

DART+ South West

Volume 4.3: Option Selection – Strategic Need Report

Iarnród Éireann

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1. Introduction

Delivering a sustainable transport system is a key adaptation measure to respond to the challenge of climate change and Ireland's international obligation to meet its EU 2030 and 2050 climate agreements as a signatory of the international treaty on climate change (Paris Agreement, 2016). The government is currently implementing a range of major projects that will assist in meeting increased transport demand through greener public transport to tackle climate change but also provide a better and more sustainable quality of life, cleaner air and health benefits for current and future generations. The DART+ Programme is one of these major projects.

The DART+ Programme will provide a high-capacity, sustainable and efficient rail transit system for the Greater Dublin Area that delivers a substantial increase to peak-hour capacity, frequency, and reliability. The Programme will benefit all transport users in the region, with improved connectivity for regional towns and cities and reduced congestion and will enable high density and sustainable development along the railway corridor.

The Programme has been prioritised as part of the *National Development Plan 2021-2030* and *Project Ireland 2040* and will be integral to the provision of an integrated, high quality public transport system in line with national, regional, and local planning policy.

The delivery of DART+ South West Project and the enhancement of the heavy rail network between Hazelhatch & Celbridge Station and Dublin City Centre will assist in meeting the DART+ Programme objectives to create a full metropolitan DART network with all lines linked and connected, and with frequency and capacity of services significantly enhanced.

This annex to the Option Selection Report provides an overview of the need for the DART+ Programme and DART+ South West Project, having regard for its strategic context and relevant plans, projects and studies undertaken in recent years.

2. Strategic Context

The need for improvements and modernisation of the rail network has long been identified. The DART+ Programme, and more specifically the DART+ South West Project, is a continuation of improvements that commenced from 2000 onwards. The underlying rationale was that integration of land-use and transportation can help reduce the need to travel and facilitate sustainable urban development. These objectives have consistently featured in strategic investment and land use plans published over the last 20 years; as have the specific improvements required to deliver these objectives, including the improvements needed on the Cork Mainline¹.

In the *National Development Plan 2000 – 2006* and *Strategic Planning Guidelines for the Greater Dublin Area* (1999) investment in the rail network was identified as a key requirement to provide a

¹ The DART+ South West Project includes part of the existing Cork Mainline between Hazelhatch & Celbridge Station and Heuston Station. This part of the Cork Mainline is often referred to in policy documents and publications as the 'Kildare Line'.

better service for the working and resident population of the Greater Dublin Area (GDA); both plans also promoted the concept of maximising existing transportation corridors along which future development of the GDA would occur.

In 2000, Iarnród Éireann and CIE published the *Dublin Suburban Rail Strategic (DSRS) Review*, which provided the genesis for the DART Expansion Programme (subsequently renamed the DART+ Programme). Of relevance to DART+ South West, there has been a long-standing rail industry recognition that operating a mixed railway (where commuter services, inter-city long distance services, and urban transit and freight services operate on the same tracks) severely compromises performance and capacity. Given the number of inter-city and commuter services using this section of the Cork Mainline the proposal to build two extra sets of railway tracks in order to separate Intercity / regional and suburban railway services and eliminate the existing capacity constraint, has been identified as a pre-requisite to improve capacity along the line.

This DSRS Review noted that, in order to maximize the use of the existing network, capacity improvements on the Cork Mainline were required (again focusing on the need for additional tracks to separate Intercity and suburban railway services). The Report recommended amongst other things:

- “four tracking of the Kildare line should start with the Cherry Orchard- Hazelhatch section to permit up to 6tph Heuston-Hazelhatch or 4tph to Sallins and 2tph Kildare, if suitable terminal facilities are provided”
- “electrification of the suburban lines from Maynooth and Sallins/Kildare”

The DSRS Review also recommended the electrification of lines. The Review further identified that the development of an underground interconnector linking Spencer Dock and the City Centre would provide for cross-city rail services and would widen the city centre rail catchment. The development of such a tunnel would also provide capacity for more intensive development along the Cork Mainline. It was from this document that the DART Underground Programme was devised (i.e., underground rail interconnector and electrification of the radial lines).

In 2001, *A Platform for Change - An Integrated Transportation Strategy for the Greater Dublin Area 2000 to 2016* (published by the Dublin Transportation Office) reiterated the key objectives of investing in rail and maximising the use of existing rail lines and reiterated the underlying requirements for the DART+ Programme. Those of relevance to DART+ South West, were:

- Four tracking from Cherry Orchard to Sallins;
- An east-west city centre tunnel; and
- Electrification of the Cork Mainline to the city centre.

In 2003, the Department of Transport commissioned a report to evaluate the long-term rail requirements from a national perspective in light of the emerging spatial planning and regional development trends and policies. This was presented in the *Strategic Rail Review* (2003). This report was cognisant of the recommendations of the DTO’s *A Platform for Change* but considered more detailed analysis to take account of the localised development potential that would result in increased passenger demand (i.e. greater than assumed in *A Platform for Change*). The *Strategic Rail Review*

(2003) acknowledged that the more detailed analysis could affect the timing of elements of the investment strategy.

