

# METROLINK

Integrated Transport. Integrated Life.

# A7.9

**Terminus Station at  
Charlemont compared  
to St. Stephens Green**

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## Executive Summary

This document addresses the concerns raised by residents affected by the proposed MetroLink Charlemont Station terminus with regard to the environmental impact of its construction and operation. A specific question raised by the residents on whether St. Stephen's Green might be a better location for the terminus is considered. The aim of the report is to present in a concise manner the design and planning work that has been done to date to arrive at the current Preliminary Design Stage in preparation for the Railway Order process.

MetroLink is a major transport project with many competing demands and this has led to changes over the course of its development. The original concept was for a metro system running from Swords (Estuary) in the north to Sandyford in the south; a key change is now to deliver the scheme in two main phases. The first phase will be from Swords to the City Centre, terminating at Charlemont Station and an associated interchange with the LUAS Green Line Charlemont Station. The current Preliminary Design will facilitate connection to a southern extension of the metro as a future second phase serving the south of Dublin, which could include the upgrade to metro standard of the Luas Green Line from Charlemont to Sandyford or support alternative southern alignment options. The upgrade works could be carried out incrementally over several decades as the passenger demand on the line increases.

So that all options for a southward extension of MetroLink remain open a decision was made to form a terminus and underground turnback facility for MetroLink near to the Luas Charlemont Stop, which is on an elevated alignment before it drops to street level at Harcourt Street. The preliminary design for this location allows for a future connection to the Green Line using top-down construction without the need for a TBM bored tunnel extension. Should an alternative underground alignment be chosen then a TBM would approach Charlemont from the south.

The construction and operation of a station at Charlemont, like all the other underground stations on the route, will inevitably bring some temporary disruption and change to the local area. This will involve road closures and property and land take for construction and operations. Affected residents in the area have previously raised concerns about the proposals at the Public Consultation session and other meetings. They have questioned the reasons for locating a MetroLink station at Charlemont and have suggested that the current south terminus would be better located at St. Stephen's Green, one stop to the north.

To respond to these concerns and questions, Jacobs/Idom has assessed in this report how Charlemont Station became the Phase 1 south terminus rather than St. Stephen's Green. The report presents a short history of the transport planning decisions that promoted the MetroLink concept, including passenger demand forecasts, and train operations. This is followed by the design features of the underground stations at Charlemont and at St. Stephen's Green before a comparison is made between the two locations. The pros and cons of the two options are shown in the table below.

Item Assessed	Charlemont		SSG East	
	Pros	Cons	Pros	Cons
<b>Scope of Works</b>	Easier future connection to Green Line	Longer tunnel with added station	Shorter tunnel and a station less	More difficult Green Line connection.
<b>Passenger Interchange</b>	Optimal interchange time. Short walking time	Greater vertical height difference	None identified	Sub-optimal interchange time. Long walking time
<b>Train Operations</b>	Reduced overcrowding on Luas Green Line on-street section.  Facilitates capacity enhancements south of Charlemont	Limited capacity on Luas Green Line street running section.	Reduced metro operation	Increased transfer time and slower Luas trip time SSG to Charlemont compared to metro.  Luas capacity constrained south of SSG because of on-street running
<b>Cost Benefit</b>	Reduced CAPEX of future Green Line connection.  Increased Revenue and passenger service.	Higher CAPEX and OPEX	Reduced CAPEX and OPEX	Reduced revenue and passenger service
<b>Future Connectivity</b>	Planned for Green Line connection and does not preclude alternative routes.	None Identified	None Identified	Green Line connection needs mining methods  Possible turnback facility needed on Green Line if alternative route selected.
<b>Environment</b>	Public Transport increased	Impact on Charlemont residents during construction.	No impact on Charlemont area.	Increased environmental impact on SSG Park.  No new public transport service at Charlemont.

The conclusion reached is that Charlemont is the best solution for the MetroLink scheme and TII is correct in progressing with the current proposals through the Railway Order process.

## 1. Introduction

This document has been prepared to address the concerns raised by residents local to the proposed MetroLink Charlemont Station terminus with regard to the environmental impact of its construction and operation. The aim of the report is to present in a concise manner the design and planning work that has been done to date to arrive at the current Preliminary Design Stage. A specific question raised by the residents on whether St. Stephen's Green might be a better location for the terminus is addressed.

MetroLink is a major public transport project for Dublin and over its development period there have been several design and alignment permutations considered. The initial aim was to deliver a metro system running a high frequency fully segregated service across the city to satisfy the increasing demand for north-south movements, particularly from Dublin Airport but also from the commuter and leisure markets in the Fingal and Dublin South areas.

To satisfy this demand the Metrolink route was developed from Swords (Estuary) in the north to Sandyford in the south, a distance of 26km. Most of the 19km route north of the city centre is to be in single-bore tunnel, except where it crosses over the M50 and accesses the proposed Dardistown Depot before going underground again below the airport. South of the city centre the route was planned to continue underground before rising to make a connection to the existing Luas Green Line at a point between Charlemont and Beechwood. The intention was to upgrade the Luas line to a fully segregated metro standard, with longer platforms and a higher frequency service.

While the project had public support at the Public Consultation sessions held in 2019, a key concern raised was the length of time that the Green Line would need to be closed during the metro upgrade works, as well as the local impact of closing the level crossings on the route. A decision was taken in 2019 to postpone the Green Line connection and upgrade until such time as the passenger demand on the line could not be satisfied by interventions such as longer trains and increased service frequency. The time period for this to happen was estimated to be 2 or 3 decades in the future.

The underground station at Charlemont was then identified as the south terminus for the MetroLink system, partly because at this location a future extension to the south could be made more easily, either onto the Green Line or in another direction yet to be decided. To reverse trains for the return journey northwards a tunnel extension was designed with the necessary crossing trackwork on an alignment that would not preclude a future southward extension of MetroLink. In the meantime, studies would be carried out to assess alternative transport solutions that might relieve the growing pressure on the Luas Green Line.

Residents at Charlemont have continued to raise concerns about the MetroLink proposals in their area. A key question posed is whether a station is necessary at Charlemont and whether the terminus and turnback facility would be better placed at St. Stephen's Green (SSG East). This report addresses these concerns as far as possible in the following sections:

- MetroLink Development
- Passenger Demand
- Train Operations
- Preliminary Design for Stations at Charlemont and SSG East
- Metro Extension Studies
- Comparison of Terminus Options
- Conclusions

## 2. MetroLink Development

### 2.1 Transport Planning

A metro scheme connecting Swords and Dublin City Centre at St. Stephen's Green was previously developed in detail and received planning approval from An Bord Pleanála (ABP) in 2010. However, due to the global economic downturn the Government decided to postpone the project in 2011.

The Transport Strategy for the Greater Dublin Area 2016 – 2035, published by the National Transport Authority (NTA), identified key projects along a North South Spine, namely New Metro North, Luas Green Line Upgrade, and Metro South with an extension of the Luas Green line southwards from its current terminus to Bray. The strategy made clear that the upgrade of the Luas Green Line was required in the shorter term and that Metro South would be delivered by the extension of New Metro North southwards, via a tunnel, to join the Green line in the Ranelagh area.

The NTA commissioned studies in 2016 to assess the corridor in detail for the most appropriate route and location for stations. The route and extent of the MetroLink scheme was established through three studies.

- An Alignment Options study determined the optimum route from Dublin City Centre to Swords<sup>1</sup>.
- The Green Line Tie-in study<sup>2</sup> established the optimum location to join MetroLink to the existing Luas Green Line. It considered a number of tie-in points between St. Stephen's Green and Milltown and concluded that the appropriate tie-in location was at Charlemont, and
- The Green Line Metro Upgrade study determined the feasibility of upgrading the existing Luas Green Line to Metro standard.

In 2017, TII published the New Metro North Options Selection Study which detailed the emerging preferred route for the New Metro North project. The Green Line Tie-in Study was an input to this work and the route options linked to the connection point. It was identified that the transition of the Luas Green Line from the upgraded infrastructure to an operational Metro South would not be required in the short to medium term, but it was concluded that the option to tie-in to the Green line should be retained.

In 2018, the Government included the MetroLink scheme from Swords to Sandyford in three key documents, namely; the National Development Plan 2018-2027, the Project Ireland 2040 document, and the National Development Plan (2018-2027). The scheme was promoted as a fast, high capacity, high frequency, modern and efficient public transport service for people travelling along the Swords/Airport to City Centre corridor.

In November 2021 the NTA published the draft Transport Strategy for the Greater Dublin Area 2022-2042. The draft strategy has considered a range of options for the onward extension of the MetroLink project to meet the demand for travel over the period of the strategy. This included consideration of the need for the upgrade of the Green Line to Metro standard, a metro extension to Dublin Southwest and a Metro extension to Sandyford via UCD. The work for the draft strategy identified that over the period of the strategy the metro extension is not required, however all options for a Metro extension should not be precluded. The Charlemont terminus does not preclude any option for a southward extension.

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<sup>1</sup> <http://data.tii.ie/metrolink/alignment-options-study/study-1/metrolink-volume-1-main-report.pdf>

<sup>2</sup> <http://data.tii.ie/metrolink/alignment-options-study/study-2/metrolink-1-gl-tie-in-options-appraisal-report.pdf>

## 2.2 Early Concept

This MetroLink scheme as shown in Figure 2-1 combines the original metro concept running from Swords to St. Stephen's Green along with an upgraded Luas Green Line, which in 2018 ran from St. Stephen's Green to Sandyford. MetroLink would then deliver a north-south urban railway between Estuary and Sandyford, connecting Dublin Airport and the City Centre with other stations along the 26km route. The mostly underground route from Estuary to the City Centre is approximately 19km in length and the completed system would have 16 Stations and a journey time of approximately 25 minutes.

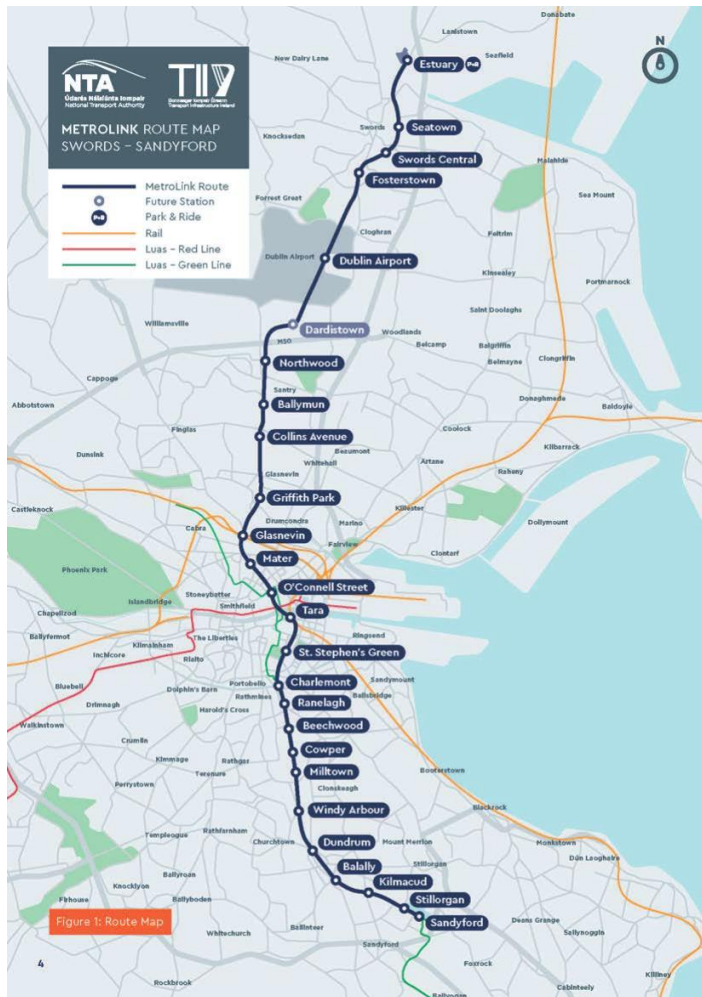


Figure 2-1 Original Concept for MetroLink

The first public consultation in 2018 presented the MetroLink project in its entirety so that the public was aware of the Emerging Preferred Route (EPR), including the upgrade and tie-in details for the existing Luas Green Line. The scheme presented had the underground section rising up to ground level near the existing Luas Charlemont Stop, at which point the metro was to connect to the upgraded Green Line as shown in Figure 2-2.



