CENTRE OF EXCELLENCE

DART Expansion

Maintenance Depot

Site Location Assessment

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1 Introduction

Iarnród Éireann, in collaboration with the National Transport Authority are currently seeking to progress key elements of the DART Expansion Programme in line with the Transport Strategy for the Greater Dublin Area 2016-2035 and the National Development Plan 2018-2027. This will see investment in infrastructure to increase train path capacity and procurement of additional electrified fleet.

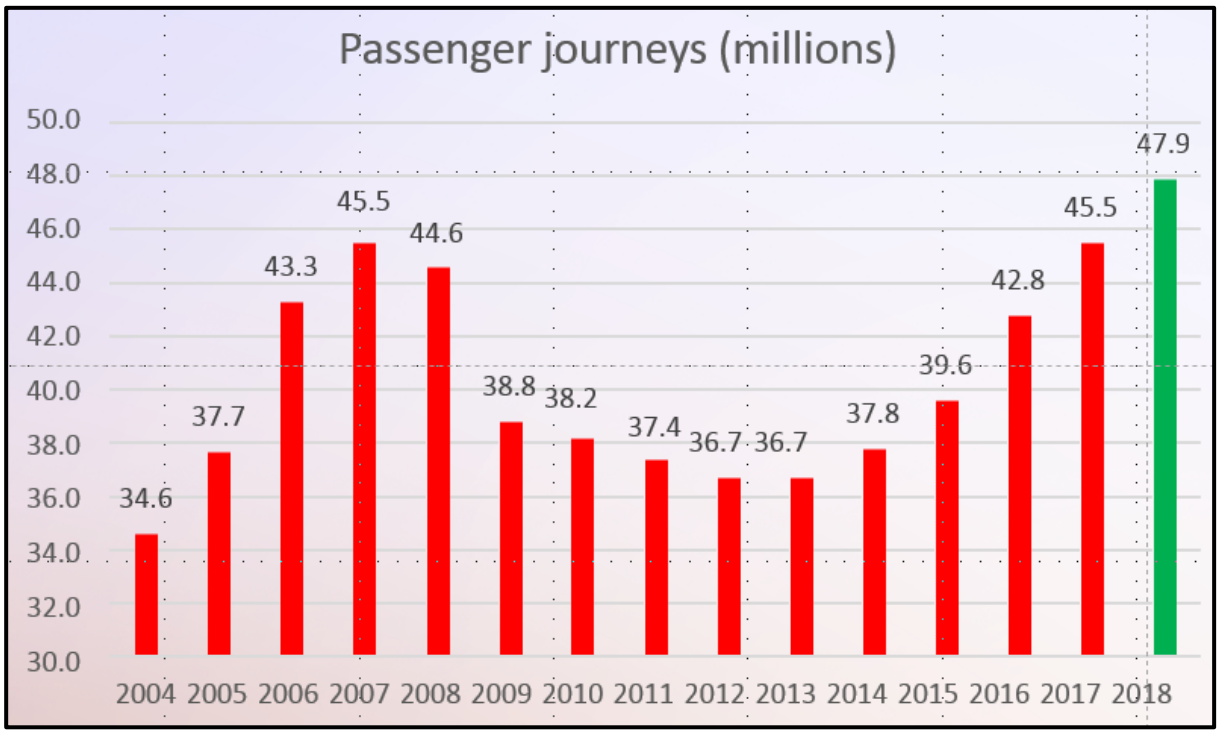
In order to support the additional DART Expansion fleet, Iarnród Éireann will require a sufficiently sized maintenance depot. This site assessment report is prepared to detail the rationale used in determining the most appropriate strategic location on the network for locating this maintenance depot. This assessment builds upon data collated since 2007 when consideration of a new DART Depot was first assessed.

2 Iarnród Éireann Network and DART Expansion Integration

Heavy rail, as a public transport option, remains a very important mode of transport for a significant number of people, for transit to work, education or to access services or amenities. There is a strong correlation between rail patronage and the national economic performance, which indicates commuter transit for work in the AM and PM peaks are key drivers for train occupancy.

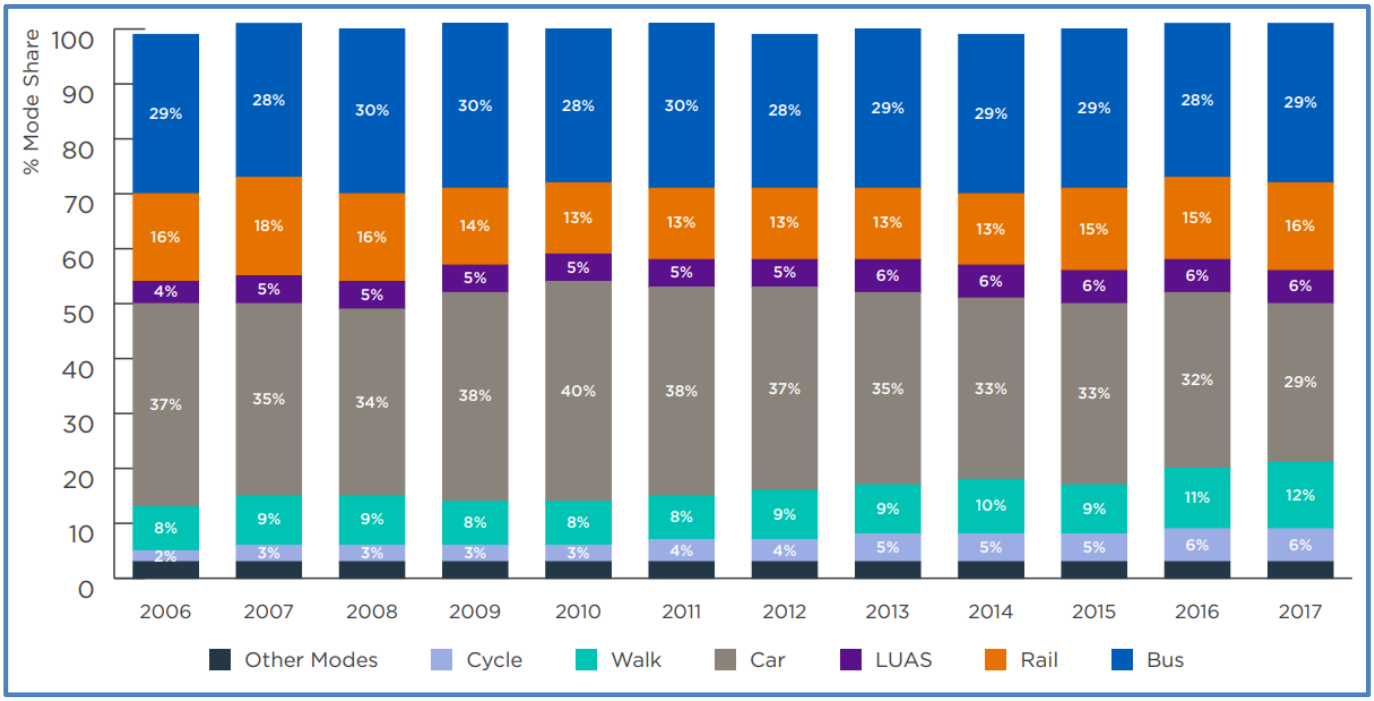
The trend in annual passenger journeys made on heavy rail from 2003 to 2018 is shown on Table 2.1. This shows a significant increase in passenger journeys between 2004 and 2007 when significant improvements in infrastructure and rolling stock was delivered by Iarnród Éireann. However from 2007 to 2013 there was a reduction in annual passenger journeys linked to the national economic crisis. Since 2013 passenger journeys has increased significantly again. In 2018 Iarnród Éireann accommodated approximately 48 million passenger journeys.