The recommendation of the Strategic Rail Review (Section 4.5.4) was to develop the Dublin Suburban Routes in four phases, including as Phase 3: *“Widening of the rail corridors between Dublin Connolly and Howth Junction and between Dublin Heuston and Hazelhatch on the Kildare route from two to four track, enabling separation of stopping DART services from fast intercity and commuter train services.”* The investment strategy recommended included:

- Progressing construction of the new turnback facility at Newbridge.
- The lengthening of platforms at Sallins and Hazelhatch.
- Secure a Railway Order and proceed to construction of the four tracking on the Kildare Line to separate Intercity and commuter traffic.

Since 2001, these objectives and requirements have remained constant including establishing Hazelhatch & Celbridge as the termination point for four tracking and Sallins the termination point for electrification; however, having regard to interdependencies between some elements, they have had to be brought forward as different projects or phases at different times.

An early project (one of the investment strategy recommendations of the *Strategic Review 2003*), involved delivering platform lengthening at Hazelhatch & Celbridge Station and Sallins & Naas Station to accommodate longer trains in 2003.

However, addressing the existing constraints of the Cork Mainline was the priority; and the four-tracking of the line, between Park West & Cherry Orchard Station and Hazelhatch & Celbridge Station, was brought forward as the Kildare Route Project in 2006. At the time, it was not possible to include the four-tracking further into the city as part of the project because the design alignment of DART Underground and its interface with the Cork Mainline around Heuston and Inchicore had not been finalised. For further details, refer to **Section 2.2**.

The delivery of the Kildare Route Project in 2009 laid down significant groundwork for the DART+ South West Project, providing four-tracking for 11km and reconstructing several bridges to provide the necessary lateral clearance and vertical clearance for future electrification.

In 2009, with the DART Underground alignment finalised, the second phase of the Kildare Route Project was progressed. This looked at continuing four-tracking from the end of Kildare Route Project at Park West & Cherry Orchard through to the end of proposed DART Underground within the IÉ Inchicore Works. With the onset of the economic recession, the Government decided to defer the DART Expansion Programme in the *Capital Expenditure Programme 2012-2016*, with a view to progressing it again when funding permitted. The progression of the Railway Order application for Kildare Route Project Phase 2 Project was put on hold.

In 2015, the Government deferred authorisation for construction of DART Underground. In this regard, the onset of the financial crisis in 2010 and a series of capital spending reviews has affected the timing, but not the objectives or underlying requirements for the DART Expansion Programme (now the DART+ Programme).

In 2018, the *DART-Expansion-Programme-Options-Assessment* (Oct 2018) by Jacobs and Systra sought to identify a lower cost alternative to the proposed DART underground tunnel component of the DART Expansion Programme. It considered a range of ‘scheme bundles’ and recommended that the DART Expansion programme be delivered by enhancing the existing rail network in the short to medium term (Scheme Bundle 6). Of relevance to DART+ South West, Scheme Bundle 6 - DART Expansion with Existing Network Enhancement (No DART Underground) initially included:

- Upgrading of the Phoenix Park Tunnel Branch Line (as an alternative to the DART Underground tunnel).²
- New stations at Heuston West (Platform 10) and Cabra.
- Four tracking on the Cork Line from Park West to Heuston station.

Following optimisation an above-ground station at Kylemore on the Cork Mainline was recommended as an alteration to Scheme Bundle 6. This in turn meant that the Heuston West (Platform 10) station was no longer required and was removed from Scheme Bundle 6.

As part of future transport policy and strategy further improvements of the Cork Mainline may be promoted, which may include full InterCity and/or Commuter electrification extensions. There is nothing being designed by DART+ South West that will preclude these future plans. These future projects will be subject to their own designs, technical assessment, and statutory approval.

In conclusion, the DART+ South West Project continues the railway modernisation works already significantly progressed by previous projects delivered since the early 2000s. DART+ South West is fully compliant with recent government transport and climate policy, most particularly the *National Development Plan 2018-2027* for completion of four-tracking from Park West to Heuston and electrification of the commuter lines from Hazelhatch to Heuston and along the Phoenix Park Tunnel Branch Line. In this context, the DART+ South West Project is an up to date upgrading the suburban railway service along this section of the Cork Mainline.

2.1. Kildare Route Project (Delivered in 2009)

The Kildare Route Project involved upgrading the suburban railway service along the section of the Dublin – Cork railway line, between Cherry Orchard (west of Le Fanu Road Bridge (OBC7)) and a point 1km west of Hazelhatch & Celbridge Station.

As part of the Kildare Route Project design development process, different solutions to improving passenger rail services between Dublin and Hazelhatch were considered. This included the option of constructing an entirely new rail line corridor between Kildare and Heuston Station. However, this option was discounted because of cost (including substantial property acquisition costs in built up area), poor use of the existing railway infrastructure including stations, no passenger interlinkage (from suburban to Intercity at certain stations) and a lack of flexibility for trains when maintenance of a track is being carried out.

² It is noted that DART Underground remains a proposal and the tunnel alignment is protected for potential future development.

