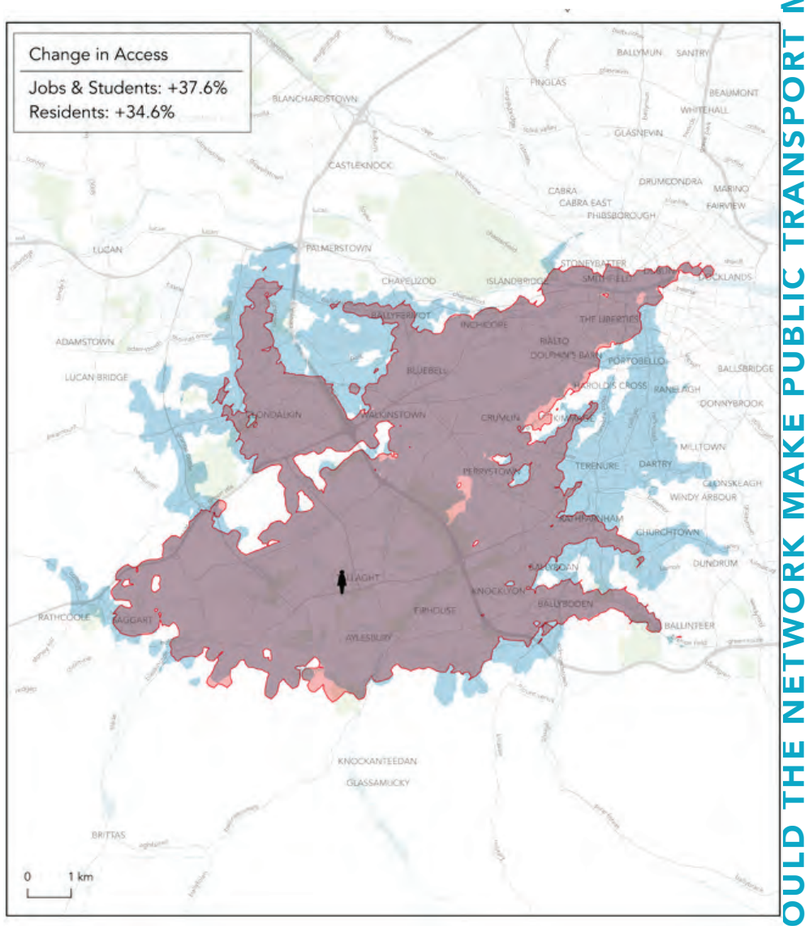



**Figure 145: Isochrone maps from Tallaght - The Square. New frequent service to Clondalkin and Liffey Valley (Route W2), and to City Centre via Templeogue (Route A3) would significantly improve access between Tallaght and many parts of south and west Dublin. However, some of the changes in Tallaght would result in longer travel times to and from certain estates. This includes a change in path for the most frequent service to City Centre (existing 27), to a routing that prioritizes direct travel to Citywest (proposed D2), and lower frequencies in some areas served by existing route 77a (e.g. Tymon North, Killinarden).**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*