**Figure 2-2 Charlemont Station as presented at Public Consultation 2018**

The proposed underground Charlemont Station is situated where the route begins to emerge from tunnel after passing underneath the Grand Canal in lands adjacent to the Irish Nationwide building. From there the route was to rise onto the existing Luas embankment south of Charlemont before proceeding on to Ranelagh station. The main concerns raised in the submissions for the Public Consultation in 2019 were:

- Disruption to the Green Line service during the metro upgrade works;
- Impacts on the heritage embankment wall for the old Harcourt Rail Line due to construction works for the MetroLink tie-in;
- Property acquisition of residences and back gardens for the MetroLink tie-in;
- Retention of existing right-of-way providing access to the rear of properties on West Cambridge Terrace, to the south of Dartmouth Road;
- Concerns on pedestrian routes connecting MetroLink with the terminated Green Line and level of access for mobility impaired users on these pedestrian desire lines;



- Clarity required on interaction with the current planning permission under review by ABP on this site and,
- Introduction of a new transfer movement to switch from the metro to the existing Luas Green Line north of Charlemont for passengers wishing to continue into city centre.

## 2.3 Preferred Route

As shown in Figure 2-3, the preferred route for MetroLink will now be a 19km long, high-capacity, high-frequency rail line running mostly underground from Estuary to Charlemont, linking Dublin Airport, Irish Rail, DART, Dublin Bus and Luas services, and thereby creating a fully integrated public transport in the GDA. As well as linking major transport hubs, MetroLink will connect key destinations including Swords, Ballymun, the Mater Hospital, the Rotunda, Dublin City University and Trinity College.

The Public Consultation process demonstrated that while there was general support for the scheme, many people were concerned about the need to close the Green Line for a prolonged period to enable its conversion to a metro system, as well as the environmental impact of construction and operation of the proposed Charlemont station.



Figure 2-3: Emerging Preferred Route 2019

The decision to postpone the upgrade of the Green Line and the connection to MetroLink led to a two-phase approach, with the first phase comprising the mostly underground section of MetroLink north of the city centre, while the Green Line conversion and connection to MetroLink was left for a future second phase.

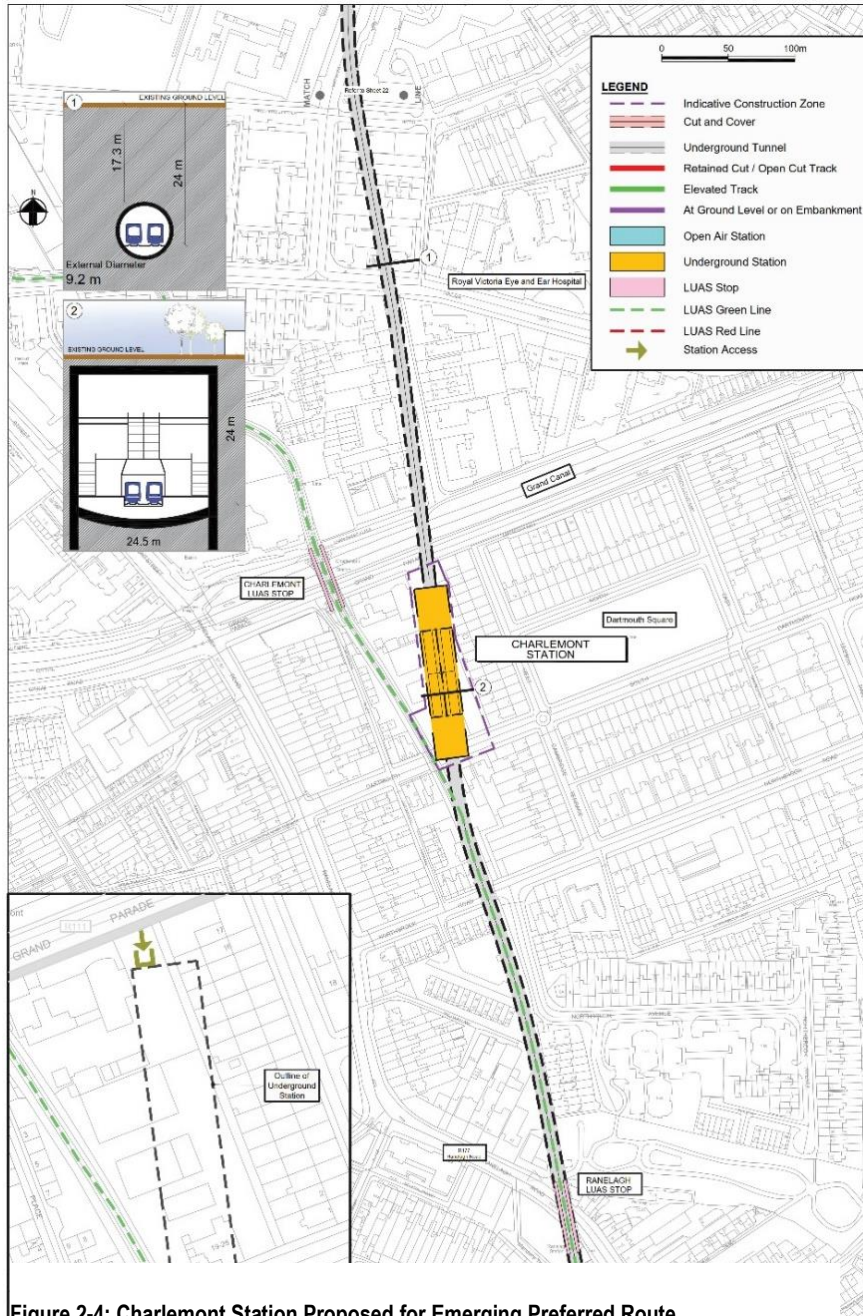


Figure 2-4: Charlemont Station Proposed for Emerging Preferred Route

The design for the EPR shown in Figure 2-4 indicates that the TBM bored tunnel was to be extended south of Charlemont Station to a connection point beyond Ranelagh. Importantly, the required tunnel boring works needed for the future connection to the existing Green Line would be completed as part of phase 1 of the works.

The Green Line route would remain open throughout this first phase and on completion, the Luas Green Line passengers would interchange with MetroLink at Charlemont, St. Stephens Green, and O'Connell Street for a fast service towards Dublin Airport and Swords. Under the Preliminary Design the TBM would continue boring to the south for approximately 650 metres past the Charlemont Station box to

terminate underground south of the Ranelagh Luas stop. The extended tunnel would be fitted out to enable trains to reverse and turnback in service, and additionally, to store out-of-service trains for more efficient operations commencement each day.

The second phase, starting potentially two or three decades from now, would possibly include a direct connection onto the Green Line; or another southward route to be decided. If a Green Line connection was to be made then all tie-in works would be constructed from the surface using cut and cover techniques. However, for the period between the completion of MetroLink Phase 1 and Phase 2, there would be a need to increase the carrying capacity of the existing Luas Green Line. This would be dealt with as a separate project to deliver capacity enhancements on an incremental basis.

Later design development of the Charlemont turnback facility took account of the requirement set out in the GDA Strategy 2022 – 2042 that any reasonable MetroLink route extension to the south, including a Green Line connection, should always remain feasible. This led to the solution shown in Figure 2-5, noting that the turnback extension deviates off the existing Green Line alignment and is reduced in length to 360m. On completion of tunnel boring the TBM would be diverted off the line of any feasible future extension of the tunnel. The parallel escape and ventilation gallery would be constructed using drill and blast methods. Charlemont station will still be constructed by the cut-and-cover method but there will be no tunnel portal. There will be various temporary road closures required but other property acquisitions proposed under the Emerging Preferred Route will not be necessary

The works to form the passenger interchange between the underground MetroLink and the existing elevated Green Line via a surface level route should involve manageable disruption to the existing Green Line services.

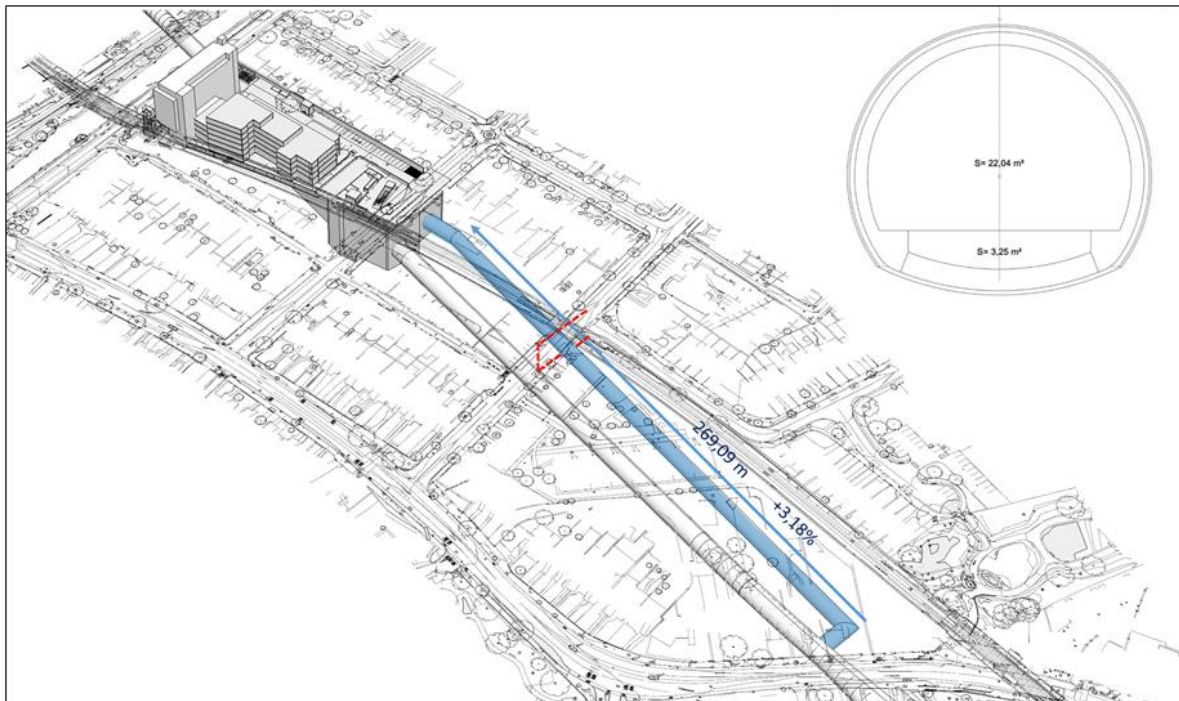


Figure 2-5: Charlemont Turnback with parallel Gallery and TBM buried at End

## 2.4 Environmental Impact

As with all projects of the scale of MetroLink, there will be numerous issues and challenges which need to be effectively and sensitively addressed. There are a number of obvious issues specific to a project of this type which are discussed below.