Figure 2.1: Annual Iarnród Éireann Passenger Journey (million)



The National Transport Authority co-ordinates an annual 'Canal Cordon Count' to collate information on the movement of people entering Dublin City Centre in the morning peak (0700 to 1000). When this data is linked with the census data from all public transport operators (Iarnród Éireann, Dublin Bus, Luas, etc) a good picture is gained on the transport mode share during a regular morning commute period. Table 2.2 shows the mode share of journeys from 2006 to 2017 (Source: National Rail Census 2017).

Figure 2.2: Mode Share of Journeys into the City Centre 2006-2017



The mode share of heavy rail has varied, from a maximum of 18% in 2007 (mirroring the peak shown in IÉ's annual passenger journey data, Table 2.1) before falling back to 13% in 2010-2013. The mode share of heavy rail has increased to 16% in 2017.

Iarnród Éireann carried in 2016 31,309 and in 2017 34,409 passengers into the city centre during the morning peak (07:00-10:00 hrs). The increase in passengers carried from 2016 to 2017 of 3,100 represents a 10% increase in the number of people travelling on heavy rail services. It should be noted that the morning peak for rail is when road congestion levels are also at peak.

The rail census also provides very good information on rail according to Iarnród Éireann train service categories. This demonstrates a very strong demand for DART and Commuter services. The rail usage per rail service categories is shown on Figure 2.3.

Figure 2.3: Rail Usage per service category, 2017

	GDA	% Change on Previous Year
DART	74,665	11%
Commuter	67,850	17%
Inter City	17,718	19%
Waterford & Regional services	7,634	12%
Total	**167,867**	**14%**

The census data was further interrogated to access inbound passenger flows into the city centre during the morning peak hour for rail services (i.e. arrival at city centre within the period 0730-0830). This analysis is an amalgam of outer commuter and inner commuter services serving stations within the boundary of DART Expansion (i.e. all within the rail envelope from Drogheda, Maynooth, Hazelhatch and Greystones). The analysis is summarised as follows:

- 432 inbound passengers were delivered to city centre from the Kildare Line (i.e. boarded trains between Hazelhatch and Park West, boarding at 4 stations along route section). The trains were 65% occupied prior to Hazelhatch and 80% occupied entering the city centre (on 9 train services).

- 3,491 inbound passengers were delivered to city centre from the Maynooth Line (i.e. boarded train between Maynooth and Broombridge, boarding at 12 stations along route section). The trains were 9% occupied prior to Maynooth and 92% occupied entering the city centre (on 7 train services).

- 7,756 inbound passengers were delivered to city centre from the Northern Line (i.e. boarded train between Drogheda and Clontarf, boarding at 19 stations along route section). The trains were 2% occupied prior to Drogheda and 87% occupied entering the city centre (on 12 train services).

- 3,903 inbound passengers were delivered to city centre from the Southeast Line (i.e. boarded trains between Greystones and Lansdowne Road, boarding at 15 stations along the route section). The trains were 2% occupied prior to Greystones and 67% occupied entering the city centre (on 8 train services).

Iarnród Éireann's network (infrastructure capacity and rolling stock availability) is now reaching its limits. Without intervention, further expansion of heavy rail as a sustainable mode of transport during the peak requirement hours will be constrained. Therefore, Iarnród Éireann is now seeking to advance DART Expansion to release capacity enhancements in the city centre and along inner commuter radial lines. This will have beneficial impacts on inner commuter services and increase capacity across the network.

3 DART Expansion and National Development Plan 2018-2027

The origins of DART Expansion date back to the 1970's. Phase 1 of the heavy rail upgrade and electrification programme was delivered in 1984 with the opening of the original DART line from Howth to Bray. Further upgrade and expansion of the heavy rail network was deferred in the 1980's due to decreasing investment due to economic conditions.

The publication of the draft Transport Policy Document 'A Platform for Change' in 2001 (Dublin Transportation Office, 2001), reinvigorated investment focus in heavy rail and formalised the benefit of using heavy rail as the spine of an integrated public transport scheme. Since 2001, Iarnród Éireann has progressed railway improvement projects in accordance with the objectives of DART Expansion as funding permitted.

DART Expansion is a programme of constituent heavy rail improvements along the existing heavy railway corridors, with focused new infrastructure where necessary, to provide a core, high capacity transit system into and out of Dublin City Centre from the outer Regions.

The outer geographical extent of infrastructure improvements currently considered under the DART Expansion programme extends to:

- Maynooth / M3 Parkway on the Sligo Line;
- Hazelhatch/Celbridge on the Cork Line;
- Drogheda on the Northern Line; and
- Greystones on the Southeast Line.

The scheme enables delivery of phased increases in network capacity on all lines into and out of Dublin in the short to long term and will benefit commuter and Intercity passengers.

DART Expansion will act as the spine of an integrated public transport network, which will efficiently interface with other public transport modes, including Metrolink, Luas, BusConnects and Dublin Bus, for onward journeys through the Metropolitan area.

This system will provide an attractive and sustainable public transport alternative to private car transport mode and allow for future network capacity growth commensurate with passenger demand. This is focused on reducing road congestion and contributing to the national aspiration of transitioning to a low carbon society, in line with the National Mitigation Plan objectives.

Prior to 2015, Iarnród Éireann was prioritising delivery, as early as possible, of the DART Underground tunnel link beneath the city centre. The objective of this prioritisation was to provide a grade separation on railway lines in the city centre and to eliminate rail capacity restrictions.

The economic case for DART Expansion with a DART Underground tunnel elements has been established and it remains an objective of Iarnród Éireann to deliver to meet long term passenger needs. However, due to the high capital cost of DART Underground it is not viable to proceed at present. Therefore, Iarnród Éireann and the National Transport Authority are progressing DART Expansion on a phased basis to incrementally increase capacity in the city centre and along the existing radial railway corridors to meet short to medium term passenger requirements.

The National Development Plan 2018-2027 (NDP) was published in February 2018 and outlines the Government's plan for sustainable development over a 10 year horizon. The NDP includes a €2 billion investment budget to deliver priority elements of the DART Expansion Programme.

The funding investment provided under the NDP will allow Iarnród Éireann to deliver priority elements of DART Expansion Programme. Priority delivery elements include:

1) Procure additional rolling stock;

2) Provide maintenance depot and network stabling for expanded rolling stock;

3) Carry out the city centre enhancement works between Glasnevin Junction and Connolly / Docklands, including electrify both the GSWR line and MGWR line;

4) Re-signal, remove level crossings and electrify the Sligo line from Maynooth to link with city centre enhancement works;

5) Complete 4-tracking from Park West to Heuston, re-signal and electrify the Cork Mainline from Hazelhatch to Heuston and via Phoenix Park Tunnel branch line;

6) Re-signal and extend electrification of the Northern (Belfast) line from Malahide to Drogheda; and

7) Provide a higher capacity turnback at Dun Laoghaire or Bray.

8) Facilitate the construction of new passenger stations within the terrain of DART Expansion and improve interchange potential with bus, Luas and Metro, in accordance with the NTA's public transport network.

9) The DART Underground will not be delivered in the short to medium term funding provided in the NDP. However, the NDP will provide funding to conduct the necessary study to establish and protect the route of DART Underground, thereby securing its viability for its future delivery.

The delivery programme for DART Expansion is phased to deliver short and medium term capacity improvements whilst ensuring that the construction works minimise disruption of passenger services. The delivery programme is cognisant of the recent improvement projects undertaken on the network over the past decades and the remaining capacity constraints on the network.

In terms of infrastructure delivery the phased DART Expansion implementation programme is as follows:

1) City Centre Enhancements;

2) Maynooth Line;

3) Kildare Line;

4) Northern and Southeastern Line.

The delivery programme is not fully consecutive. There is a time lag between project elements to ensure management of the delivery programme is optimised.