The option considered to have clear economic and social advantages was to widen the existing railway corridor confining the railway works to an area that already has a railway presence and where duplication of items such as signalling structures and road overbridges, could be avoided.

An option of providing for the section from Heuston to Cherry Orchard was also technically examined; however, it did not form part of the Kildare Route Project Railway Order, as clarification of the DART Underground final design alignment was pending, and it would ultimately enable suburban services from Hazelhatch to run through to Connolly station, Spencer Dock and to link with the existing DART and Luas lines.

An option of an electrified service was also considered; however, it was not so much regarded as an alternative, but rather as a future development opportunity and enabler (delivering the basic railway line infrastructure) for a future DART type service on the railway corridor.

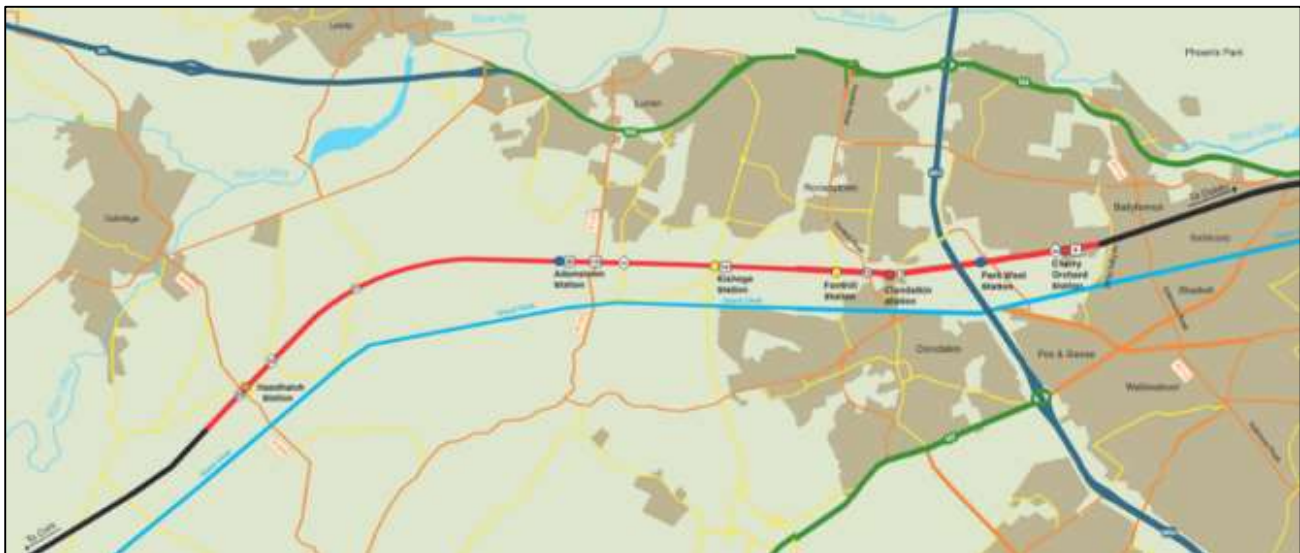


Figure 2-1 Route and Extent of the Kildare Route Project (in red) (2006 EIS)

The upgrading works included:

- Two extra sets of railway tracks between Cherry Orchard and Hazelhatch stations in order to separate Intercity / regional and suburban railway services.
- New / relocated railway stations (including at Park West, Fonthill Road and Kishoge).
- Upgrading Hazelhatch & Celbridge Station to provide additional platforms.
- Demolition and reconstruction (where appropriate) of several road bridges over the railway line to accommodate the widened railway corridor, including bridges located at:
 - Station Road Bridge (OBC11)
 - Ninth Lock Road Bridge (OBC13)
 - Stacumny Road Bridge (OBC21)
 - Hazelhatch Road Bridge (OBC25)

- Hazelhatch Footbridge (OBC24A)
- Associated station, upgrades amended road layouts and all associated and ancillary works including cycle facilities and bus interchanges.

The Railway Order application was lodged in 2005 and approved in 2006. The project was completed in 2009.

The Kildare Route Project delivered significant enabling infrastructure for the DART+ South West Project, including four-tracking between Park West & Cherry Orchard Station and Hazelhatch & Celbridge Station and several bridge reconstructions along the section which provide the necessary clearances for electrification. Other relevant enabling works included the 2003 platform lengthening at Hazelhatch & Celbridge Station to accommodate longer trains and construction of the turnback in Newbridge in order to improve outer commuter services served by the Kildare Arrow Route (including *inter alia* Newbridge, Sallins and Celbridge).

Refer to **Volume 4.5 Useful Links** for a hyperlink to the Kildare Route Project Railway Order.