The project requires the acquisition of a number of residential and commercial properties. The NTA and Transport Infrastructure Ireland (TII) are committed to ensuring that these acquisitions are managed in a fair and equitable manner and will provide assistance to any affected parties.

TII understands and appreciates the concerns of residents, businesses and other stakeholders may have in relation to potential noise, vibration and ground settlement issues typically associated with tunnelling projects. In accordance with the requirements of the amended Environmental Impact Assessment Directive (2014/52/EU) and the Transport (Railway Infrastructure) Act 2001 as amended, TII is required to prepare an Environmental Impact Assessment Report (EIAR) for the Scheme. The EIAR will form an integral element of the submission to secure statutory approval from An Bord Pleanála and will detail the nature and extent of the project, its effect on environmental aspects and the likely impacts and measures which will be taken to reduce or monitor these impacts.

The construction works for MetroLink will generate significant volumes of soil, stone, and waste materials. TII will ensure that effective waste management, which includes reducing, re-using, and recycling remains a priority throughout the design and construction phases. TII will assist in the preparation of the statutory Construction and Demolition Waste Plan in the EIAR. Throughout scheme development there will be dialogue between stakeholders with regards to effective waste management. There will be full compliance with the Waste Management Acts 1996-2011 at all project phases.

MetroLink has the potential to impact on our Cultural Heritage, including as a minimum sites of archaeological and architectural heritage significance. TII will endeavour to avoid all unnecessary impacts on this non-renewable resource. This will be achieved through the EIAR process and through consultation with all relevant stakeholders. In terms of archaeological heritage impacts, TII operate under a Code of Practice with the Department of Arts, Heritage and the Gaeltacht which reflects TII's commitment to appropriately protecting this resource.

### 3. Passenger Demand

#### 3.1 Design Capacity

MetroLink will carry up to 50 million passengers annually, cutting journey times from Swords to the city centre to 25 minutes, and Dublin Airport to the City Centre to 20 minutes.

#### 3.2 Green Line Capacity Enhancement

TII published a Technical Note<sup>3</sup> dated March 2019 outlining the available Luas Green Line passenger demand projections in the context of the required service capacity on the existing Luas Green Line, south of Charlemont.

The capacity of a rail service is a function of the vehicle size / length and the service frequency. Ultimately a peak vehicle requirement and service type is determined through an analysis of projected maximum line flows during peak periods. It is good practice to design a new system with a Peak Hour Factor (PHF) of 0.8. However, the high level of segregation south of Charlemont enables a very high journey time reliability, and a PHF in excess of 0.9 has been recorded. Therefore, the potential Green Line capacity for different levels of upgrade is as shown in Table 3-1. Two scenarios have been used for the projection that provide a low and a high estimate of future demand on the Green Line:

- Low Projection: GLCE Business Case demand, adjusted to account for the impacts of Metro from Swords to Charlemont; and
- High Projection: Full MetroLink from Swords to Sandyford.

Table 3-1: Potential Green Line capacity for different levels of upgrade

Service	Vehicle Capacity (passengers)	Peak hour frequency (trams per hour)	Peak Hour Factor	Capacity (passenger per direction per hour)
<b>Current Green Line services</b>	319 / 408	20	0.9	6,407
<b>Green Line Capacity Enhancement</b>	408	24	0.9	8,813
<b>Further Upgrade of Green Line</b>	408	30	0.9	11,016
<b>Metro Upgrade</b>	500	40	0.9	18,000

The passenger numbers carried by the Luas Green Line in the busiest morning peak hour in 2017, pre-Covid, was approximately 5,000 passengers in the northbound direction. The possible introduction of new 55 metre length trams, and the extension of the existing trams, would increase the Green Line capacity up to approximately 8,000 passengers per direction per hour based on a three-minute frequency. We note that the extension of the Green Line in December 2017 to include Luas Cross City has seen a significant increase in passenger numbers over the entire route of the Green Line. In addition, as areas such as Cherrywood and Sandyford are further developed in the coming years, the passenger demand on the Green Line will further increase.

The modelling projections suggest that further upgrades to the Luas Green Line to achieve a 30 trams per hour Luas service between Sandyford and St. Stephen's Green, would accommodate Luas demand to approximately 2039 in the high projection or to approximately 2049 in the low projection. A metro

<sup>3</sup> [https://www.metrolink.ie/assets/downloads/MetroLink\\_Green\\_Line\\_Future\\_Demand\\_Capacity\\_Intervention.pdf](https://www.metrolink.ie/assets/downloads/MetroLink_Green_Line_Future_Demand_Capacity_Intervention.pdf)

upgrade of the Luas Green Line south of Charlemont would ultimately be required in the long term although the timing of this intervention is dependent on the rate of demand growth.

Over the next two decades, passenger demand levels on the Green Line is forecast to reach approximately 11,000 passengers in the northbound direction, and is expected to grow to approximately 13,000 passengers by 2057. This is beyond the carrying capacity of a standard Luas system and an upgrade to a metro system will be required. The timing of this upgrade requirement is dependent on the rate of growth in demand.

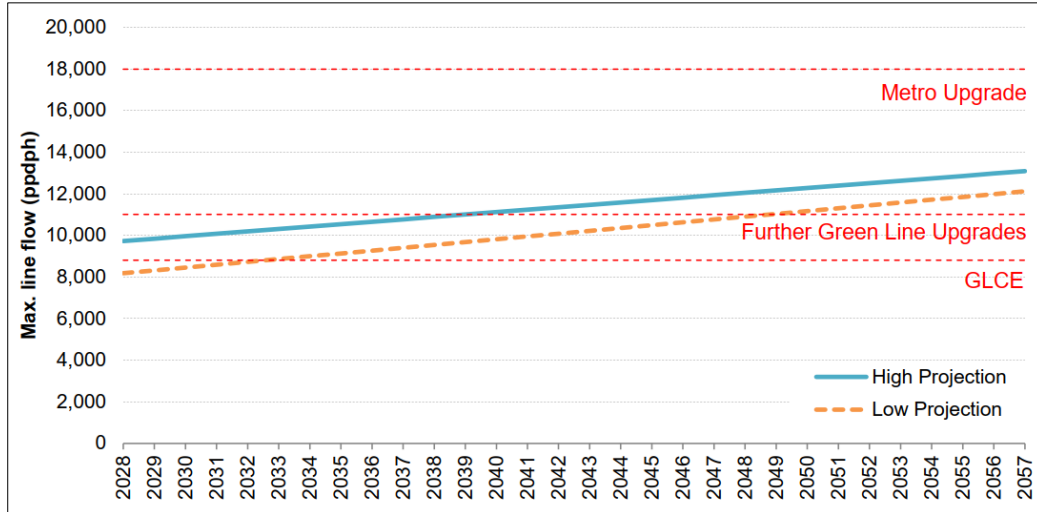


Figure 3-1 Green Line AM northbound max line flow projections and capacities to 2057

### 3.3 Terminus Passenger Demand for Charlemont versus SSG East

The terminus at Charlemont will serve a large catchment area including Ranelagh and previous work for the NTA is shown in Figure 3-2. The figure indicates that the 12hr forecast patronage for year 2060 at Charlemont is greater than SSG East by a factor of more than two.

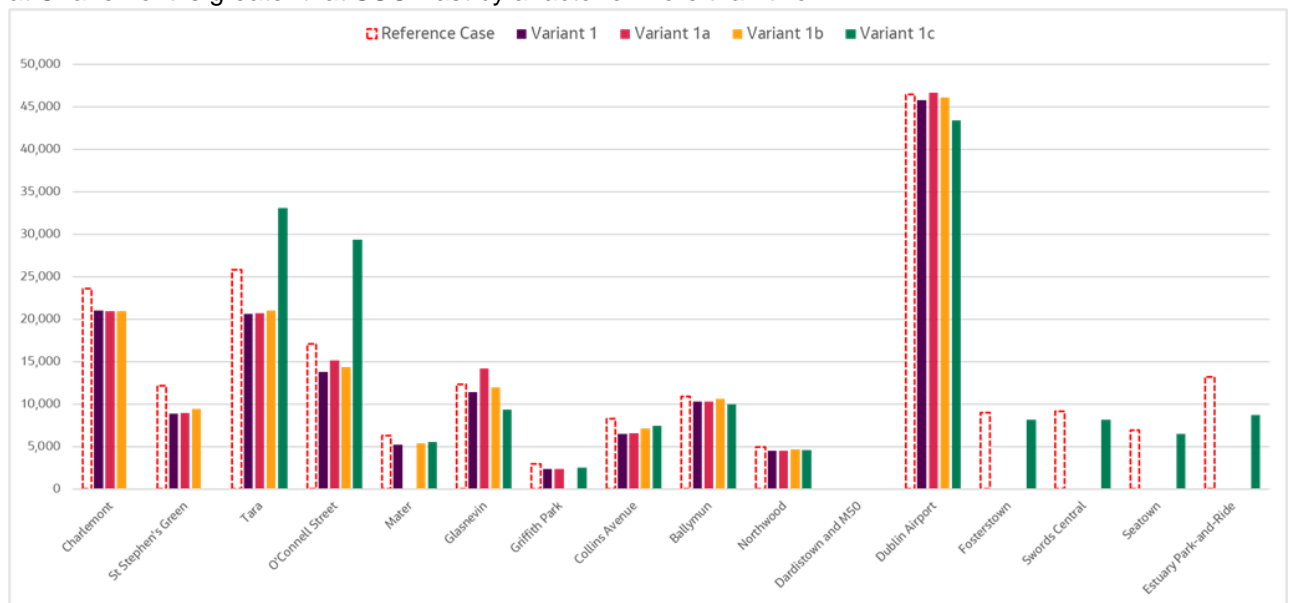


Figure 3-2: 2060 Total Passengers Boarding Per Station - 12hr Period

The annual figures forecast for 2060 are shown in Figure 3-3. This figure indicates that the forecast patronage at Charlemont is approximately 10 million per annum and this compares to less than 5 million for SSG East.