The priority for delivery of the city centre enhancements is self-evident. Unless more trains can be accommodated for through running or turn-back there is no point in increasing capacity on the remainder of the network.

The next priority ranking is improvement of the Maynooth Line. This line is currently operating at peak train path capacity. The presence of level crossings on this line introduces a limiting factor and constraints. The presence of level crossings mean that rail capacity is constrained so that the level crossings can be opened for road traffic movements. The level crossings are located at Ashtown, Coolmine, Porterstown, Clonsilla, Blakestown and Barberstown, some of which are busy urban roads. If the level crossings were removed and the line re-signalled the train path capacity of the line could be significantly improved. The current level of rail usage on the Maynooth Line is very strong and peak hour train occupancy is high. Land development between the city centre and Maynooth is generally mature and there is a latent population demand that could be encouraged to switch to public transport by rail for commuter journeys if train path capacity was increased.

Therefore, Iarnród Éireann proposes to advance the City Centre Enhancements and the Maynooth Line as the first major DART Expansion contract element.

The improvements on the Kildare Line from Hazelhatch to Heuston will progress, to ensure capacity is increased as land use and demand dictate. At present the Kildare Line is well served, with available capacity in the short term. Completion of the 4 tracking from Park West to Heuston will release significant train path capacity for Inner Commuter (Heuston to Hazelhatch), Outer Commuter (Hazelhatch to Portlaoise) and Intercity traffic. Inner commuter land development is considered immature on this line. Adamstown is currently being developed and the Clonburris lands are currently seeking statutory approval. The delivery of the Kildare Line improvements will be programmed to ensure increased capacity can be delivered as the inner commuter population increases.

The northern line and southeast line already have the highest capacity on the network. Therefore, the short term will focus on removing the infrastructural capacity constraints on the other lines. However, IE will seek to increases passenger capacity on the northern and southeast lines through deployment of higher capacity trainsets.

4 Key Depot Requirements

Periodic and efficient maintenance of rolling stock is critical to Iarnród Éireann's objective of providing a high quality and high capacity service under the DART Expansion Programme. Efficient call-in and dispatch of rolling stock for periodic maintenance, without significant interference with operational passenger train services, is a fundamental requirement to maintain passenger services, maximise timetable reliability and enable track access for infrastructure maintenance activities.

As part of DART Expansion, Iarnród Éireann will pursue a single "Centre of Excellence" maintenance depot for the Electric Multiple Unit (EMU) DART fleet. A single depot is considered appropriate given the scale of the rolling stock needed for DART Expansion and also to maximise the scale of efficiency a single maintenance depot will provide over a significant lifecycle.

The rationale for promoting a single "Centre of Excellence" Maintenance depot is based on the rationale that multiple (2 or more) small depots are less operationally and economically effective. Multiple depots would unnecessarily duplicate plant & equipment and management functions, dilute maintenance expertise, require higher stocking levels and increase overall costs.

The new maintenance depot will serve to examine, maintain and overhaul the EMU rolling stock at the necessary intervals recommended by the supplier and in accordance with Iarnród Éireann safety requirements.

The maintenance depot will be required to accommodate 240 EMU DART carriages at any given time and provide all maintenance functions to maintain a fleet of up to 600 EMU DART carriages.

A maintenance depot provides broad levels of intervention, based on the current DART fleet the requirements are:

i. Servicing, which includes
    - scanning, analysis & telemetric reporting;
    - train washing;
    - replenishment of consumables (water, sand, etc)

- internal cleaning.

Servicing checks are envisaged every 48 hours at the depot and will keep an EMU out of revenue service for approximately 2 hours. Cleaning of units is carried out nightly.

ii. Running maintenance, which includes

- vehicle inspection and testing;
- replacement of consumable items (lighting tubes, brake pads etc); and
- minor & short duration mechanical servicing and lubricant top-ups.

Running maintenance works are envisaged every 30 days and on average will keep an EMU out of revenue service for approximately 6 hours

iii. Heavy maintenance, which includes

- mechanical and electrical repairs;
- major overhaul works; and
- crash repairs.

Heavy maintenance works are carried out over 2, 4, 8 and 16 year intervals and can vary between 2 days and 2 weeks in duration.

iv. Wheel turning on the wheel lathe

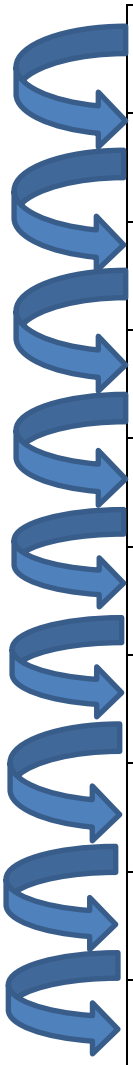
This can take approximately 10 hours per car. This occurs every 2 years on the current fleet but can vary due to many factors.

v. Unplanned maintenance, which can include

- replacement of failed components;
- fault finding;
- crash repairs;
- unplanned wheel turning due to component failure or degraded track conditions; and
- cleaning/repair following obstacle/animal strikes.

It should be noted that these maintenance requirements can vary depending on the requirements of the vehicle manufacturer and will be refined during the fleet procurement process.

The general process flow for the maintenance depot is as follows:



Step 1	Intake of DART Train from Operational Line to Depot Reception Line
Step 2	Train is parked at the handover point and handed over from depot control to operational control
Step 3	Train moves through Automated Vehicle Inspection diagnostic checks and train wash
Step 4	Train moves to sheltered service slab for toilet emptying, sand box refilling, cleaning, refilling wiper reservoir
Step 5	Train moves to cleaning slab for internal cleaning
Step 6a	Train moves to service shed for running maintenance, heavy maintenance or unplanned maintenance
Step 6b	Train moves to wheel lathe
Step 7	Train moves to stabling road
Step 8	Train is parked at the handover point and handed over from depot control to operational control.
Step 9	Return of DART train to operational service

The Centre of Excellence approach being pursued by Iarnród Éireann is to ensure the functionality of the DART Expansion Maintenance Depot is optimised from a functionality perspective. The layout and activities of the depot need to maximise the safety/productivity of the depot processes/activities and minimise the timescale for rolling stock being out of service. Pending a detailed study of depot size, off-site stabling requirements and depot design, the following are the general requirements for the proposed depot:

- Vehicles will be between 160m and 168m in length made up of 8-car units or two 4-car units

- Reception road with AVI facility and train wash (including a road for bypass of AVI and train wash)
- Primary and secondary rail access for egress to and from both ends of the depot
- Minimum 3 road train reception area (with raised platforms) for handover of vehicles entering and leaving the depot
- Minimum 3 covered servicing slabs of a minimum of 170m to facilitate sanding, toilet discharge, fluid top ups
- Maintenance Building with two Heavy Maintenance Roads, four Running Maintenance/Unplanned Maintenance Roads. Each road must support at least an 8-car unit.
- Underframe wash road shed separate from main building
- Stabling for 240 vehicles
- Wheel lathe with a through road that can accommodate at least two 8-car units
- Material stores
- Capital spare and bogie storage area
- Bogie delivery area
- Office accommodation
- Meeting rooms and training facilities
- Maintenance workshops
- Staff car parking
- HGV access, loading area and turn around area
- Drivers accommodation
- Electrical substation
- Depot signalling and signal control accommodation

5 General Locational Requirements for Maintenance Depot

There is currently no Irish Guidance documents to inform on the siting of railway maintenance depots. However, the Railway Safety and Standards Board (RSSB) has recently published a "Guidance Note for the Development and Design Considerations for Passenger Rolling Stock Depots" (RSSB Guidance Note GIGN7621, September 2018). This guidance document includes some general considerations to be considered in choosing the strategic position for a Maintenance Depot. The considerations from the guidance note are summarised as follows:

- The position of the new depot should be on a site adjacent to the operational railway line and should feed into the network and/or terminal stations where the rolling stock starts/ends its service.
- The stabling requirements of the system should be considered separately from the maintenance requirements of a depot.
- Primary and secondary routing into the Maintenance Depot is recommended to ensure resilience of the system to operate in the event of emergency or planned maintenance.
- The security and reliability of utility supply to the Maintenance Depot shall ensure that there is a low risk of outages that would render the Maintenance Depot out of service (access/egress by road and rail, power, water, etc).
- The general security and resilience of the depot to unauthorised access shall be assessed.
- The location of the depot should consider the efficiency of the overall system to facilitate trains to be slotted into and out of the Working Timetable and to minimise "Empty Train Movements".
- Land availability and land development policies close to the railway corridor should be considered.
- The growth of the railway system will result in minimal spare capacity being available for empty train movements and will also increase the requirement for a

sufficiently sized maintenance depot. The overall maximum capacity of the system and the envisaged life-time maintenance requirements of the fleet should be used to guide the site requirements for the Maintenance Depot.