Figure 2-2 Four-tracking and Bridge Reconstruction (delivered as part of the Kildare Route Project)

2.2. DART Underground (2002 - 2011)

In 2002, CIÉ commenced a three-phase process considering several route alignments and station locations for DART Underground, as follows:

- **Phase 1 – Feasibility:** commenced in 2002 by Parsons Brinckerhoff Ireland Ltd. It identified an alignment running from East Wall to Pearse Station, and on to Heuston Station with additional stations at Docklands (under the River Liffey), St. Stephen's Green and the Digital Hub.
- **Phase 2 – Preliminary Design:** commenced in 2006 by Mott MacDonald Pettit Ireland. The alignment did not change significantly in this phase, but the design detail was refined. For the

Western Portal underground station, a range of options were initially considered. Options west of Islandbridge were discounted, and ultimately two options remained:

- Heuston Plan A - beneath the Diageo-owned St. James' Gate Brewery, east of the existing Heuston mainline station and adjacent to Victoria Quay.
- Heuston Plan B - the underground station was moved westwards, partially out of Diageo lands and partially into CIÉ lands. The alignment would come to the surface in the centre of the Kildare Route Project track configuration thereby negating the need to provide a grade-separated junction as would have been required for Plan A. Plan B was selected as the preferred option.
- **Phase 3 – Reference Design:** commenced in 2008 by Arup Halcrow Joint Venture. As part of this design process several further options were considered in order to optimise the final scheme design. However, during design development, it became clear that the constraints at Heuston Station were significant and potentially could have a major impact on existing train operations and on the local infrastructure and environs.
- In order to address the impacts of Plan B, the option of extending the DART Underground tunnel to Inchicore, referred to as Plan C, was investigated. Given that the concept of the Plan C extension was a new development for the DART Underground project, several assessments had to be carried out to bring the proposed extension into line with the remainder of the project, including route options with varying arrangements for station provision and turnbacks.
- In early 2009 it was decided to advance with the extension to Inchicore and to connect with the existing mainline in the vicinity of Kylemore Road.
- This phase culminated with the preparation of an EIS and Railway Order Documentation. In 2010, the railway order application was submitted to An Bord Pleanála. It was approved in 2011. Refer to **Volume 4.5 Useful Links** for a hyperlink to the DART Underground Railway Order.
- The final alignment of the DART Underground Project had implications for the upgrading of the remaining section of the Cork Mainline into Heuston Station and informed the scope of Kildare Route Project Phase 2.

Note: For the avoidance of doubt, the *National Development Plan 2018-27* requires that the initial sequencing of investment of the DART+ Programme “focus on delivery of non- underground tunnel elements of the programme” and provides for the “route for the remaining element of the overall DART Expansion Programme, the DART Underground Tunnel, will be established and protected to allow for its future delivery.” References to the DART Underground Tunnel in the context of other studies (below) are therefore provided for context only. The requirement for the DART+ South Project is to be compatible with the future provision of DART Underground.

2.3. Kildare Route Project Phase 2 (2010)

In 2009, Iarnród Éireann commenced preparation of a Railway Order application for the Kildare Route Project Phase 2. It followed the decision to advance with the extension of the DART Underground to Inchicore and to connect with the existing mainline in the vicinity of Kylemore Road. Kildare Route

Project Phase 2 was to consist of four-tracking from the previous end of Kildare Route Project at Cherry Orchard through to the end of DART Underground within the CIÉ Inchicore Works.

The primary objectives of the project were to address the two constraints on the Cork Mainline that would prevent the full capacity of the DART Underground being realised. These were:

- The bottleneck between Cherry Orchard and Inchicore where four tracks reduced to two.
- The DART Underground would only accommodate Electric Multiple Units (EMU). Future Commuter trains will be EMUs operating from Hazelhatch to the Belfast Line, hence the line to Hazelhatch must be electrified.

It was proposed to:

- Install two new railway tracks in parallel to existing tracks between Cherry Orchard and Inchicore.
- Electrify the route from Inchicore to Hazelhatch in order to deliver DART services (approximately 15 kilometres).
- Upgrade two bridges at Le Fanu Road and Kylemore Road.
- Provide a new junction at Inchicore to separate DART services from Intercity and regional services bound for Heuston.

A detailed design was developed, and a draft Environmental Impact Statement was prepared. Consultation with the public and local communities was also undertaken.

With the onset of the economic recession, the Government decided to defer the DART Expansion Programme in the *Capital Expenditure Programme 2012-2016*, with a view to progressing again when funding is permitted. The Kildare Route Project Phase 2 Project was put on hold.

2.4. Western Tie-in Study (2017)

Refer to **Volume 4.5 Useful Links** for a hyperlink to this Study and other publicly available reports referred to in this section.

In 2015 the Government deferred authorisation for construction of DART Underground and instructed Iarnród Éireann to examine the current design with an objective of delivering a lower cost technical solution, whilst retaining the required rail connectivity for the DART Expansion Programme.

The assessment review, including transport benefits modelling carried out by Iarnród Éireann and the NTA in 2016 and 2017 concluded that:

- DART Expansion with DART Underground offers the greatest benefits.
- Other network arrangement scenarios focused on delivering non-tunnel city centre capacity enhancements, with integration through the Phoenix Park Tunnel, allow early delivery of service capacity and meet projected passenger demand in the short to medium term at a lower cost.