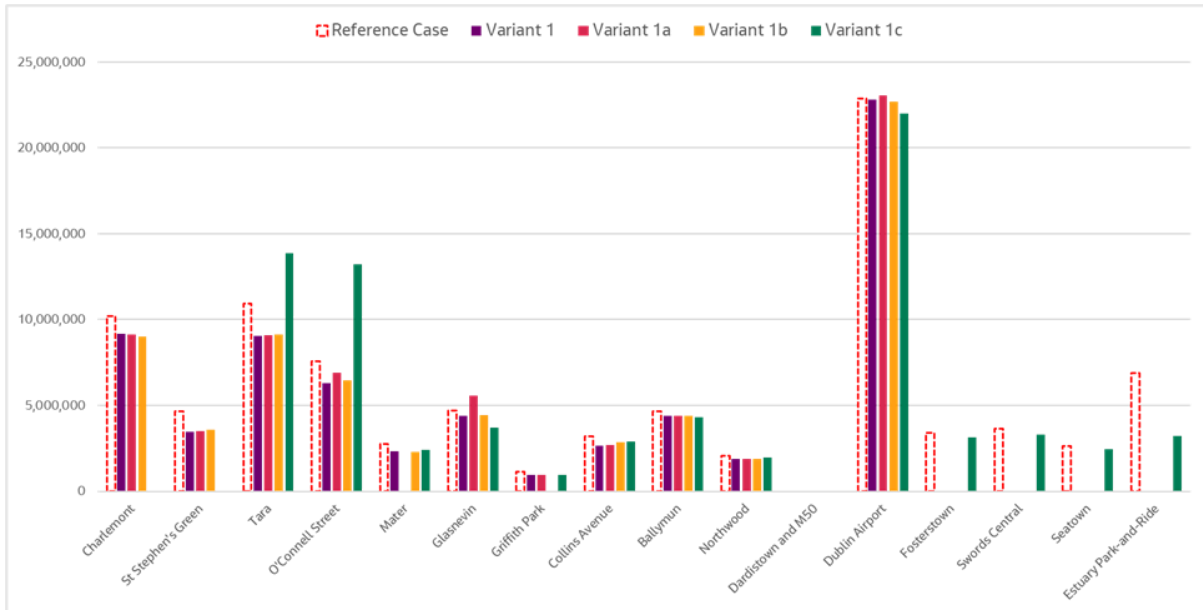


Figure 3-3: 2060 Annual Boarding Passengers by Station

### 3.4 Capacity Constraint on Luas north of Charlemont

The Luas Green Line is segregated from other transport modes for most of its length but this changes north of Charlemont where the line drops off the viaduct onto city streets. The current constraints on capacity of on-street running and tight radius bends means that it is not possible to increase passenger numbers much beyond the current levels of approximately 7000 passengers/ hr.

A MetroLink terminus at SSG East interchanging with Luas at the existing SSG West Stop would bring little benefit to Green Line capacity on the segregated sections because the on-street running operation between Charlemont and SSG West would limit capacity to its current level. This contrasts with the situation for a MetroLink terminus at Charlemont, which facilitates growth in capacity of the Green Line south of Charlemont by enabling easy passenger interchange between modes.

For both terminus options there would need to be a facility in the Charlemont vicinity to turn back the additional trains introduced in the future on the Green Line.

## 4. Train Operations

### 4.1 Charlemont Terminus

A schematic of the Metrolink Route is shown in Figure 4-2 and two operating circuits or cycles have been proposed as shown in Figure 4-1.

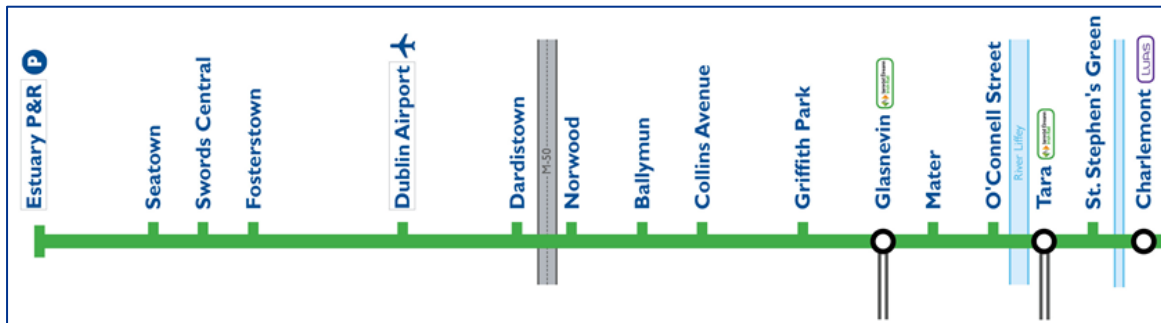


Figure 4-2: Route Schematic



Figure 4-1: Two operating circuits

The longer circuit will run from Estuary Station to Charlemont Station and the shorter circuit will run from Dublin Airport Station to Charlemont Station. The demand study analysis indicated a minimum operational headway of 90 seconds in the inner circuit for a maximum of 40 trains per hour (40TPH), and 180 seconds headway in the outer circuit for 20TPH. Should MetroLink be extended southwards to Sandyford or elsewhere in the future, the circuit will be increased either in number or in length, and the train fleet increased accordingly. The Dardistown Depot has been designed for the ultimate fleet.

At the start of service, a train will depart from the turnbacks at Estuary and Charlemont, as well as from Dublin Airport. These trains will operate with the designed headways for the two circulations - the long circuit between the terminus stations and the short circuit from Dublin Airport south to the Charlemont terminus. The deployment to the main line will be managed in such a way that empty coaching stock movements are minimised.

The Stabling Strategy is for up to five trains to park overnight at the Charlemont Station and its turnback; and the rest of the fleet to park at Dardistown Depot. The operating strategy would adjust headways to suit the demand profile so that when an increase in headway is desired to suit a lower demand the method of train removal from service is that up to 4 units would be removed at the terminals of Charlemont and Estuary, and any remaining units that need to be removed would go to the Dardistown Depot. When a decrease in headway is desired to suit a rising demand the method of train introduction is by releasing the stabled trains from the terminals at Charlemont and Estuary, then any other trains needed would be deployed from Dardistown Depot. At the end of service, the last train will depart from each of the terminals (Estuary, Dublin Airport and Charlemont) and all units will be removed at the Dardistown Depot, except for the last five units, which will be stabled at Charlemont Station and its turnback tunnel. The final Charlemont departure will have an Estuary destination, from where it will reverse and run empty to the depot.



The design of the route has been developed so that during degraded operations service robustness is maintained and independent route sections can continue to operate. As shown in Figure 4-3, the switches and crossings (S&C) on the track are located near to the stations so that the time required for manoeuvring is kept to a minimum. Crossings are located at every third station so that operating headway is no more than 12-minutes in degraded situations. It is noted that the terminal stations offer the most flexibility in managing changing service situations, for example, at start and end of the service, headway changes, and removal of faulty trains.



Figure 4-3: MetroLink Route with Track Crossings

The double set of S&C is indicated south of Charlemont Station, which are necessary to achieve the turnaround times for the 90 second headways.

## 4.2 SSG East Terminus

The operational situation described for the Charlemont Terminus will be the same for an alternative SSG East Terminus, except for the reduced running time over the 950m shorter route length. Taking the return journey length to be approximately 2km, a reduction in return journey time of 6 minutes including two dwell times and reversing move could be expected. This time saving for a 90 second headway operation could lead to a reduction in fleet size of 4 trains.

Therefore, there would be a capital and operational cost saving available if the terminus was changed from Charlemont to SSG East. However, there will also be a loss in operational fare revenue due to loss of boardings at Charlemont.

## 5. Preliminary Design for Stations at Charlemont and SSG East

### 5.1 MetroLink Charlemont Station

#### 5.1.1 Public Consultation and Design Development

TII has organised meetings with the residents affected by the proposed Charlemont Station. The most recent meeting was on 25<sup>th</sup> January 2022, when a project update was presented and comments were received. Reference was made to the recently published National Development Plan, and the fact that the Preliminary Business Case approval process was underway. It was reported at the meeting that the Railway Order Planning Application was being prepared for submission in Q2 2022 and that the Statutory Process was expected to take 18-24mths (to Q2 2024). The meeting was advised that Works are to commence as soon as possible following the granting of the Railway Order.

Also discussed was the fact that since the Public Consultation process in 2019 a number of key changes to the design of Charlemont Station have been made. These include:

- Enhanced pedestrian connection with the LUAS Charlemont stop has been developed.
- New second entrance to the station has been added.
- Tunnel south of Charlemont has been reduced in length and now includes a parallel ventilation & evacuation gallery to the station.

It was explained that the Charlemont Station terminus does not preclude any southward extension including a tie-in to the Green Line. A connection to the Green Line would be by cut and cover methods while connection to another bored tunnel would be by a direct connection underground.

#### 5.1.2 Surface Layout and Visual Impact

The station plan layout at ground surface level is now as shown in Figure 5-1.

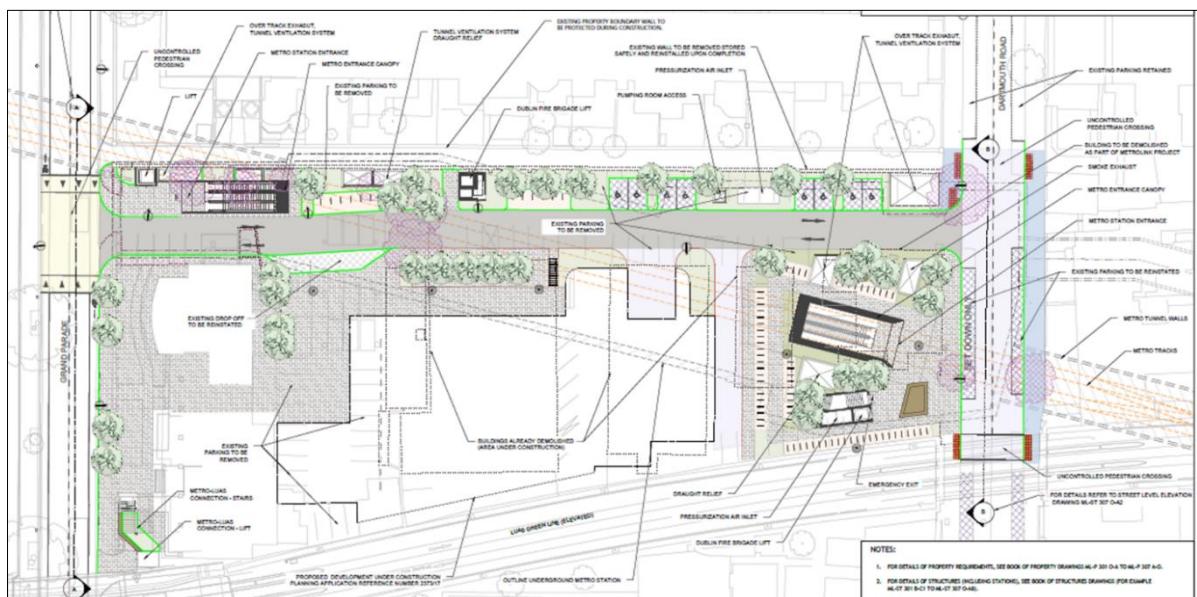


Figure 5-1: Charlemont Station Layout at Surface

Photomontage images are now available of the visual impact post-construction and these are given below in Figure 5-2 to Figure 5-4, inclusive.