- The general environmental setting of the land outside the railway corridor should be considered, to ensure an efficient and streamlined process flow can be maintained.
- The servicing of a Maintenance Depot will require additional road traffic, including access/egress of Heavy Goods Vehicles. This availability and adequacy of the road network should be considered at an early juncture.
- The ideal is rarely achievable and therefore a justifiable compromise will need to be made.

In terms of depot scale, sites will be assessed with certain minimum thresholds. These thresholds are:

- Minimum site area – 20 hectares; and
- Minimum linear length off / parallel to operational line – 1.8km.

In addition to the RSSB guidance, Iarnród Éireann is progressing DART Expansion in accordance with National, Regional and Local Transportation Policy and Land Use Development Policy. In this regard the Maintenance Depot Study needs to take account of National Development Plan (2018-2027), the Transport Strategy for the Greater Dublin Area (2016-2035) and Local Development Plan at City/County Council level.

6 Strategic Location Nodes

From a strategic perspective, Iarnród Éireann has reviewed the extent of DART Expansion and the network operations. This resulted in identification of a number of Iarnród Éireann operational railway yards and other strategic nodes along the DART Expansion network.

The operational railway yards and strategic nodes are located at:

1) Fairview Depot & immediate environs;
2) Connolly Station & immediate environs;
3) Heuston Station & immediate environs;
4) Pearse Station & immediate environs;
5) North Wall Railway Yard & immediate environs;
6) East Wall Railway Yard & immediate environs;
7) Inchicore Railway Works & immediate environs;
8) Drogheda Station/Depot & immediate environs;
9) Maynooth Station & immediate environs;
10) M3 Parkway Station & immediate environs;
11) Hazelhatch Station & immediate environs;
12) Greystones Station & immediate environs; and
13) Bray Station & immediate environs.

All the sites were subject to the assessment to determine the Emerging Preferred Location for the DART Expansion Maintenance Depot.

7 Assessment Criteria

7.1 Pre-Appraisal Criteria

Each of the strategic locations was subject to a preliminary pre-appraisal using the minimum functional site thresholds and satisfying a number of high level principles, as follows:

A. Site area equal to or greater than 20 hectares;

B. Linear site length off / parallel to operational land of equal to or greater than 1.8km. This threshold is based on the following depot process flow:

- 250m from operational line to end of reception road;
- 350m from reception road to end of Automatic Vehicle Inspection (AVI) / train wash road;
- 200m depot handover point;
- 200m service slab;
- 200m cleaning slab/stabling
- 200m maintenance roads;
- 400m end of depot stabling /backend shunting.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

7.2 Assessment Criteria

Following the pre-appraisal, a consistent set of assessment criteria was used in the formal appraisal.

While this study is focussed specifically on location assessment the criteria in the main align with applicable topics that should be considered under a qualitative appraisal as identified in the Common Appraisal Framework for Transport Projects and Programmes (DTT&S, 2016).

In this regard the following criteria was considered:

- Economy
    - Capital Cost: The indicative scheme infrastructure requirements for the maintenance depot has been considered. There are additions/deductions from the scheme requirements based on the depots site specific location. Land acquisition costs have not been taken into account at this early stage. Therefore, as there are no differentiating capital cost factors between sites, it is not considered as an assessment criteria in choosing a preferred depot location.
    - Operating Cost: The position of the maintenance depot on the network does have an impact on on-going operating costs, in terms of empty running of trains at start and end of service. The depot position also impacts on track access maintenance time, which also impacts on on-going operating costs.
- Demand

The position of the maintenance depot will not impact on train service capacity and/or passenger demand. The Working Timetable will take account of start of service/end of service passenger requirements and will appropriately manage and regulate the logistics of getting the rolling stock into position. Therefore, it is not considered as an assessment criteria in choosing a preferred depot location.

- Integration
    - Land-Use Integration: The position depot must be adjacent to the existing network. National, regional and local policy and objectives are to ensure higher density development is concentrated at appropriate locations along the rail network to promote public transport in factor of private car journeys. Therefore, the depot study does consider land-use integration as an assessment criteria. The depot study seeks to ensure each location is assessed to ensure a potential site does not adversely impact a future land-use development aspiration. The siting of the depot will not, in itself, impact on land-use integration.
    - Public Transport Integration: The position of the maintenance depot will not impact on public transport integration. The Working Timetable, together with integration with other public transport operators, will take passenger requirements and public transport integration. Therefore, it is not considered as an assessment criteria in choosing a preferred depot location.
    - Walking/Cycling/Private Car Journey Integration: The position of the maintenance depot will not impact on walking/cycling/private car journey integration. Therefore, it is not considered as an assessment criteria in choosing a preferred depot location.
    - Impact on the Road Network: The position of the maintenance depot relative to the public road network is a factor in the assessment. Material imports/exports during construction and operation are a factor in delivering a functioning depot. Therefore, road access in considered as an assessment criteria in choosing the preferred depot location.
- Environment: The availability of suitable land and the effects on the neighbouring environment are factors to be considered in the assessment of the depot and are differentiators between potential sites. Therefore, these are considered as assessment criteria in choosing the preferred depot location.

- Accessibility and Social Inclusion: The broad meaning of "Accessibility and Social Inclusion" in the Common Appraisal Framework Guidance is to maximise access to jobs for deprived geographic areas. The position of the rail depot will not impact on the rail services offered by Iarnród Éireann and therefore, on taking the broad meaning, the depot will not affect passenger options for access jobs. On a localised level and regardless of site specific location, the maintenance depot will be design to ensure it is un-assisted accessible for mobility and sensory impaired persons. Therefore, accessibility and social inclusion is not considered as an assessment criteria in choosing the preferred depot location.

- Safety: The position on the rail depot will not impact on rail safety or depot safety. All necessary safety measures and risk minimisation measures will be incorporated into the depot design, irrespective of location. Therefore, safety is not considered as an assessment criteria in choosing the preferred depot location.

- Physical Activity: The position on the rail depot will not impact on physical activity and this criteria is not a differentiator between potential depot sites. Therefore, physical activity is not considered as an assessment criteria in choosing the preferred depot location.

The criteria used is detailed below and is the outcome of a workshop held with key internal stakeholders. They are not listed in any order of priority.

Each of the selected sites is assessed under the following criteria:

1. Minimised empty running for daily service commencement / ending of service (cost implication);

2. Maximise track access time for maintenance (rail safety / public service obligation);

3. Complexity of access and egress to / from depot (public service obligation / train planning logistics);

4. Availability of suitable lands (construction deliverability);

5. Consideration of neighbouring environment (construction deliverability);
6. Road vehicle routing for access to site (construction deliverability);
7. Compliance with transportation and land-use policy (Compliance with policy); and
8. Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding).