To find a more commercially viable solution, Arup was commissioned to re-evaluate the possible connection options to link the proposed DART Underground tunnel project to the existing surface rail line serving Heuston Station.

The *DART Underground Western Tie-in Study (2018)* was undertaken in four distinct phases, culminating in the Emerging Preferred Option. It comprised a running connection onto the Cork Mainline, occurring immediately east of the existing Sarsfield Road Underbridge and four track widening of the existing rail corridor until the end of the previously completed Kildare Route Project Phase 1. A twin bore tunnel configuration was also recommended with the tunnel portal sited on the Ballyfermot approach to the junction of the Chapelizod Bypass and the Con Colbert Road (moving the western portal of the tunnel from within Inchicore Works (as approved by the DART Underground Railway Order)).

The Study recommendations were complemented by the findings of the *DART-Expansion-Programme-Options-Assessment Study*, namely Bundle 6 - DART Expansion with Existing Network Enhancement (No DART Underground).

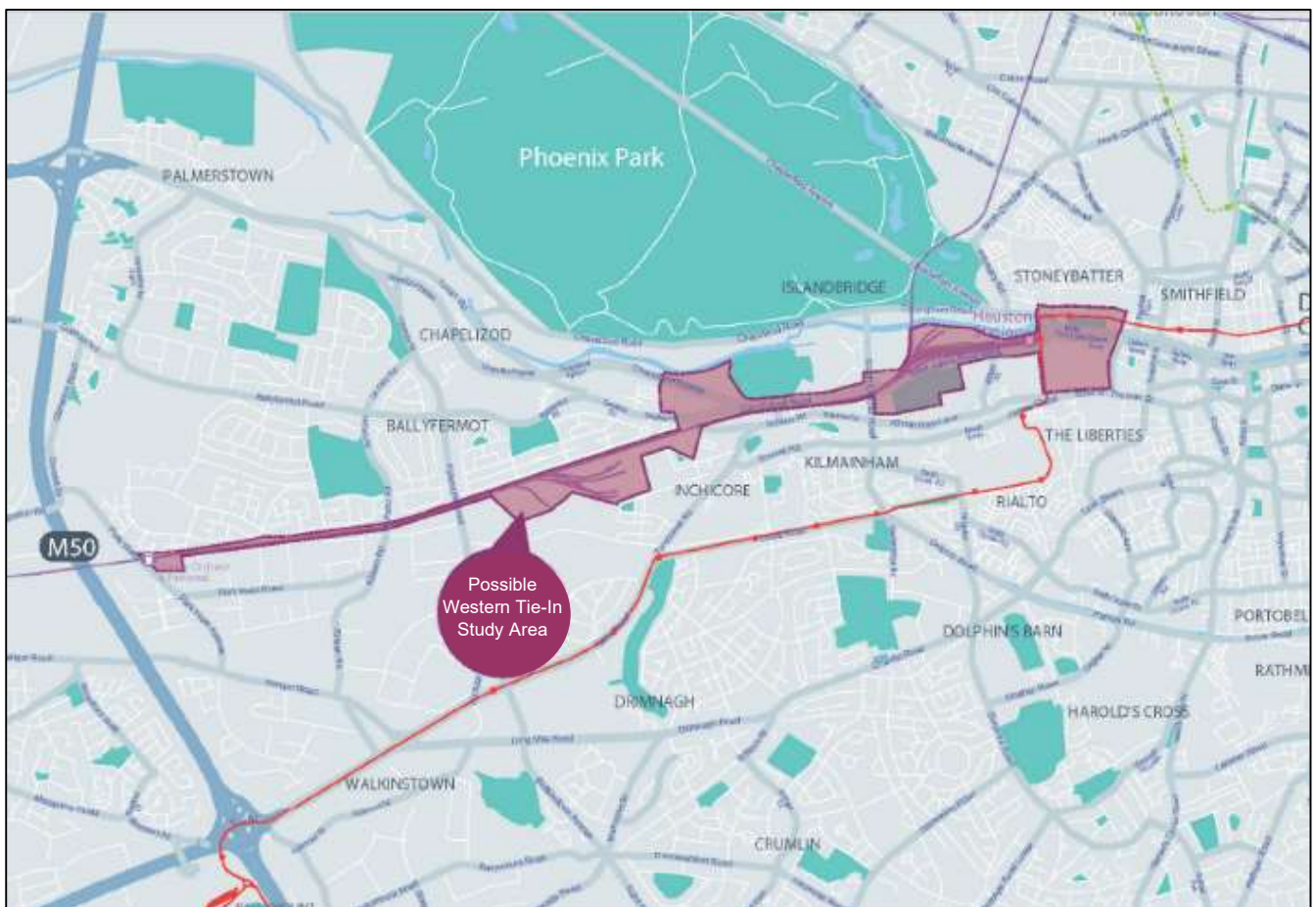


Figure 2-3 Overview of the Study Area for the Western Tie-In

Source: DART Underground Western Tie-in Study (2018)

2.5. DART Expansion – Rail Four-tracking from West of Hazelhatch to Phoenix Park Tunnel (2018)

The short to medium term non-tunnel DART Expansion network was included in the *National Development Plan 2018-2027* but noted that a DART Underground Tunnel alignment would be

protected for potential future development. This decision required alteration to the Cork Mainline previously designed with the tie-in through the DART Underground tunnel from Inchicore.