**Figure 5-2: Main Entrance at Grand Parade**



**Figure 5-3: Metro/LUAS Integration**



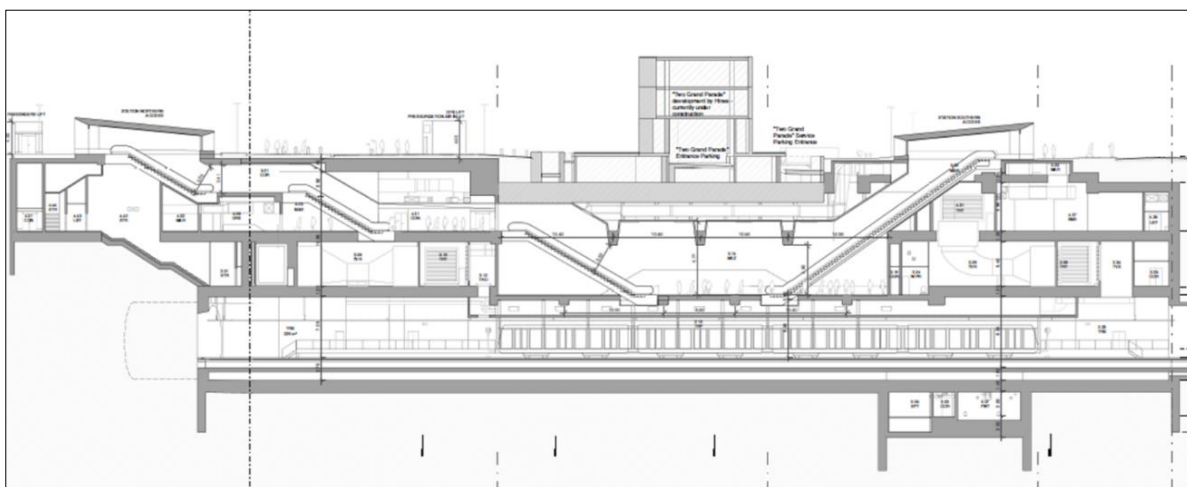
**Figure 5-4: Second Entrance- Dartmouth Road**

The additional southern entrance has been incorporated in the design to:

- improve station accessibility from the south of the station where modelling indicates strong demand from the Ranelagh area;
- avoid overcrowding on the Grand Parade footpath, which is used for the interchange with Luas;
- facilitate station access for cyclists and from vehicle drop off; and to,
- provide additional resilience to passenger evacuation and emergency access in the event of an incident at the station.

### **5.1.3 Underground Construction**

The underground facilities involve extensive construction as can be seen from the longitudinal section in Figure 5-5.



**Figure 5-5: Charlemont Station Long Section**

The long section shows the running tracks on the third level down from the surface and the platforms are accessed by a series of short and/or long escalators or lifts.

#### 5.1.4 Charlemont Turnback Tunnel

A terminus station at Charlemont requires a means of turning southbound trains for the return trip north. This will be achieved using a turnback tunnel extending 360m to the south of the station box, as shown in Figure 5-6.



Figure 5-6: Turnback Tunnel and Parallel Evacuation Tunnel

The turnback tunnel will be fitted with the necessary track and equipment so that trains can switch tracks and direction. The length of the tunnel also allows for stabling of out of service trains so that start of operations are as efficient as possible. The dead-end tunnel is provided with a parallel gallery for ventilation and escape route purposes. Recognising the future possibility that MetroLink operations could extend southwards on the Green Line route or another route to be confirmed, the design allows for the TBM to deviate sufficiently from any feasible alignment extension, before being sealed in the rock formation.

More detail for the turnback tunnel is provided in the section drawings in Figure 5-7.

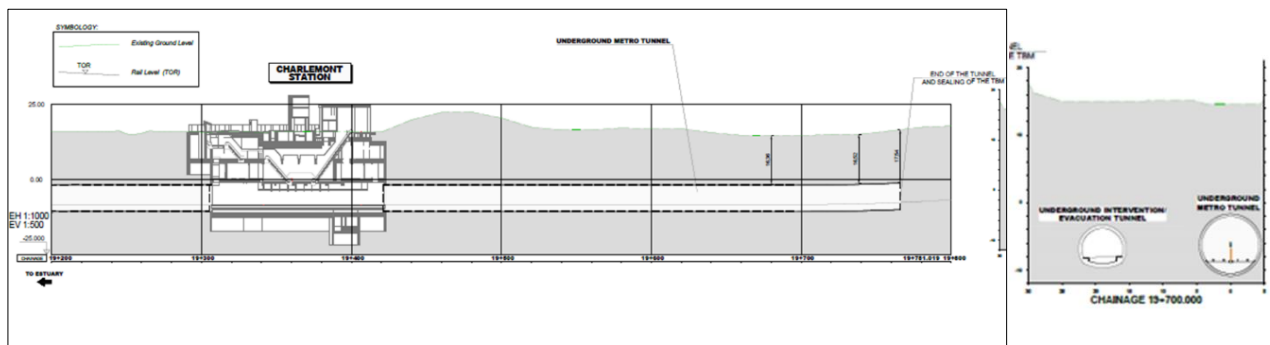


Figure 5-7: Long Section and Cross Section through Turnback Tunnel

**5.1.5 Construction Impact**

The station proposals will have an impact on the area and in particular on Dartmouth Road, which will need to be closed to traffic for between 3 to 4 years to facilitate utility diversions and the main station box works.

The works area will extend up to the south footway as shown in Figure 5-9 and Figure 5-8, although access to the properties will be maintained at all times. Environmental impacts will be mitigated and residents most affected by the works will be given the opportunity to relocate during critical work phases. The vertical extent of the works affecting Dartmouth Road can be seen in Figure 5-10.



Figure 5-9: Dartmouth Road looking North

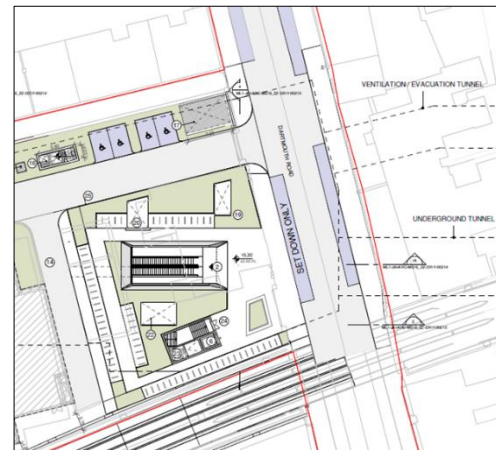


Figure 5-8: Impact of Works on Dartmouth Road

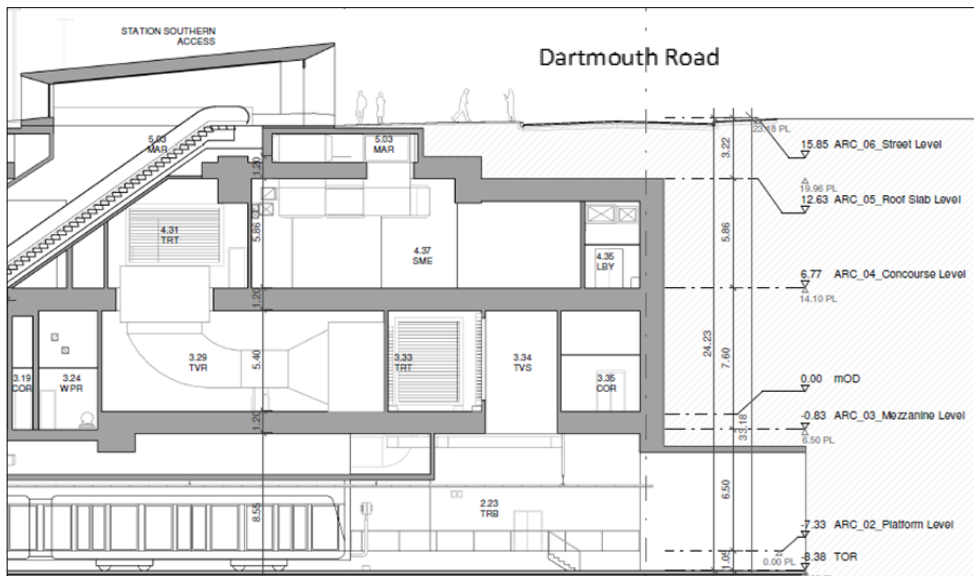


Figure 5-10: Vertical Extent of Works at Dartmouth Road

**5.1.6 Traffic Routes**

Access to the northern part of the construction site is via Grand Parade. Access to the southern part of the construction site is principally via R117 Ranelagh Rd/Dartmouth Road. Occasional HGV access will be required from Dartmouth Rd East for abnormal loads not able to pass under the Luas bridge.

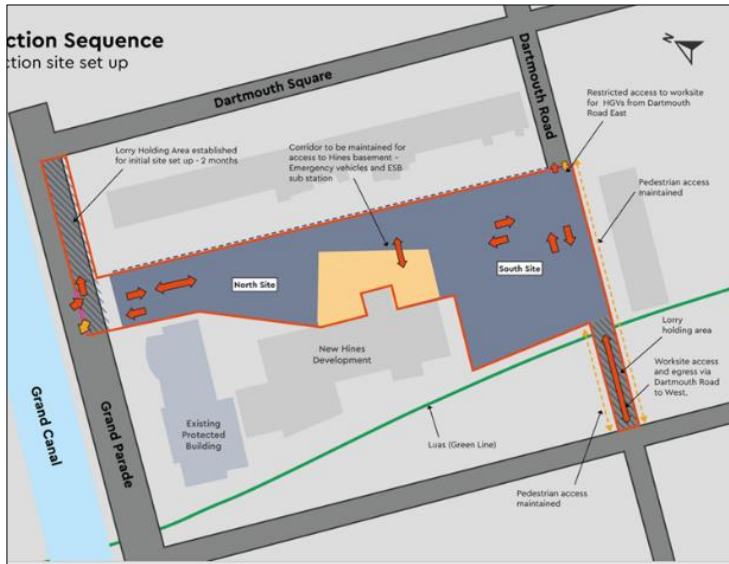


Figure 5-12: Charlemont Station Construction – Site Access and Spoil Removal

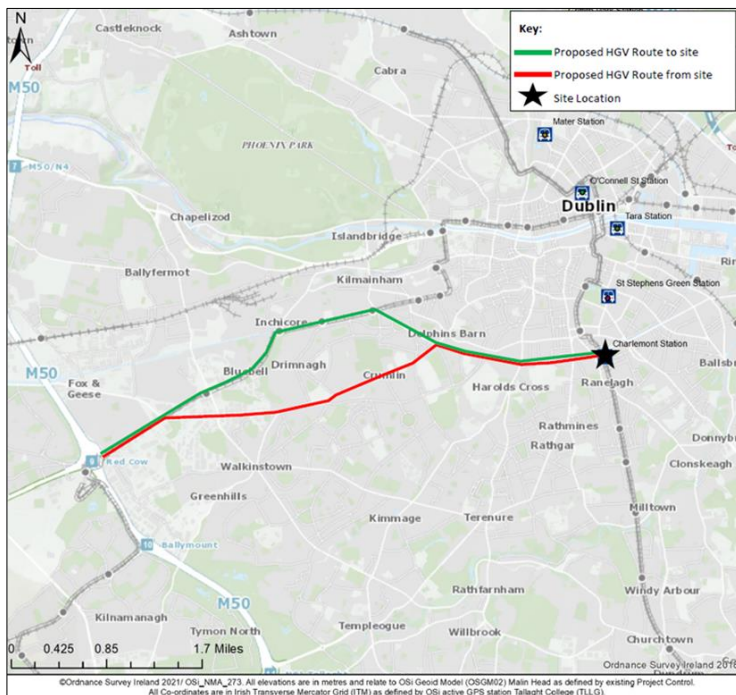


Figure 5-11: Construction traffic route to M50 from Charlemont

## 5.2 St. Stephen's Green Station – Alternative Terminus

### 5.2.1 MetroLink SSG East Station

The location of the MetroLink SSG East Station was determined primarily as an intermediate station location between two critical interchange points at Charlemont (tie in with Luas Green Line) and Tara St (DART interchange). Its location on the east side of the park and not the west side as in previous alignments was dictated by restrictions on railway curvature between the two adjacent stations. This can be seen in Figure 5-13 where the tight curve to the south of the station is needed for the alignment required at Charlemont.