The options were compared against how well they delivered on the criteria description, using a five-point scale. This scale ranges from Significant Advantageous to Significant Disadvantageous.

The appraisal system is shown below.

Score	Description
Most preferable	Significant advantages over other options
Preferable	Some advantages over other options
Neutral	Comparable to other options
Not Preferable	Some disadvantages to other options
Least Preferable	Significant disadvantages to other options

For each of the criterion, the options are compared against how well they deliver on the criteria using a five-point scale. The score for each criteria is based on a qualitative justification. These justifications are determined in a collaborative technical assessment across the Project Team. Following the appraisal of each option the overall scores are determined and an Emerging Preferred Option identified.

8 Preliminary Pre-Appraisal

8.1 Fairview Depot

Fairview Depot is located on the Northern (Belfast) Line immediately adjacent to Clontarf DART Station. Fairview Depot is currently utilised to maintain and stable the existing 144 No. DART fleet. The site is bound by Fairview Park to the north and west and by Alfie Byrne Road, the Dublin Port Tunnel portal and playing pitches to the south and east.

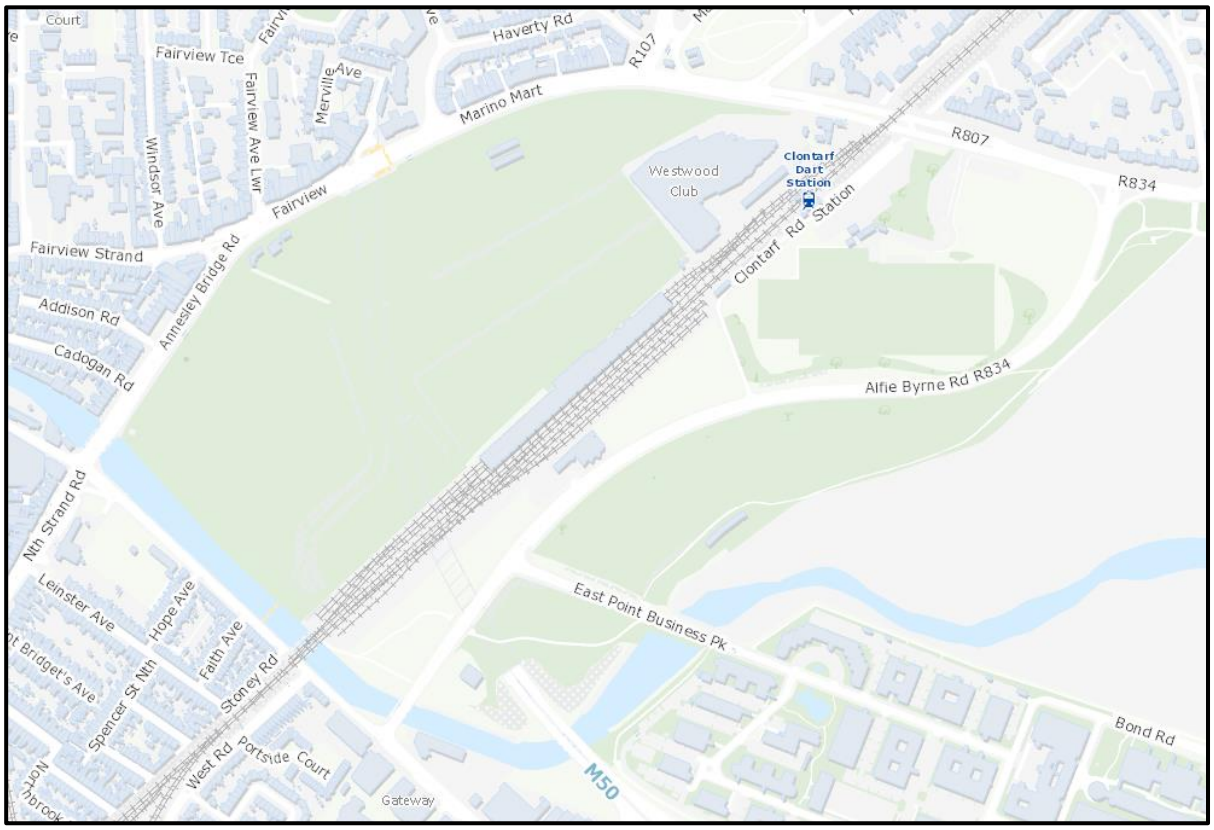


Figure 8.1: Location of Fairview Depot

A. Is the site equal or greater than 20 hectares?

Fairview Park and the adjacent Westwood Club, to the north of Northern Line, comprises an area greater of approximately 22 hectares.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum linear length of approximately 800-850m off the operational railway line.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

The minimum linear threshold of 1,800m has not been achieved.

Fairview Park is a city amenity park owned by Dublin City Council. The lands are reclaimed and infilled tidal mudflats. The parklands are noted to be of high amenity value to Dublin City Council, is highly valued by local residents and it used as feeding grounds by birds from the Natura 2000 protected sites in Dublin Bay.

The existing DART fleet is maintained and predominantly stabled at Fairview Depot. The current deport is approaching maximum capacity for the existing DART Fleet (i.e. 144 DART Units). There is no spare capacity within existing Iarnród Éireann lands to expand the depot to cater for a 600 unit DART fleet.

The potential expansion of a heavy rail maintenance depot into a city centre amenity parkland is not considered practicable. Permission to impose heavy industrial activities in place of city centre high value amenity is a high risk proposition.

Therefore, it is not considered practical to develop a maintenance depot at the existing Fairview Depot.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

The greenbelt lands to the south of the railway are the River Tolka floodplains. It is not considered viable to construct a critically important rail maintenance depot within a high risk floodplain.

Continuity of DART maintenance at Fairview Depot is critical to until the new DART Expansion Centre of Excellence Maintenance Depot is delivered. Increasing DART capacity cannot be realised until the new depot is delivered.

The construction of a Maintenance Depot in the environs of the existing depot would pose risks to the existing depot and may result in delays in delivering the new depot.

Therefore, it is not considered practical to develop a maintenance depot in the wider environs of Fairview Depot

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The greenbelts north and south of Fairview Depot are of high amenity value in a high urban density environment. There are also ecological issues associated with the site. The occurrence of Dublin Port Tunnel beneath the site would also lead to technical complications in the construction and operation of the site.

Conclusion: Consideration of Fairview Depot as a strategic location for a Maintenance Depot is discontinued.

8.2 Connolly Station

Connolly Station is situated in Dublin City Centre at the convergence of the Northern (Belfast) Line, the Sligo Line and the Southeast (Rosslare) Line