In 2018, the NTA commissioned Arup to undertake a review of options to tie-in the Cork Mainline to the DART Expansion scheme connecting to the Phoenix Park Tunnel, in a manner that would not impede development of a DART Underground in the future. The assessment considered and complements previous studies, including the DART Underground design and Western Tie-In Study carried out as part of the 2016 and 2017 DART Expansion review.

The Study examined amongst other things:

- Options to widen the existing rail corridor to accommodate four tracks from Heuston Yard, as far as the end of the previously constructed Kildare Route Project near Park West / Cherry Orchard into Heuston (previously incomplete due to the tie-in to the proposed DART Underground).
- The implications of changing the operational track configuration from the existing Fast-Slow-Slow-Fast (FSSF) design with commuter trains in the centre lanes as designed for the initial DART Underground design, to Slow-Slow-Fast-Fast (SSFF) for the DART Expansion network to match the Phoenix Park Tunnel Branch Line which is on the north side of Heuston and Fast-Fast-Slow-Slow (FFSS) for a future DART Underground network to match the tunnel route recommended on the south side of Heuston Station.
- Review the alignment from west of Park West & Cherry Orchard Station to just west of Hazelhatch to identify any changes to the existing trackwork or systems to accommodate future DART expansion running.

The Study concluded with a recommended solution (an Emerging Preferred Option, design drawings covering alignment, structures and property, and a feasibility working cost estimate). There are a number of aspects of the study and recommended solution, which are relevant to the DART+ South West Project, as follows:

- The Study identified horizontal and clearance issues associated with South Circular Road Bridge (OBC1), Memorial Road Bridge (OBC3), Sarsfield Road Underbridge (UBC4), Khyber Pass Footbridge (OBC5), Kylemore Road Bridge (OBC5A) and Le Fanu Road Bridge (OBC7) and the requirement to replace these bridges to accommodate four tracking.
- The Study identified a station to the west of Kylemore Road to act as a replacement for the Inchicore Station proposed in the original DART Underground.
- The Study identified the requirement for retaining walls along the length of the widened corridor to accommodate the four tracking (from the end of the Kildare Route Project Phase 1 Works at Cherry Orchard to Sarsfield Road).
- The Study identified a number of consequences for widening the existing rail corridor through Inchicore, which included potential land take:
 - Removal / relocation of buildings and structures within Inchicore Works, including the Signal Box, the Sancton Wood Tower (also referred to as the Turret) which projects from the Old Running Shed, part of the Maintenance Shed Building, annexes.

- Impacts to properties and land acquisition requirements.
- Relocation of existing track drainage attenuation.
- The above interventions should still be compatible with a future tie-in with DART Underground South of Heuston station (Islandbridge area), as opposed to the tie-in location proposed in the Western Tie In report, and the design accounted for that.

The associated preliminary design was intended to, and has, informed the infrastructural requirements for this Project (to be brought forward through the Railway Order (RO) process). In this regard, it established a concept option that comprised the baseline feasibility option which has been carefully considered by the DART+ South West Project Team.

Refer to **Volume 4.5 Useful Links** for a hyperlink to the *DART Expansion – Rail Four-tracking from West of Hazelhatch to Phoenix Park Tunnel* (2018).

3. Strategic Need

Having regard for the context and background set out in **Section 2**, the strategic need and key objectives relating to the DART+ Programme and, specifically the DART+ South West Project are considered below and summarised in **Figure 3-1**.

- **To improve land use planning**

Land use and development is the primary influencing factor for travel demand. The historic sprawl of urban development with a focus on expanding the road network to cater for private car-based transport has long since been recognised as unsustainable. The resolve that Dublin's growth will be anchored by higher density development around strengthened and efficient public transport corridors has been the cornerstone of integration of land use and transport policies in recent years.

By shaping the pattern of development and influencing the location, scale, density, design and mix of land-uses, integrated land use and transportation planning can help reduce the need to travel and facilitate sustainable urban development and city living. The *Transport Strategy for the Greater Dublin Area 2016-2045* notes that the primary goals of land use and transport integration include reducing the need to travel, the distance travelled, and the time taken to travel, as well as promoting walking, cycling and the use of public transport.

It is evident that focusing development along rail corridors and providing higher densities at key transport nodes to create a compact urban form will increase the viability of public transport facilities, combat unnecessary urban sprawl, and reduce the unsustainable reliance on private car transportation. However, the public transport systems must be in place for this to happen. The DART+ Programme will ensure a high capacity, integrated network is provided enabling a more plan-led transport-oriented development (TOD) which is fully aligned with Ireland's international and national policy positions, and with recent institutional developments in relation to active land management by the State, as set out in *Transport-Oriented Development: Assessing the Opportunity for Ireland* (No. 148 June 2019). Refer to **Volume 4.5 Useful Links**.