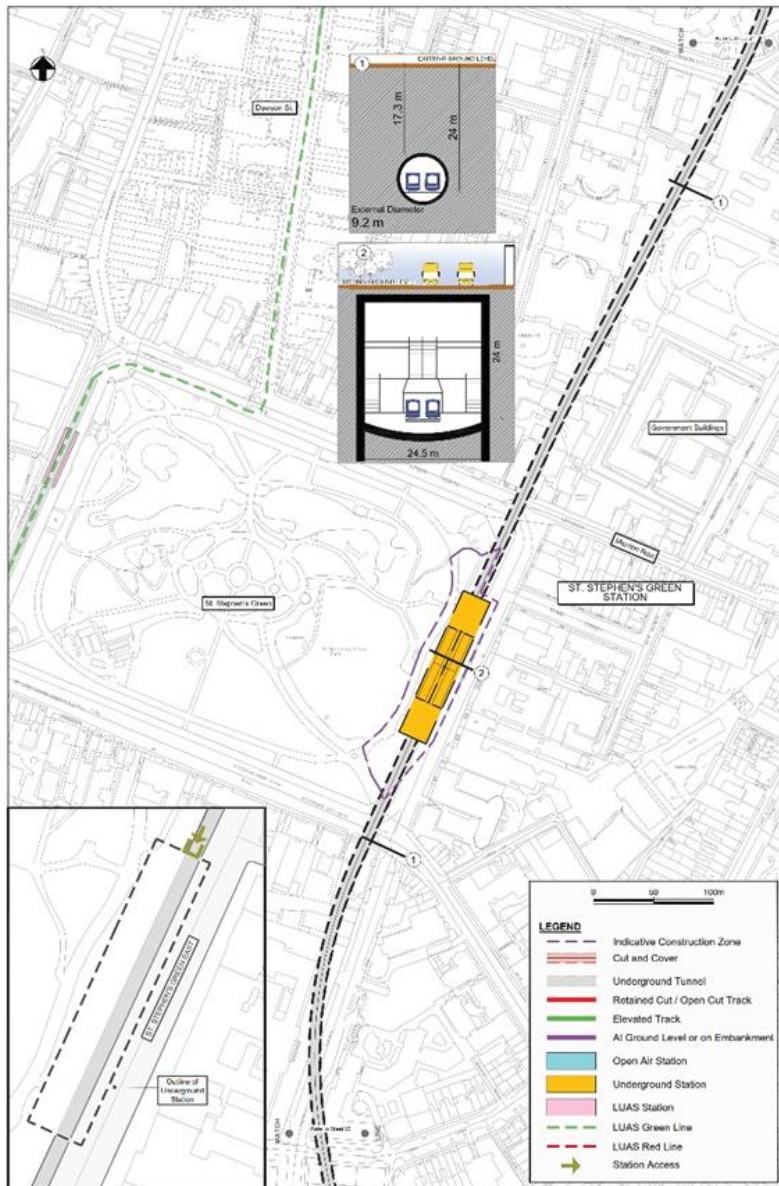


Figure 5-13 Route Alignment for SSG East Preliminary Design

St Stephen's Green East is bordered on one side by St. Stephen's Green Park and on the other by a mixture of Georgian and modern buildings. The carriageway of St Stephen's Green East includes three northbound traffic lanes and a cycle lane and a southbound bus lane and cycle lane. While the station impacts on SSG East road and a small part of the SSG East Park it does avoid the most significant impacts when compared to the other locations that were examined. These impacts include



landscape and visual impacts, as well as traffic and the requirement for utility diversions. The surface layout for SSG East is shown in Figure 5-14.

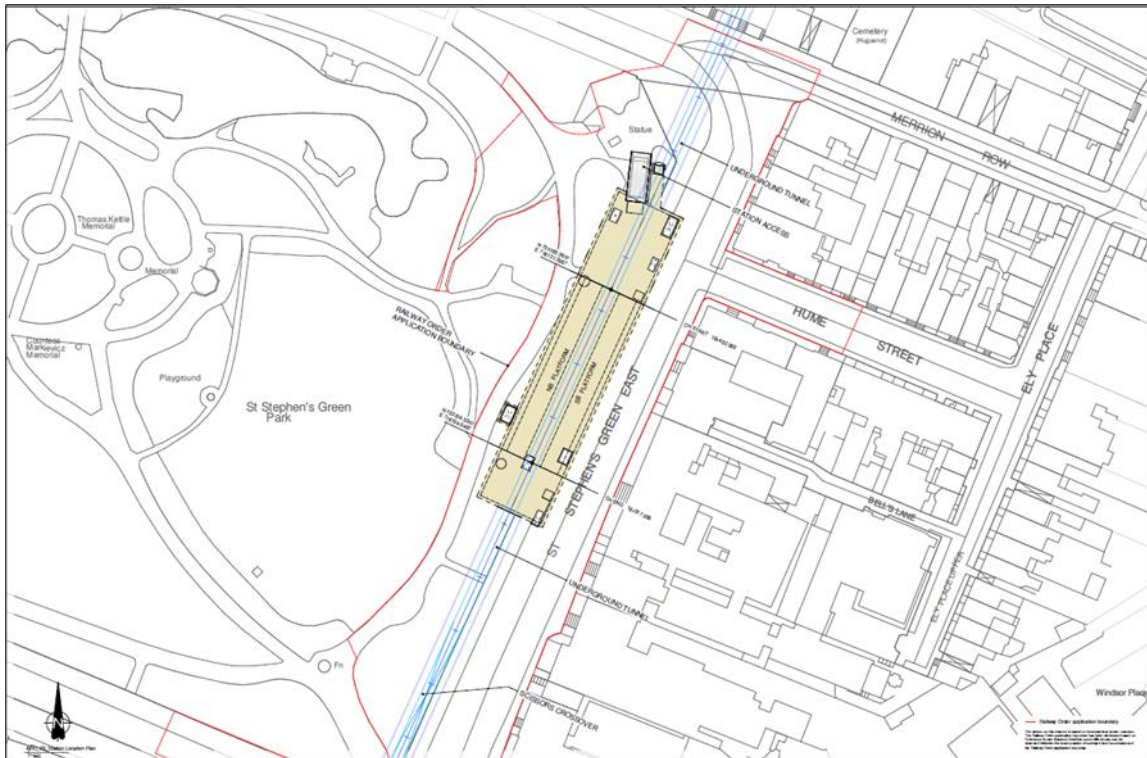


Figure 5-14: SSG East Surface Layout

This option location was selected with regard to the following:

- The importance of St Stephen's Green Park as an historical public park which maintains its Victorian layout and features extensive tree, shrub and flower planting that enhance the architectural features of the park. The park is one of the most important green spaces in the centre of Dublin and attracts significant numbers of visitors each year;
- The Architectural Heritage of the area having particular regard to St Stephen's Green Park which is designated as a National Monument (RMP DU018-020334) and is listed on the Dublin City Council Record of Protected Structures (RPS 7751-7761). Furthermore, there are a number of buildings on the east side of St Stephen's Green which may be impacted by potential station locations as they feature extensive cellars that protrude underneath the roadway;
- The importance of St Stephen's Green East road as a transport corridor for public transport, private vehicles, cyclists, and pedestrians. It should be noted that during the AM peak hour, 384 buses used the corridor to access the City Centre;
- The presence of multiple utilities underneath the roadway on St Stephen's Green East and the requirement for major diversions of those utilities. Particular attention was given to the requirement to divert a 1,800mm brick "ovoid" Victorian sewer under St Stephen's Green East and 1,710mm reinforced plastic mortar ovoid sewer situated underneath Hume Street as diversions of these utilities could extend the construction period by 12 months or more, causing significant additional impacts; and

- The requirement for an intervention shaft between the St Stephen's Green Station and Tara Street in the event that the distance between these stations is greater than 1,000m. An intervention shaft is a significant structure that would be required to allow for emergency services to access the MetroLink tunnel in the event of an emergency. The intervention shaft would need to be located between Tara Street and St Stephen's Green and would cause significant additional impacts if required.

Overall, this location was chosen as the preferred station location for St Stephen's Green East to mitigate the potential impacts on St Stephen's Green Park, reduce the overall construction phase impacts by avoiding the requirement for an intervention shaft and significant utility diversions, while maintaining transport and traffic movements on St Stephen's Green East road during the construction phase.

## 6. Metro Extension Studies

Following the postponement of the Green Line upgrade to metro standard the NTA wished to understand if there were other options to serve the transport needs of the south of Dublin, with or without a direct connection to the MetroLink terminus at Charlemont. Two studies were carried out as described in the following sections.

### 6.1 Metro UCD to Sandyford Feasibility Study (8/08/2021 - NTA)

This study<sup>4</sup> considers the feasibility of a Metro system to serve transport demand along a corridor from the city centre to Sandyford via University College Dublin (UCD). Two representative Metro alignments were assessed and one of them as shown in Figure 6-1 is relevant for the Charlemont area. This route starts at Sandyford and goes north to a station on the eastern side of the UCD campus, then Ballsbridge, before turning west to connect with MetroLink at Charlemont.

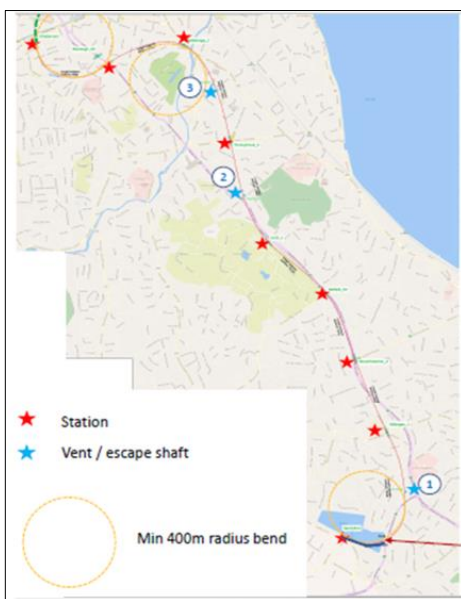


Figure 6-1 Charlemont Alignment in UCD Sandyford Study

The forecast usage of the proposed alignment is shown to be relatively low. A significant proportion is identified as arising from transfers from existing public transport options, with overall levels of trip making by public transport increasing by a maximum of 1.2% for the best performing option. Analysis of the benefits and costs of the proposals show that, depending on the option, the expected benefit to cost ratio (BCR) is between 0.13-0.6.

Whilst the options are considered broadly feasible from a technical and environmental perspective, the initial indication is that a Metro is unlikely to be a cost-effective approach to enhancing public transport in this area of Dublin. A review of the demand forecasts highlights some of the challenges in developing a successful Metro option but also some potential opportunities which may be worth further exploration. Briefly, UCD is a key destination but its wide geographical distribution and existing bus services makes it difficult for a metro to compete. Also, there is a very strong case for integration with MetroLink. The study corridor is already relatively well served in terms of its existing Rail, Luas, and bus provision, which restricts opportunities for achieving major mode shift. More positively is the relative success of the Charlemont connected alignment in enabling access to UCD from the north.