# How far could I travel from **University College Dublin (UCD) - Belfield** in...

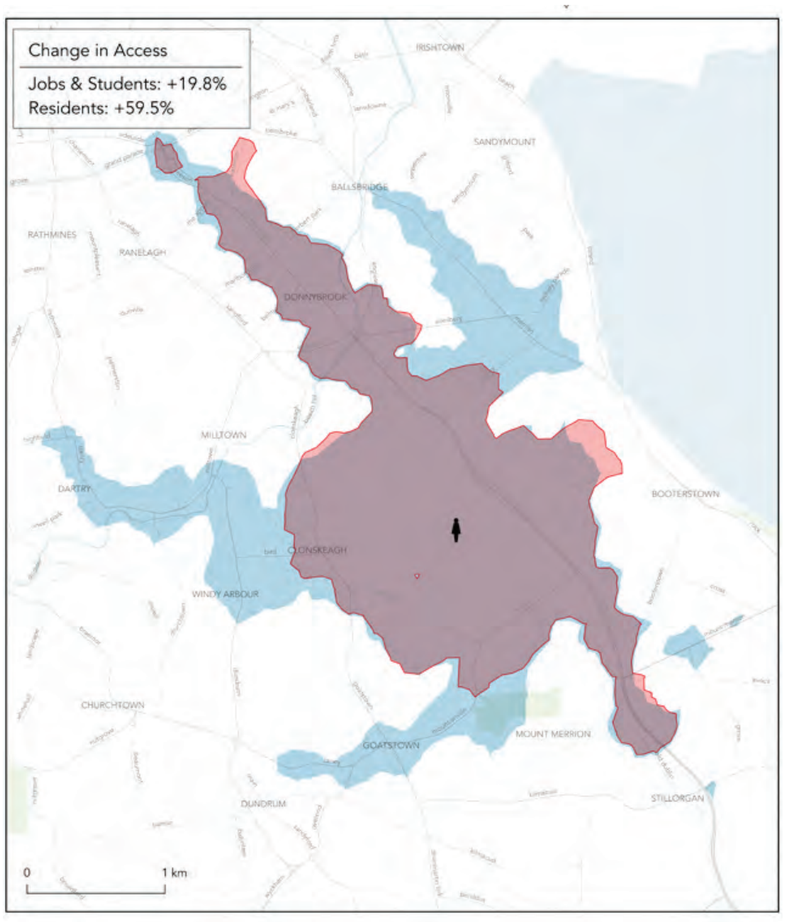
= start location

New Access

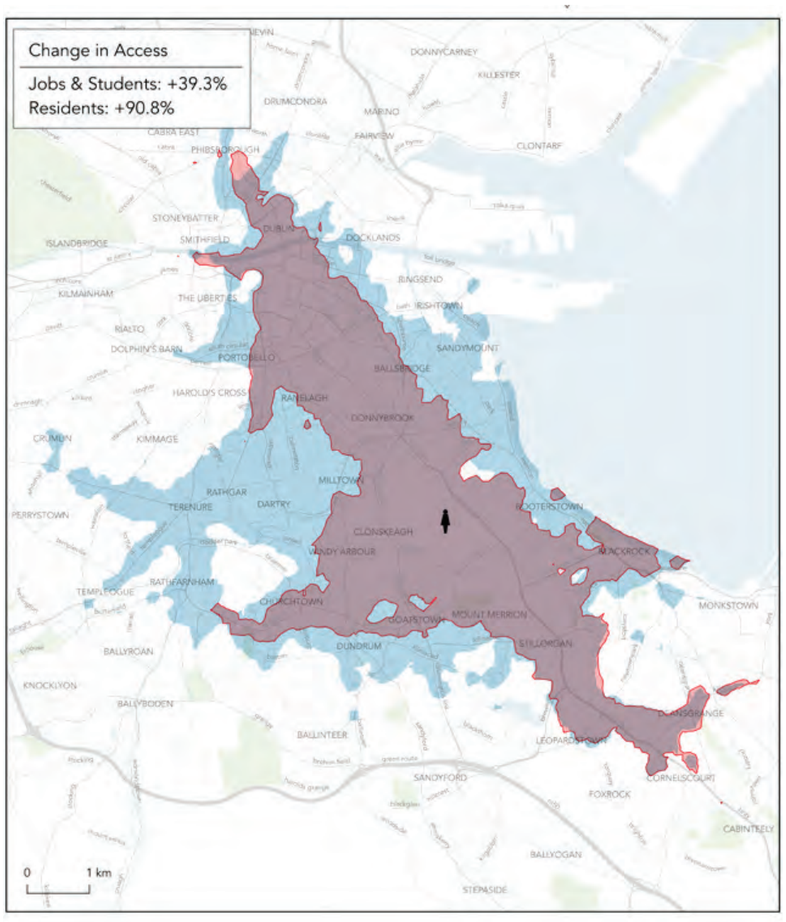
Retained Access

Lost Access

## ...30 minutes?




## ...45 minutes?




## ...60 minutes?

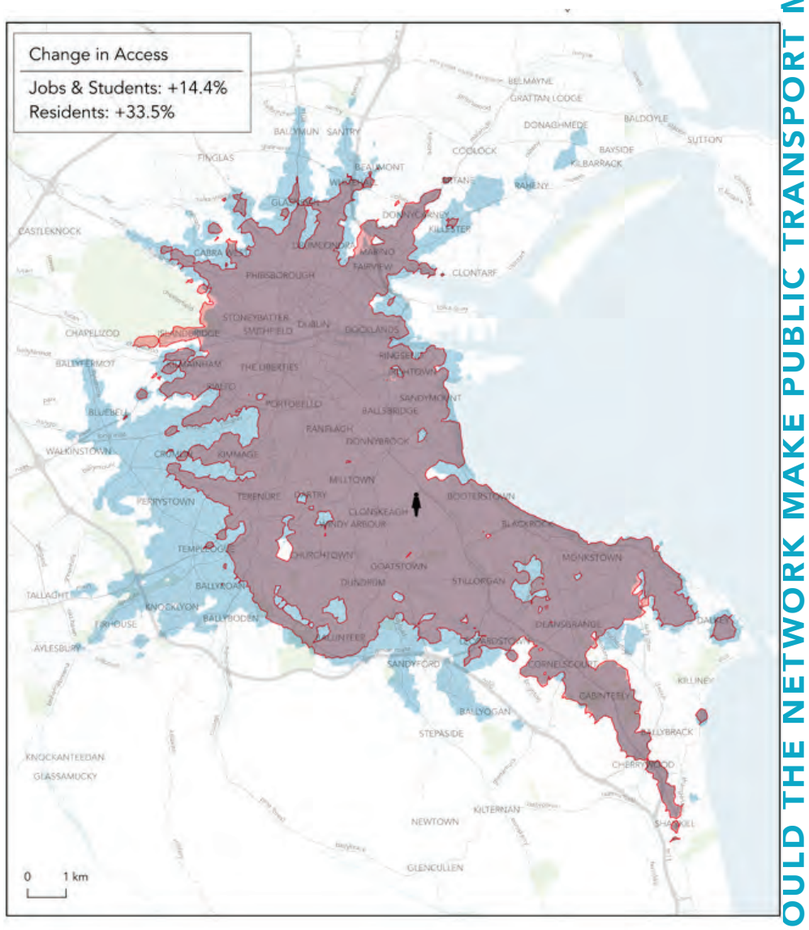



**Figure 146: Isochrone maps from UCD Belfield. The proposed network would significantly increase both radial and orbital services to UCD. Cross-city radial routes include service every 5 minutes via the Stillorgan Road (E spine) and every 8 minutes via Merrion Road/Ballsbridge (B1, B2). Frequent orbital service would include both Route S4 (to Milltown, Terenure, Crumlin, Ballyfermot and Liffey Valley), and Route S6 (to Blackrock, Dundrum, Rathfarnham, Firhouse and Tallaght). As a result, UCD would become accessible in a reasonable amount of time from far more locations.**

***Notes:***

*1. Travel times based on travel on weekdays, given typical speeds and service frequencies between 10:00 and 15:00. Peak speeds are typically lower, but frequencies are often higher, and from some locations faster travel times may be available on peak express routes.*

*2. Travel time includes walking, waiting, and time in vehicle, including time spent changing buses and/or trains at interchanges where applicable.*

*3. Walk speed is assumed to be 0.93 m/s, and waiting time for any bus or train is assumed to be half of the service frequency, i.e. half the scheduled amount of time between two buses.*