The existing Cork Mainline serves several communities and includes stations at existing and future transport-oriented development areas such as Adamstown, Clonburris, and Cherry Orchard and Park West. However, the current frequency, capacity and connectivity of train services cannot cater for the planned growth of these areas.

- **To improve integration**

Modern transport infrastructure must be accompanied by an efficient, integrated, and appropriate network of transport services. Integrated transport systems are essential in making sustainable, compact growth work. While the rail network has continued to be developed over recent decades, significant work remains to be done to create a fully integrated rail network and a fully integrated multi-modal public transport network.

The DART+ Programme will significantly upgrade our existing infrastructure and improve multimodal connectivity through interchanges with other public transport networks.

Services on the Cork Mainline primarily terminate on the outskirts of the City Centre at Heuston Station; however, there is a limited number of passenger services using the Phoenix Park Tunnel Branch Line (two trains per hour per direction between Hazelhatch and Grand Canal Dock). While the Luas (Red Line) and bus services connect Heuston to Conolly Station, there is no direct link between the Cork Mainline and the other heavy rail services.

The DART+ South West Project will improve multimodal connectivity through interchanges with other public transport networks including:

- Allowing for Intercity / regional services to operate efficiently alongside DART services on the Cork Mainline.
- Linking with the Maynooth Line at Glasnevin interchange (via the Phoenix Park Tunnel Branch Line).

- **To support economic and population growth**

The Central Statistics Office's (CSO) *Regional Population Projections 2017-2036* notes that the population of Dublin could potentially increase by 31.9% by 2036, with the number of people living in Dublin rising from 1.34 million in 2016 to 1.76 million by 2036. To cater for this potential growth, *Project Ireland 2040* promotes the provision of higher density developments at accessible locations to encourage a more sustainable, compact urban form.

The DART+ Programme will bring fast, frequent, reliable, and sustainable transport to existing communities along existing rail corridors, making it easier to travel for work, education, or leisure purposes. It will also facilitate the development of new communities that will greatly benefit from the connectivity that the DART+ Programme will deliver.

- **To reduce reliance on private car use**

The *TomTom Traffic Index* has ranked Dublin as the 17th most congested city in the world, with waiting times having increased by 3% in 2019. According to the most recent CSO data (2016), the private car remains the dominant mode of transport in Dublin, accounting, on average, for 54% of all journeys.

Within the GDA, the highest levels of car dependency are evident around the outer edge of the Metropolitan area and in peri-urban fringe locations, where more than 7 in 10 people drive to work. This contrasts with the city centre, where less than 1 in 4 people drive to work. This reliance on the private car for those living on the outer edge of Dublin places substantial pressure on the road network – particularly during the morning and evening peak commuting times.

The Report *The Costs of Congestion – An Analysis of the Greater Dublin Area* (2017) suggests that the cost of time lost to congestion is €358 million in the base year (2012) and estimates the cost to rise to €2.08 billion per year by 2033. Most of this cost is the time lost by personal vehicle users as a result of increased journey times.

Additionally, the current lower frequency and capacity, and poor integration of public transport services within the wider network, does not encourage road users to leave their cars at home and use the public transport option.

The DART+ Programme will provide both existing and future residents along the Project route corridor with a viable alternative to the private car.

- **To achieve climate change targets**

In 2018, Ireland's transport emissions per capita were the fourth highest in the EU and well above the average. The Environmental Protection Agency (EPA) identifies that transport is Ireland's second largest emitter at 20.3%³ of the national total emissions. The private car was the largest contributor at 48%. The EPA recognises an urgent need for better urban and spatial planning, as well as a major investment programme to encourage much more fuel-efficient transport, a switch to cleaner and alternative fuels, a rapid increase in the electrification of our car stock and a very significant shift from private car to public transport.

Tackling the challenges of climate change is a priority for Ireland, as outlined in the *Climate Action and Low Carbon Development (Amendment) Bill 2021*.

Electrification will provide a low carbon energy source for rail transport, reducing greenhouse gas emissions, and an additional fleet of electric trains will assist in the de-carbonisation of the transport sector, enable a transition away from fossil fuels and ultimately allow for reduction of CO₂ emissions by 2050 in line with Government targets.

³ <https://www.epa.ie/ghg/transport/>

Provides Sustainable Transport Options

- Over-reliance on private car use and increasing congestion in Greater Dublin Area.
- DART trains are more sustainable and cleaner than current diesel trains.

Achieve Climate Change Targets

- Will help reduce the transport sector greenhouse gas emissions which continue to rise.
- Supporting the Government's Climate Action Plan.



Integration of Land-use & Transport Planning

- Co-ordination and integration of spatial planning with rail transport.
- Supporting compact growth and increased densities in the Greater Dublin Area.
- Supports the implementation of the Project Ireland 2040 and the National Planning Framework.

Facilitates Integration with other modes of transport

- Improves integration of rail services with active modes of travel (walking and cycling).
- Enables greater cross-modal journeys through improved integration with other modes – Bus, Luas, proposed MetroLink and Dublin Bikes.