<sup>4</sup> <https://www.nationaltransport.ie/wp-content/uploads/2021/11/Metro-UCD-to-Sandyford-Feasibility-Report.pdf>

## 6.2 Metro to Knocklyon Feasibility Study Report (16/07/2021 - NTA)

This study<sup>5</sup> was undertaken to consider the feasibility and suitability of a Metro system to serve the transport demand along the corridor from the city centre to Knocklyon in the south-west of the county. The option for a run-through connection with MetroLink at Charlemont is shown in Figure 6-2. Another option considered an interchange connection with MetroLink at SSG East.

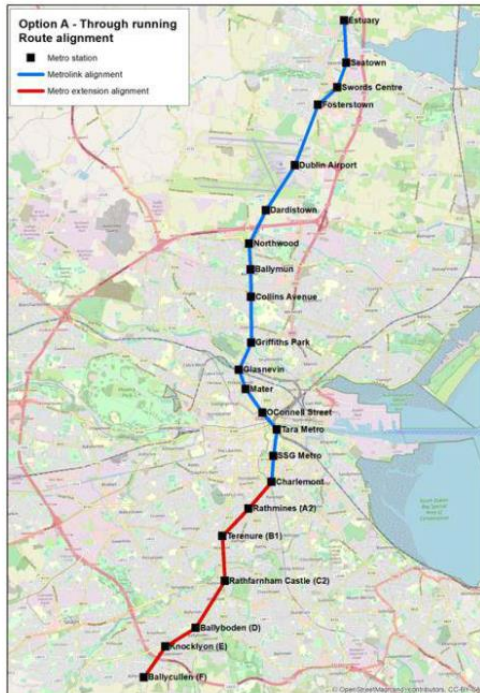


Figure 6-2 Option with run-through Connection at Charlemont

The forecast usage of the alignment options is shown to be relatively low outside of the peak periods. This can relate to low density housing in the suburbs and lack of attractors to these suburbs, such as office and retail attractors. A very strong case is made for options of this type being fully integrated with the existing Metro as a through running service, which appears to offer a more attractive service, for similar or lower cost. On a positive note, is the relative success of the Charlemont alignment in enabling access to the southern suburbs of Rathmines, Terenure and Knocklyon from the north.

Whilst the two metro options assessed are considered broadly feasible, the initial indication is that a Metro option is unlikely to be a cost-effective approach to enhancing public transport in this area of Dublin.

<sup>5</sup> [https://www.nationaltransport.ie/wp-content/uploads/2021/11/Metro-to-Knocklyon-Feasibility-Study-V3\\_noWM\\_opt.pdf](https://www.nationaltransport.ie/wp-content/uploads/2021/11/Metro-to-Knocklyon-Feasibility-Study-V3_noWM_opt.pdf)

## 7. Comparison of Terminus Options

### 7.1 Mobility Hubs for Interchange at MetroLink Termini

High quality interchanges or Mobility Hubs significantly broaden the transport offering for their catchment areas and add to the appeal and attractiveness of sustainable transport by ensuring that people can easily change modes to access a wider range of places by these services. The proposed MetroLink route runs from Estuary in north Dublin to its south city terminus at Charlemont. A key design aspect of the system is the ability for travellers to be able to interchange between public transport modes as seamlessly as possible.

The NTA's draft Greater Dublin Area Transport Strategy 2022-2042 establishes interchange as a key implementation measure of its Strategy, *"As high-capacity bus routes, heavy rail plus light rail increase their coverage across the urban area of Dublin and the region's settlements, the full benefit of this investment, (the "network effect") can only be fully capitalised on by the development of high-quality interchange facilities or Mobility Hubs"*.

The terminus locations for any metro system are key points of interchange into the system. For MetroLink the northern terminus of the system is at Estuary where a large Park and Ride interchange facility is to be constructed. The southern terminus location is likewise of critical importance for interchange as this location will be used for interchange with the Luas Green Line and bus services.

The Metrolink south city terminus has been located at Charlemont because it offers the optimal location for interchange with the Luas Green Line. The only alternative location is at SSG East and as is demonstrated below this is not an optimal location for interchange with the Green Line. The location of the south city terminus for Metrolink is also supported by the NTA in their draft Greater Dublin Area Transport Strategy 2022-2042 where it states, *"The south city terminus at Charlemont offers the optimal location for interchange with the Green Line in response to growing demand in the longer term and is an appropriate location to facilitate any potential future metro extensions to serve the south west, south or south east of the city region should sufficient demand arise"*.

As mentioned previously, a key requirement for intermodal interchange is that the movement between systems is as seamless as possible. In this regard, there are clear differences in the passenger experience of interchanging between Metrolink and Luas modes at the two location, Charlemont and SSG East. This matter is discussed in the following sections.

### 7.1.1 MetroLink Charlemont Station interchange to elevated Luas Stop

Figure 2 below highlights the walk route from Charlemont Station to the elevated Luas Platform. The distance is approximately 60m based on the addition of the Luas platform stairs to the east of the Luas line.



Figure 7-1: Walk route (white line) from Charlemont MetroLink station access to Luas platform

Account then needs to be taken of the vertical distance from the MetroLink platform to the exit of the station at the street level and access to the raised LUAS platform above the street. The vertical distance from street level to Luas platform level is shown in Figure 7-2.



Figure 7-2 Vertical route from Street to Luas Platforms

For the Charlemont terminus location, the total distance and estimated walking journey time using the MetroLink escalators to make the system interchange is shown in Table 7-1.

Table 7-1: Total walking time between Metrolink Charlemont platform and Luas Charlemont platform (using stairs to Luas from street)

	WALKING TIME FROM CHARLEMONT PLATFORM TO ELEVATED LUAS PLATFORM (by stairs)					
	Walk Distances		Walking Time Rates (m/sec)		TOTAL WALKING TIME	
	H	V	1.42	0.65		
	H	V	H	V	seconds	minutes
<b>Through Platform</b>	30.14		21.23	0.00	21.23	0.35
<b>Platform Mezzanine</b>		13.80	0.00	21.23	21.23	0.35
<b>Through Mezzanine</b>	14.53		10.23	0.00	10.23	0.17
<b>Mezzanine-Concourse</b>		14.40	0.00	22.15	22.15	0.37
<b>Through Concourse</b>	13.00		9.15	0.00	9.15	0.15
<b>Concourse Street</b>		17.70	0.00	27.23	27.23	0.45
<b>Exit to LUAS Stairway to Platform</b>	60.00		42.25	0.00	42.25	0.70
<b>Stairway (see note)</b>		14.56	20.68	0.00	20.67	0.36
					<b>174.16</b>	<b>2.90</b>

Notes: Vertical Rates considering escalator speed (90persons/min at 0.65m/s) and stairway walking time at 1.42m/sec.

For access by lift from the street, the alternative calculation is 1m/sec and this would take 7 seconds plus added waiting time, therefore an assumed 30 seconds time would be reasonable.

### 7.1.2 MetroLink Station (SSG East) Interchange to LUAS Stop (SSG West)

The figure below highlights the walk route from SSG East station to Luas SSG East West. The horizontal walk distance is indicated as 480m, via SSG East North. Account then needs to be taken of the vertical distance from the ML platform to the exit of the station at the street level.

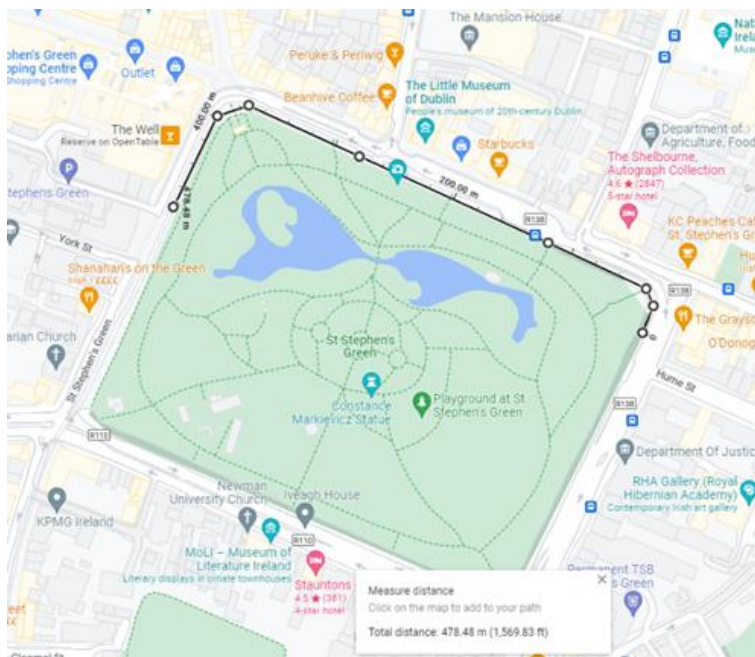


Figure 7-3: Walk route at SSG East from Metrolink station to Luas Stop (Source Jacobs Project Mapper)

Table 7-2: Total walking time between MetroLink SSG East platform and Luas SSG West Platform

	WALKING TIME FROM SSG PLATFORM TO LUAS ON SSG WEST					
	Walk Distances		Walking Time Rates (m/sec)		TOTAL WALKING TIME	
	H	V	1.42	0.65		
			H	V	seconds	minutes
<b>Through Platform</b>	30.14		21.23	0.00	21.23	0.35
<b>Platform Mezzanine</b>		13.80	0.00	21.23	21.23	0.35
<b>Through Mezzanine</b>	13.00		9.15	0.00	9.15	0.15
<b>Mezzanine-Concourse</b>		14.40	0.00	22.15	22.15	0.37
<b>Through Concourse</b>	22.50		15.85	0.00	15.85	0.26
<b>Concourse Street</b>		17.70	0.00	27.23	27.23	0.45
<b>Exit to LUAS Stop</b>	480.00		338.03	0.00	338.03	5.63
					454.87	7.58

*Note. Vertical rates considering escalators speed. (90persons/minute at 0.65m/sec)*

Table 7.2 sets out the total distance and estimated walking journey time using the MetroLink escalators to make the system interchange.

Table 7-2: Total walking time between MetroLink SSG East platform and Luas SSG West Platform

	WALKING TIME FROM SSG PLATFORM TO LUAS ON SSG WEST					
	Walk Distances		Walking Time Rates (m/sec)		TOTAL WALKING TIME	
	H	V	1.42	0.65		
			H	V	seconds	minutes
<b>Through Platform</b>	30.14		21.23	0.00	21.23	0.35
<b>Platform Mezzanine</b>		13.80	0.00	21.23	21.23	0.35
<b>Through Mezzanine</b>	13.00		9.15	0.00	9.15	0.15
<b>Mezzanine-Concourse</b>		14.40	0.00	22.15	22.15	0.37
<b>Through Concourse</b>	22.50		15.85	0.00	15.85	0.26
<b>Concourse Street</b>		17.70	0.00	27.23	27.23	0.45
<b>Exit to LUAS Stop</b>	480.00		338.03	0.00	338.03	5.63
					454.87	7.58

*Note. Vertical rates considering escalators speed. (90persons/minute at 0.65m/sec)*



### 7.1.3 Interchange Penalties

Table 7-3 highlights the 12hr total transfer modelled demand numbers both from Metrolink to Luas and Luas to Metrolink at Charlemont station. A total of 19102 interchange passenger movements between the two stations at Charlemont are predicted to occur in 2060. The number of interchange movements if the interchange was located at SSG is expected to be similar.