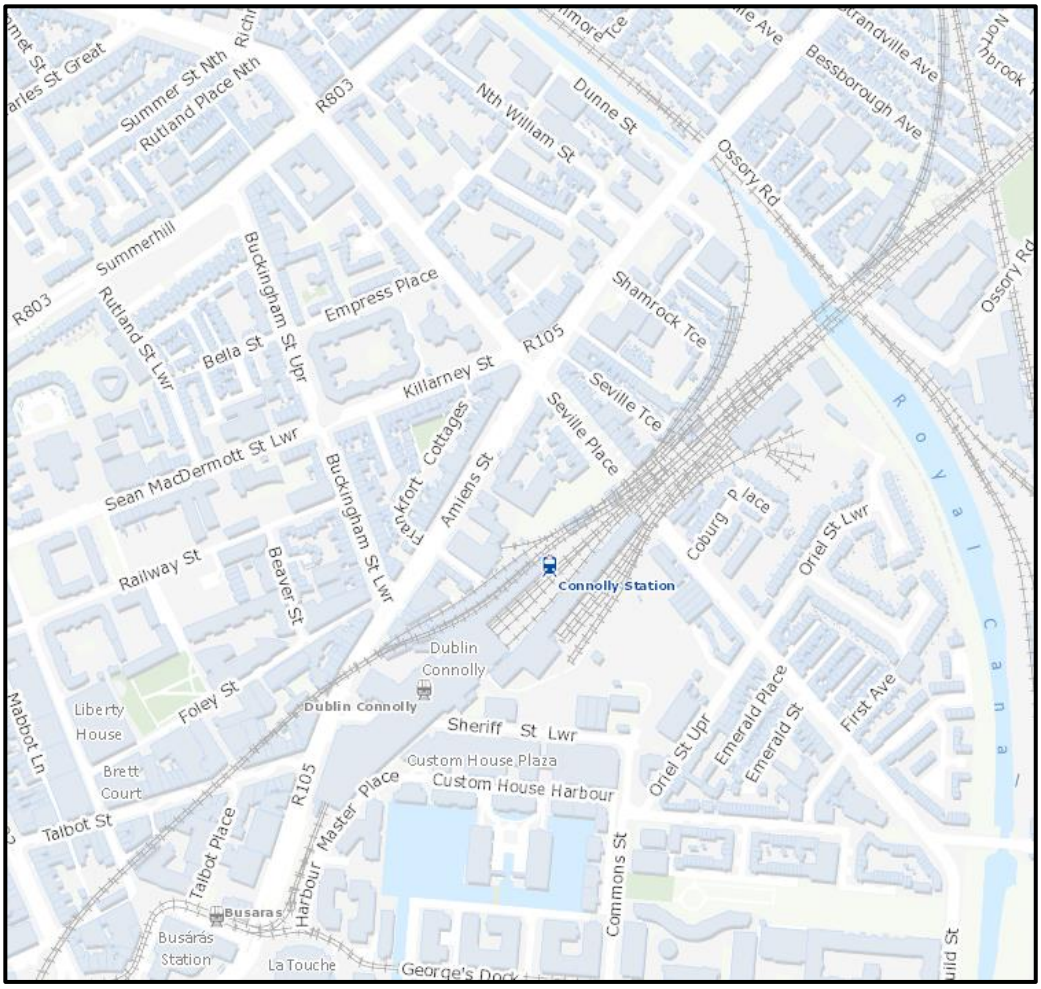


Figure 8.2: Location of Connolly Station

A. Is the site equal or greater than 20 hectares?

The total CIE lands south of the Connolly operational lines comprises approximately 17.5 hectares.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 400-450m linear length off the operational railway line.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

The minimum site area and the minimum linear length thresholds have not been achieved.

Connolly Station is a very busy terminus station, which is already highly congested. The station is used for light maintenance and stabling of Intercity and Outer Commuter rolling stock during night time periods, to facilitate early morning start of service fleet management. The site is surrounded by high density residential and commercial development.

Development of a maintenance depot at this location would likely be disruptive to the operational railway environment and to surrounding residential/commercial neighbours. The acceptability of a new operational railway depot in a dense urban setting is also problematic, given the requirements for night time operations.

Therefore, it is not considered practical to develop a maintenance depot at Connolly Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

The land around Connolly Station is fully developed. Therefore, it is not considered practical to develop a maintenance depot in the wider environs of Connolly Station.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

A maintenance depot at Connolly Station does not meet the minimum threshold criteria and is not considered feasible for development of a maintenance depot.

Conclusion: Consideration of Connolly Station as a strategic location for a Maintenance Depot is discontinued.

8.3 Heuston Station

Heuston Station is the terminus for Intercity and Outer Commuter Services from the West, Southwest and South of the country.

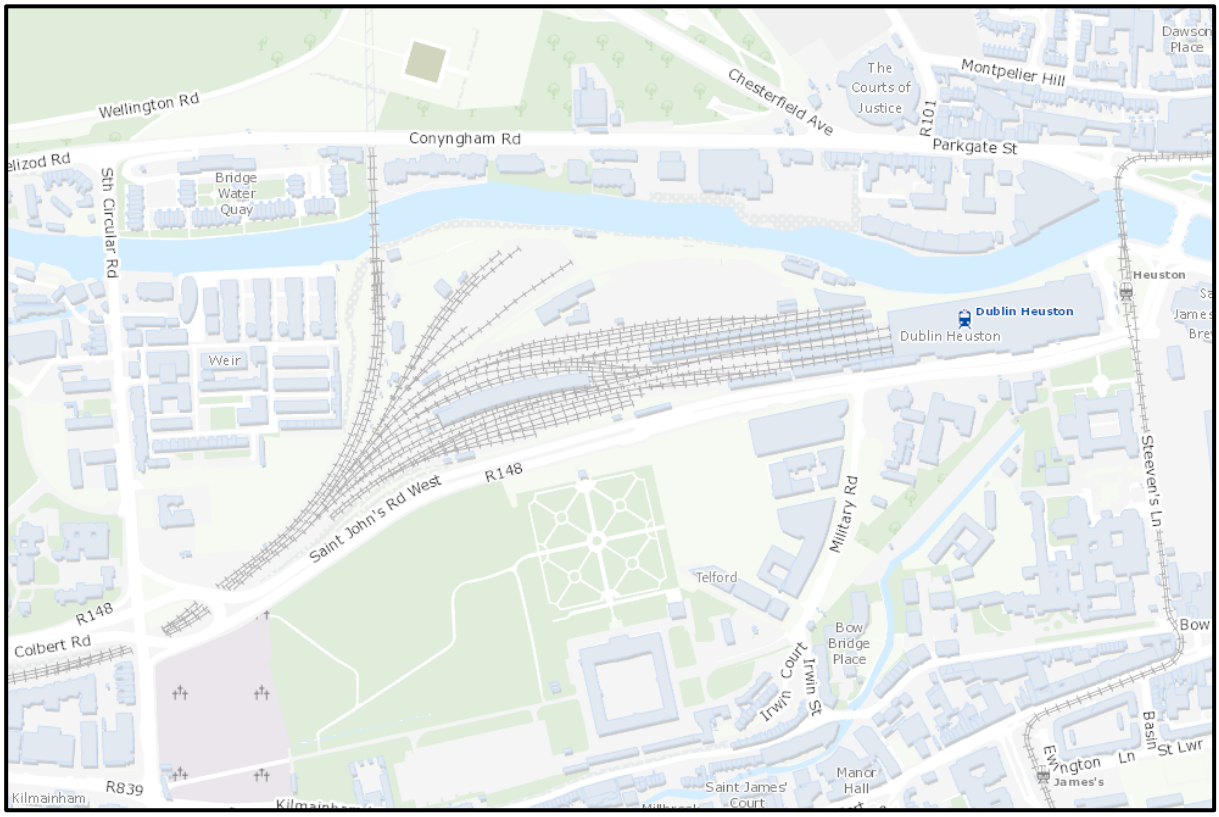


Figure 8.3: Location of Heuston Station

A. Is the site equal or greater than 20 hectares?

The operational railway yard to the year of Heuston Station/Car Park comprises approximately 15 hectares.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 300-350m linear length off the operational railway line

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

Heuston Station is a very busy terminus station, which is already highly congested. The station is already used to stable Intercity and Outer Commuter rolling stock during night time periods, to facilitate early morning start of service fleet management. The site is bound by the River Liffey and riverside residential development to the north and by heritage sites and high density buildings to the south. There is a single entry to the operational railway yard, which is narrow and shared with passenger traffic for the station.

Therefore, it is not considered practical to develop a maintenance depot at Heuston Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

Heuston Station Car Park is immediately north of the station and south of the River Liffey. The throat leading into Heuston Station from the Cork Mainline is highly constrained.

Therefore, it is not considered practical to develop a maintenance depot in the wider environs of Heuston Station.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

A maintenance depot at Heuston Station would result in significant negative impacts/risks on the operational capacity of the existing Heuston Station.