Supporting Economic and Population Growth

- Congestion in Greater Dublin Area is increasing.
- Cost of Time Lost in the Dublin Region is - €350million/annum and forecast to rise to €2,000million/annum by 2033.
- Sustainable public transport infrastructure (pedestrian, cycling, bus and rail) will sustain economic and population growth while reducing emissions.

Figure 3-1 Why Investment in DART+ Programme is Needed

• To improve capacity and frequency of services

The current services along the Project route corridor are limited to 12 trains per hour per direction with a peak passenger capacity of approximately 5,000. This low frequency and capacity not only affect the viability of the service in the eyes of local communities, but also limits the potential growth and delivery of new communities along the corridor. To promote a modal shift from unsustainable private car usage to public transport, higher frequency and higher capacity services must be provided to ensure convenient and viable alternatives for road users.

DART+ South West will significantly increase train capacity to 23 trains per hour per direction (i.e., maintain the existing 12 services, with an additional 11 train services provided by DART+ South West). This will increase passenger capacity from the current peak capacity to approximately 20,000 passengers per hour per direction.

• To improve track alignment

The current track alignment between Cherry Orchard & Park West and Heuston Station does not allow for the potential for Intercity and regional services to overtake future DART services that, due to their higher frequency of stops, would operate at a slower average speed. As such, if DART services were introduced with the current two track alignment maintained, the journey time for Intercity and regional services would be governed by the DART services. The upgrading of this section of railway to include four tracks will remove this limitation and allow Intercity / regional services to operate efficiently and independently alongside DART services.

3.1. Objectives (DART+ Programme and DART+ South West)

The primary objective of the DART+ Programme is to support urban compact growth and contribute to reducing transport congestion and emissions in Dublin by enabling modernised high-quality commuter

rail services between Dublin City Centre and the areas of Drogheda, Maynooth, Dunboyne, Celbridge and Greystones. This is aimed to provide a safe, sustainable, efficient, integrated, and accessible public transport service along these corridors.

Sub-objectives of the DART+ Programme include:

- Cater for existing heavy rail travel demand and improve customer services along established rail corridors in the Greater Dublin Area through the provision of a higher frequency, higher capacity, electrified heavy rail service which supports sustainable economic development and population growth.
- Improve accessibility to jobs, education, and other social and economic opportunities through the provision of improved inter-rail and inter-modal connectivity and integration with other public transport services.
- Enable further urban compact growth along existing rail corridors, unlock regeneration opportunities and more effective use of land in the Greater Dublin Area, for present and future generations.
- Deliver an efficient, sustainable, low carbon and climate resilient heavy rail network, which contributes to a reduction in congestion on the road network in the Greater Dublin Area and which supports the advancement of Ireland's transition to a low emissions transport system and delivery of Ireland's emission reduction targets.
- Provide a higher standard of customer experience including provision of clean, safe, quiet, modern vehicles and a reliable and punctual service with regulated and integrated fares.

The primary objective for the DART+ South West Project focuses on the target to increase the carrying capacity on the Project route corridor between Hazelhatch to Heuston and Glasnevin from the current peak capacity of approximately 5,000 passengers per hour per direction to approximately 20,000 passengers per hour per direction.

Sub-objectives of the DART+ South West Project include:

- To deliver higher frequency, higher capacity, electrified rail service along the Project route corridor to enable the extension of the DART service to Hazelhatch & Celbridge Station.
- To separate Intercity and fast regional services from the future DART service by providing additional tracks between Park West & Cherry Orchard Station and Heuston Station.
- To tie-in the Cork Mainline with the wider DART+ Programme using the recently opened rail link and existing connector tunnel through the Phoenix Park.
- To identify sustainable cost-effective solutions from a capital, operations, and maintenance perspective.
- To minimise adverse impacts on the natural and built environment during construction and operation.
- To minimise impacts on existing rail services, road users and landowners during construction.

- To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.
- To deliver an improved customer experience and service for customers along the Project route corridor from Hazelhatch & Celbridge Station to the city centre.

The delivery of DART+ South West Project and the enhancement of the heavy rail network between Hazelhatch & Celbridge Station and Dublin City Centre will clearly assist in meeting the DART+ Programme objectives to create a full metropolitan DART network with all lines linked and connected, and with frequency and capacity of services significantly enhanced.

4. Conclusion

There have been proposals to build two extra sets of railway tracks on the Cork Mainline since 1999. Following a Railway Order application, in 2009 the Kildare Route Project delivered significant enabling infrastructure for DART including four tracking, bridges with the necessary clearances, and new stations between Park West and Hazelhatch.

Despite the onset of the economic recession and changes in Government spending, investment in rail and in the DART+ Programme has remained a priority. Feasibility studies have been ongoing to deliver a cost-effective solution for DART+ Programme. These studies provided the basis for the scope for the DART+ South West Project, which will resolve the outstanding constraints between Park West and Heuston Station by four tracking the line into Heuston Station; it will provide all the necessary infrastructure for electrification out to Hazelhatch, and it will link directly to the City Centre through the Phoenix Park Tunnel Branch Line. It will also be compatible with the future DART Underground rail project.