Table 7-3: 12hr total transfer demand both from Metrolink to Luas and Luas to Metrolink at Charlemont station.

Station	Transfers to MetroLink				Transfers from MetroLink			
	First Boarders	From Bus	From Rail/DART	From Luas	Final Destination	To Bus	To Rail/DART	To Luas
Charlemont	7,367	3,635	-	9,823	7,436	4,368	-	9,279

The interchange penalty for these people to move between Metrolink and LUAS at SSG East Station is calculated to be 7.58 minutes whereas the interchange penalty for a similar move at Charlemont is 2.90 minutes. This is a very significant difference of 4.68 minutes and an interchange at SSG East is therefore considered sub-optimal. For Charlemont we consider that the interchange penalty of 2.90 minutes is within the optimal limits for a modal interchange.

This situation represents a significant barrier for a SSG East terminus to be used as an interchange location for Metrolink in the South City area. We consider that the interchange penalty to LUAS at SSG is such that, unless more important factors take precedence, it would rule out SSG as a southern terminus point for the Metrolink system.

## 7.2 MetroLink Extension to South

The draft Transport Strategy for the Greater Dublin Area 2022-2042 makes it clear that all reasonable options to extend MetroLink should not be precluded. The Preliminary Design for Charlemont and its turnback facility is such that a future connection to the Green Line could be formed, while at the same time enabling other reasonable alignments to the south to be developed if deemed appropriate. Two options for a metro extension to the south have been examined by the NTA as summarised in this report, one via UCD to Sandyford and the other to Knocklyon. The findings do not indicate a positive business case. If this continues to be the case then a Green Line run-through connection will remain a likely option for the future.

A terminus at Charlemont has buildability advantages over a terminus at SSG East because during construction the TBM can continue to bore all the way to the end of the turnback tunnel 360m beyond the Charlemont Station box, before being buried underground. A future Green Line connection could then be constructed using cut-and-cover techniques without the need and expense of a new TBM.

If instead the terminus was at SSG East and a Green Line connection was required in the future, an underground station at Charlemont would likely be built as currently proposed and the connecting 950m long single bore tunnel would have to be formed using mining techniques. This would increase the construction safety risks compared to the more efficient TBM methods and would have a negative impact on cost and programme. Tunnel spoil would likely be extracted at Charlemont with an increased environmental impact.

On the other hand, if a Green Line connection was not favoured compared to another metro route to the south then a Terminus at SSG East could make sense as long as a suitable station or shaft could be located on an acceptable alignment within a 1000m radius (to retain compliance with the MetroLink tunnel fire safety requirements). However, a much-improved business case from what has been reported would be required for the new route and this would be a severe challenge given the added

cost to the scheme of the 950m long tunnel and additional station when compared to the current MetroLink proposal.

### 7.3 Cost Benefit Discussion

While no detailed Cost Benefit Appraisal (CBA) has been conducted to compare Charlemont and SSG East it is helpful to consider a high-level cost/benefit assessment of the cost difference between a terminus at Charlemont and one at SSG.

A broad estimate for the delta construction cost between a terminus at Charlemont and a terminus at SSG East, both with a 360m long turnback facility, is in the order of €600m allowing for the almost 1km tunnel length and the Charlemont Station. For the 2km reduced length of the return trip a saving in the rolling stock fleet could also be available for up to 4 trains, or say €20m in procurement cost. Should a future extension to the south onto the Green Line be progressed, a penalty in construction cost is likely because mining methods would be needed rather than a continuation of the TBM bore.

Of course, there would be loss of MetroLink revenue if there was no station at Charlemont. The Luas Green Line would likely suffer increased overcrowding as a result and the lack of capacity on the street-running section between Charlemont and SSG East would be an increasing problem. The longer term might include a connection to the Green Line and additional costs would be incurred because, as previously discussed, mining methods would need to be used rather than extending the more efficient TBM drive.

We can identify the following scope items that differ between the options in the short term.

Table 7-4: Medium Term Cost Comparison – Charlemont versus SSG East Terminus

Scope Item	Charlemont	SSG East	Charlemont versus SSG Delta Cost (€m)
Tunnel Length	+950m	0	100
Station	1	0	500
Turnback Facility	1	1	0
Fleet Reduction (trains)	0	4	50
<b>Delta Total</b>			<b>+650</b>

Referring to Section 3.3 we note that for a terminus at Charlemont the forecast annual patronage for Charlemont Station is approximately 10 million while patronage at SSG is forecast to be 5 million. If the terminus was at SSG instead then we would expect a significant loss in patronage for the network.

Based on available information a reasonable estimate for year 2060 is that Metro trips would decrease by between 4% (8000/day) and 7% (14000/day), or up to 4 million trips per annum. Assuming an average fare of €2.00, a revenue loss in the first year of €8m is possible. This loss over a payback period of 30 years or more has the potential to match the NPV of the investment, depending on a wide range of a factors beyond the scope of this report

### 7.4 SSG East Terminus

The same turnback arrangement would be required at SSG East as at Charlemont, that is, a 360m dead end tunnel with side ventilation/escape tunnel. This would increase the size of the southern end of SSG East station, with a greater construction impact on SSG East. Alternatively, if no parallel side



This could mean that a curved track section on leaving the SSG station heading south is provided before the straight turnback, followed by a reverse curve to suit the current design for Charlemont Station. More detailed design work would be needed to confirm that this arrangement is feasible.

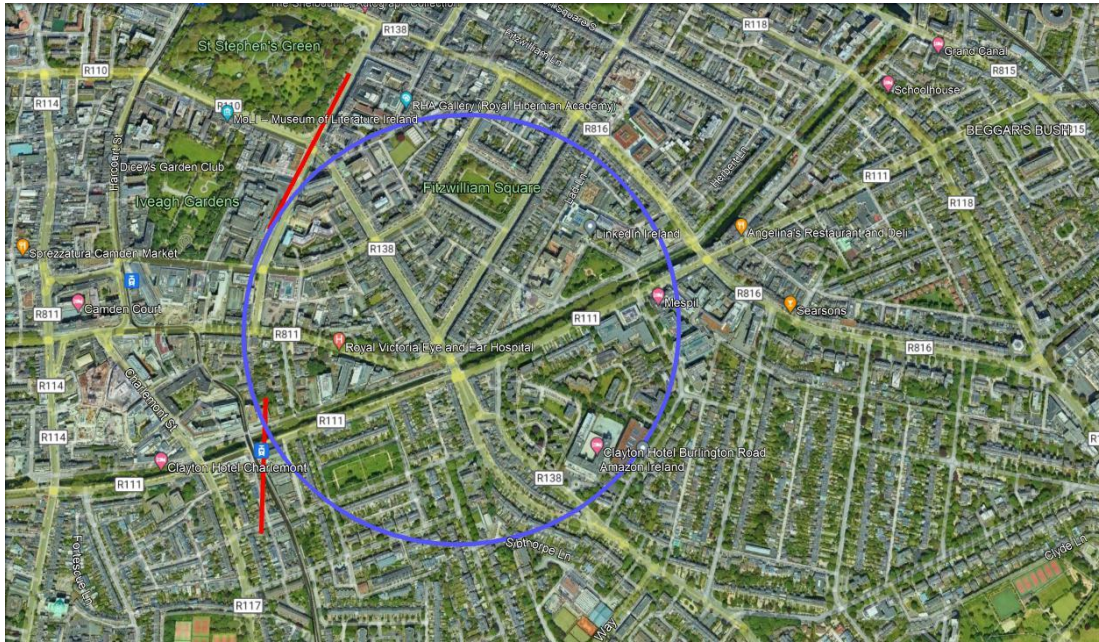


Figure 7-5: Alignment between SSG East (with 360m long Turnback & 400m radius) and Charlemont [source Google]

## 8. Conclusions

In the coming decades, the Luas Green Line is forecast to exhaust its capacity to satisfy the forecast demand on its transport corridor, even with incremental improvements on train length and frequency. The draft Transport Strategy for the Greater Dublin Area 2022-2042 accepts that the southward extension of MetroLink is not required in the short to medium term but states that all reasonable options for a metro extension should not be precluded. It was highlighted that the Charlemont terminus does not preclude any of these options

Before unacceptable congestion on the Green Line develops it will need to have a substantial upgrade to metro standard because it has been shown that alternative route options towards the south do not have a sufficiently good business case to be pursued. It is therefore likely that a connection between MetroLink and the Green Line will be needed and studies by NTA and TII have shown that the connection point should be near to the Charlemont Luas Stop. The Preliminary Design has been developed on the basis of delivery in two phases with the south terminus at the underground Charlemont Station and turnback facility.

A comparison between the proposed Charlemont Station terminus and a terminus at SSG East as suggested by local Charlemont residents has been conducted and Table 8-1 gives a summary of the “pros” and “cons” of each location.

Table 8-1: Pros and Cons of Terminus Locations

Item	Charlemont		SSG East	
	Pros	Cons	Pros	Cons
<b>Scope of Works</b>	Easier future connection to Green Line	Longer tunnel with added station	Shorter tunnel and a station less	More difficult Green Line connection.
<b>Passenger Interchange</b>	Optimal interchange time.  Short walking time	Greater vertical height difference	None identified	Sub-optimal interchange time.  Long walking time
<b>Train Operations</b>	Reduced overcrowding on Luas Green Line on-street section.  Facilitates capacity enhancements south of Charlemont	Limited capacity on Luas Green Line street running section.	Reduced metro operation	Increased transfer time and slower LUAS trip time SSG to Charlemont compared to metro.  Luas capacity constrained south of SSG because of on-street running
<b>Cost Benefit</b>	Reduced CAPEX of future Green Line connection. Increased Revenue and passenger service.	Higher CAPEX and OPEX	Reduced CAPEX and OPEX	Reduced revenue and passenger service

Item	Charlemont		SSG East	
	Pros	Cons	Pros	Cons
<b>Future Connectivity</b>	Planned for Green Line connection and does not preclude alternative routes.	None Identified	None Identified	Green Line connection needs mining methods  Possible turnback facility needed on Green Line if alternative route selected.
<b>Environment</b>	Public Transport increased	Impact on Charlemont residents during construction.	No impact on Charlemont area.	Increased environmental impact on SSG Park.  No new public transport service at Charlemont.

The table highlights the interchange penalty for MetroLink at SSG East to and from Luas SSG West and at almost 5 minutes it can be argued that this fact alone should rule out SSG East as a southern terminus point for the Metrolink system when compared to a Charlemont terminus. Other issues are also important including the difficulty in forming an engineered alignment between SSG East, with the required 360m long straight turnback tunnel, and the Charlemont station layout. The loss of substantial revenue if Charlemont Station was not included is a strong consideration also.

In summary, the key reasons for selecting Charlemont over a SSG terminus include:

- a shorter interchange walking distance with almost 5 minutes shorter interchange penalty
- future proofing of the Green Line connection
- bypassing of the capacity constrained Luas on-street running section
- supported by the draft Transport Strategy for the Greater Dublin Area 2022-2042
- all potential future connectivity options enabled
- additional fare/revenues collected with a favourable Cost Benefit ratio likely.