Conclusion: Consideration of Heuston Station as a strategic location for a Maintenance Depot is discontinued.

8.4 Pearse Station

Pearse Station is one of Iarnród Éireann's busiest passenger stations and will continue to function as a significant node on the DART Expansion network.

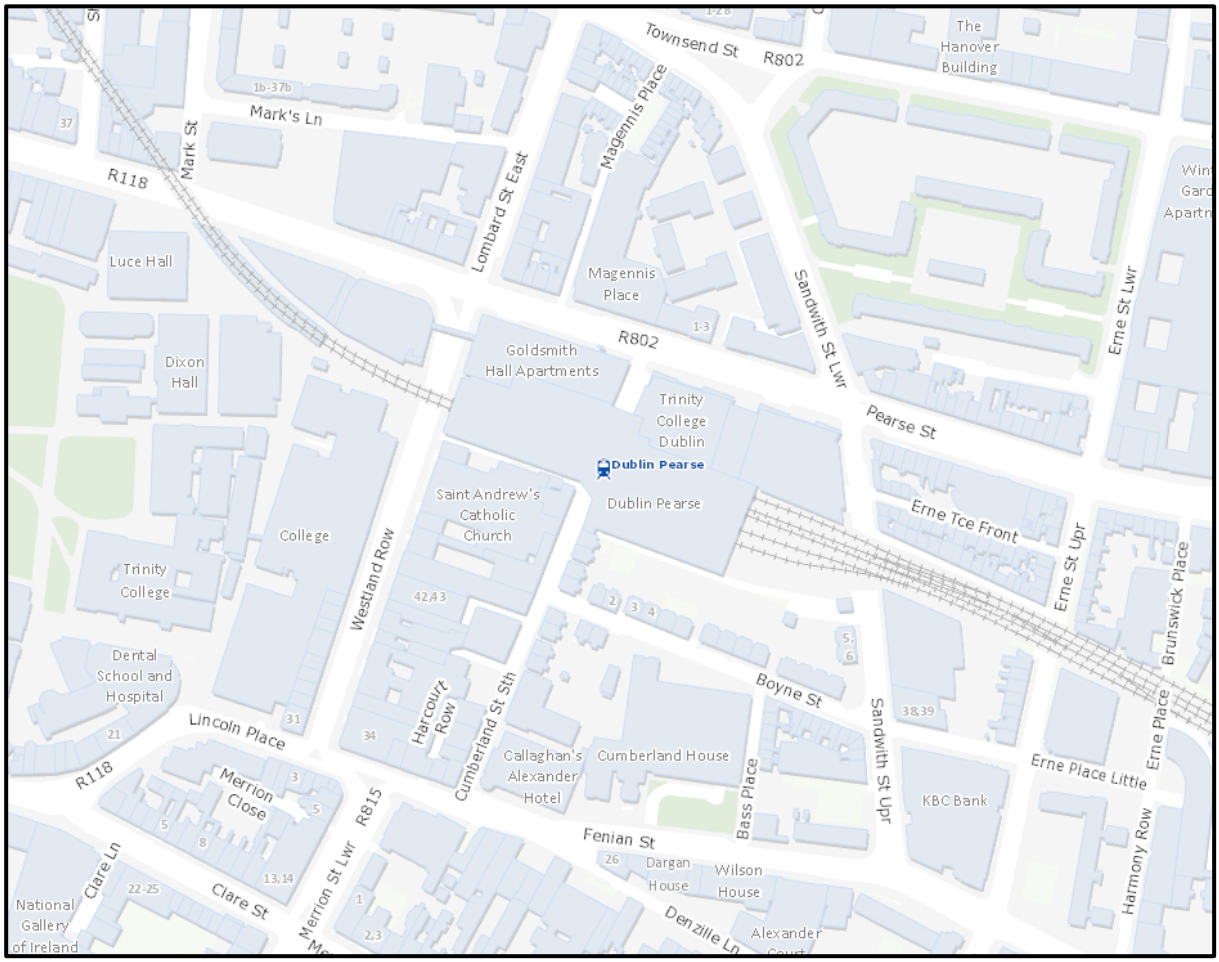


Figure 8.4: Location of Pearse Station

A. Is the site equal or greater than 20 hectares?

There is minimal spare available lands at Pearse Station off the operational railway (i.e. <1 hectare).

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is no linear length of land off / parallel to the operational railway in the environs of Pearse Station.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

Pearse Station is, and will remain, a very important city centre station. It is a through running station and does not have sufficient space to accommodate a maintenance depot.

Therefore, it is not considered practical to develop a maintenance depot at Pearse Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

Pearse Station is elevated above the surrounding street level and is largely fully development. Therefore, it is not considered practical to develop a maintenance depot in the wider environs of Pearse Station.

Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The position and location of the Pearse Station is unsuitable for consideration for development of a maintenance depot.

Conclusion: Consideration of Pearse Station as a strategic location for a Maintenance Depot is discontinued.

8.5 North Wall Railway Yard

North Wall Yard is situated at the end of the Midland and Great Western Railway (MGWR) line. Historically, the railway lines would have continued beneath Sheriff Street Bridge and connect through to North Wall Quay. However, railway lands between North Wall Quay and Sherriff Street are no longer in railway use and are situated within the North Lotts Strategic Development Zone.

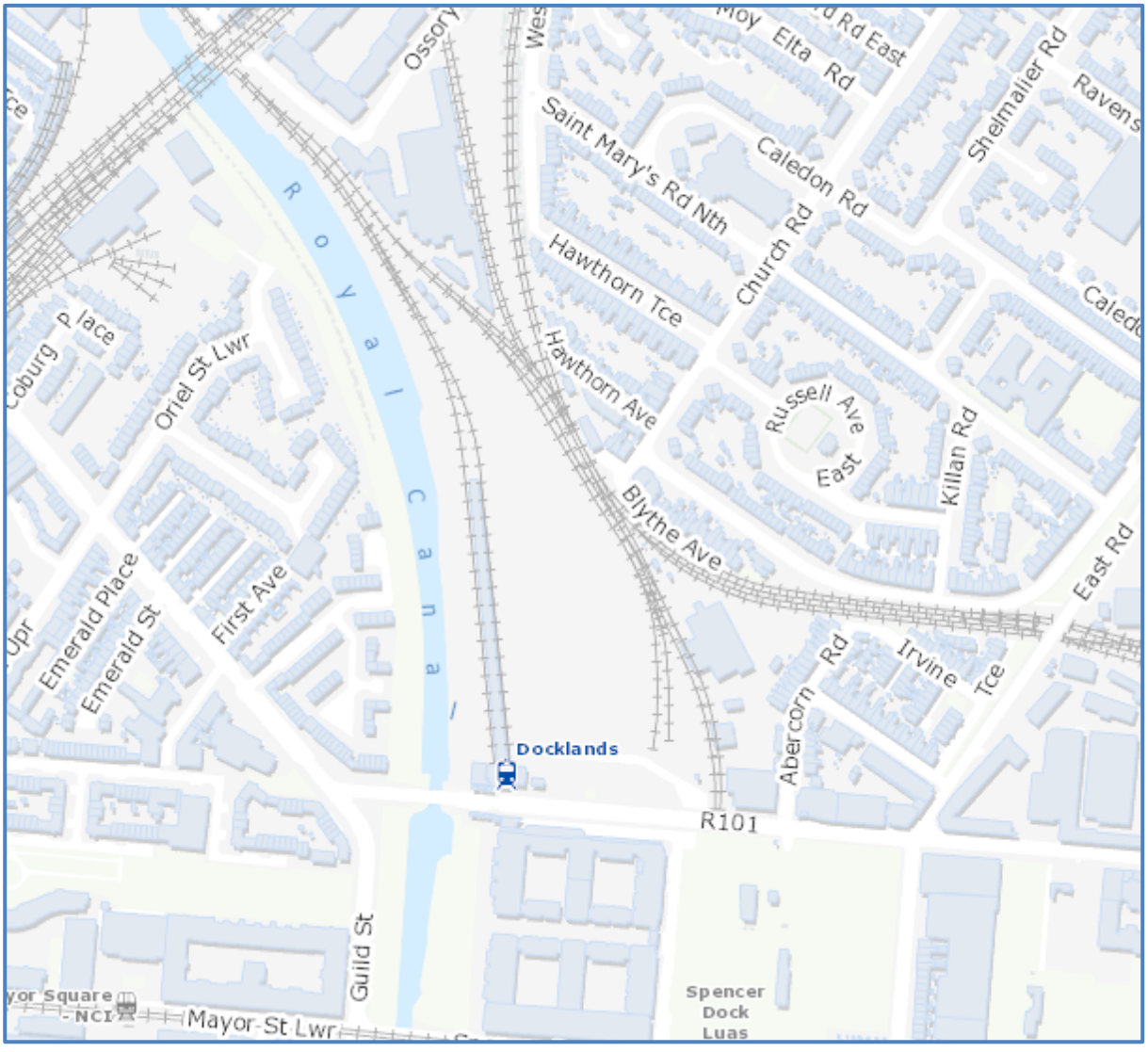


Figure 8.5: Location of Docklands Station

Docklands Station is an operational railway station that currently serves as a destination for rail services from M3 Parkway during the AM and PM peak, due to capacity issues at Connolly. It is envisaged that Docklands will service increased numbers of trains under DART Expansion.

A. Is the site equal or greater than 20 hectares?

The North Wall Railway Yard comprises approximately 4 hectares.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

The North Wall Railway Yard linear length is approximately 350m.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

North Wall is a wedge shaped landbank, currently served by only the MGWR line. A connection to the Greater Southern and Western Railway (GSWR) line could be established, but there is not likely to be sufficient surplus land remaining to accommodate a maintenance depot.

North Wall Yard is also very low lying, approximately 1m OD, which is well below the floor level for developments in North Lotts recommended by Dublin City Council Drainage Dept.

Access and egress of trains to the wider network from a depot at North Wall is considered poor.

Therefore, it is not considered practical to develop a maintenance depot at North Wall Yard.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There are no other suitable lands immediately adjacent to North Wall.

Therefore, it is not considered practical to develop a maintenance depot in the wider environs of North Wall Yard.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The minimum threshold criteria is not met. The site is very low lying, with a history of road flooding in the general environs of North Lotts and East Wall. It is not considered appropriate to locate a strategically important asset in a known natural risk area.

Conclusion: Consideration of North Wall Yard as a strategic location for a Maintenance Depot is discontinued.

8.6 East Wall Railway Yard

East Wall Yard is an existing railway Yard at the extreme east of the railway network, which continues into Dublin Port. The north of East Wall Yard currently accommodates the freight link between Dublin Port and the Iarnród Éireann network.

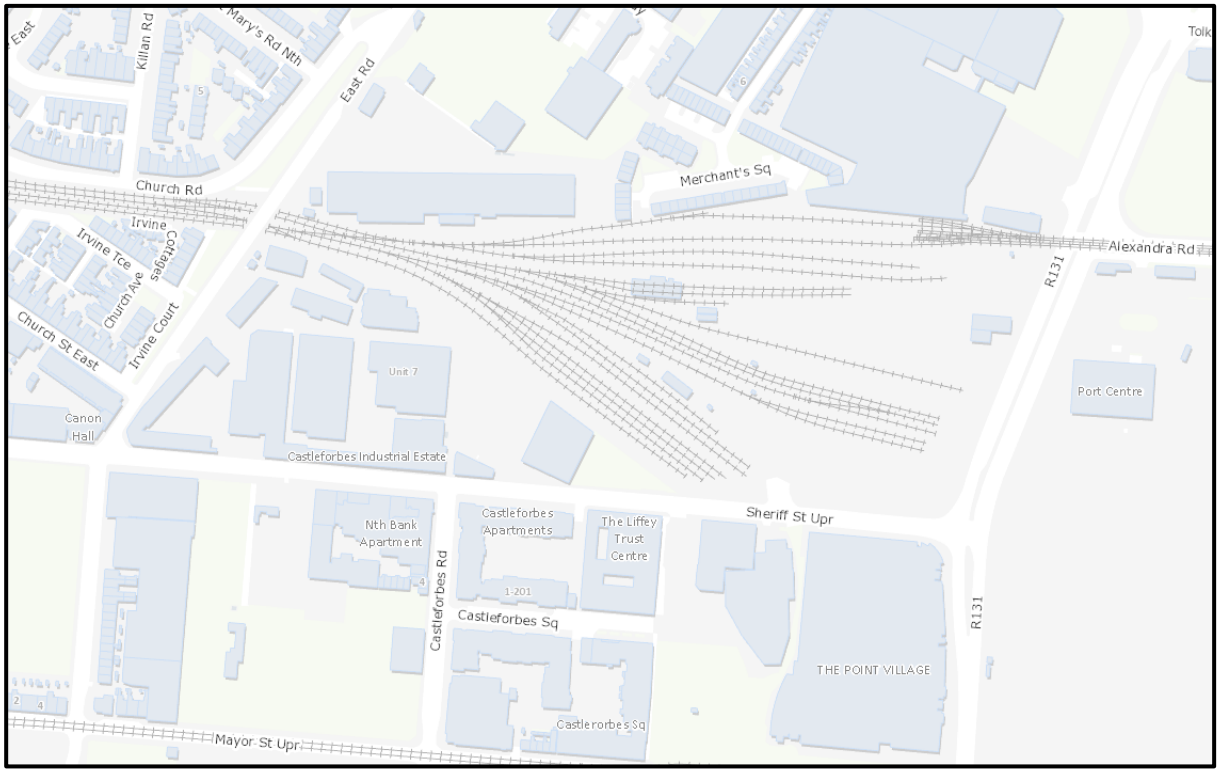


Figure 8.5: Location of East Wall Yard Depot

A. Is the site equal or greater than 20 hectares?

Maintaining freight connection between Dublin Port and the Iarnród Éireann network is a fundamental corporate requirement. Notwithstanding, the total area of East Wall Yard comprises 5.5 hectares, which is well below the minimum site area threshold.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 450m linear length off the operational railway line.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

East Wall Yard is relatively low lying and is accessible only from the GSWR Line and the Northern Line. The site is served by twin track but connects poorly to the remainder of the network. Movements from East Wall Yard would be disruptive to operations.

The yard is immediately north of Sheriff Street and the modern mixed use developments in North Lotts.

Therefore, it is not considered practical to develop a maintenance depot at East Wall Yard.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There is no other lands immediately adjacent to East Wall. Land availability for Dublin Port is currently at a premium.

Therefore, it is not considered practical to develop a maintenance depot in the wider environs of East Wall Yard.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The minimum threshold criteria is not met. The site is very low lying, with a history of road flooding in the general environs of North Lotts and East Wall. It is not considered appropriate to locate a strategically important assets in a known natural risk area.

Conclusion: Consideration of East Wall Yard as a strategic location for a Maintenance Depot is discontinued.

8.7 Inchicore Railway Works

Inchicore Works is located approximately 2km west of Heuston Station. Inchicore Works was originally constructed in the mid-1800s by the Great Southern and Western Railway and has continued in operation up to the present day. The works are currently used as a maintenance depot for rolling stock.

There are turnouts from the Cork Mainline into the works and an extensive network of receiving roads and sidings. However the overall works are a legacy of the historic railway. There are a number of buildings of industrial heritage within the works.

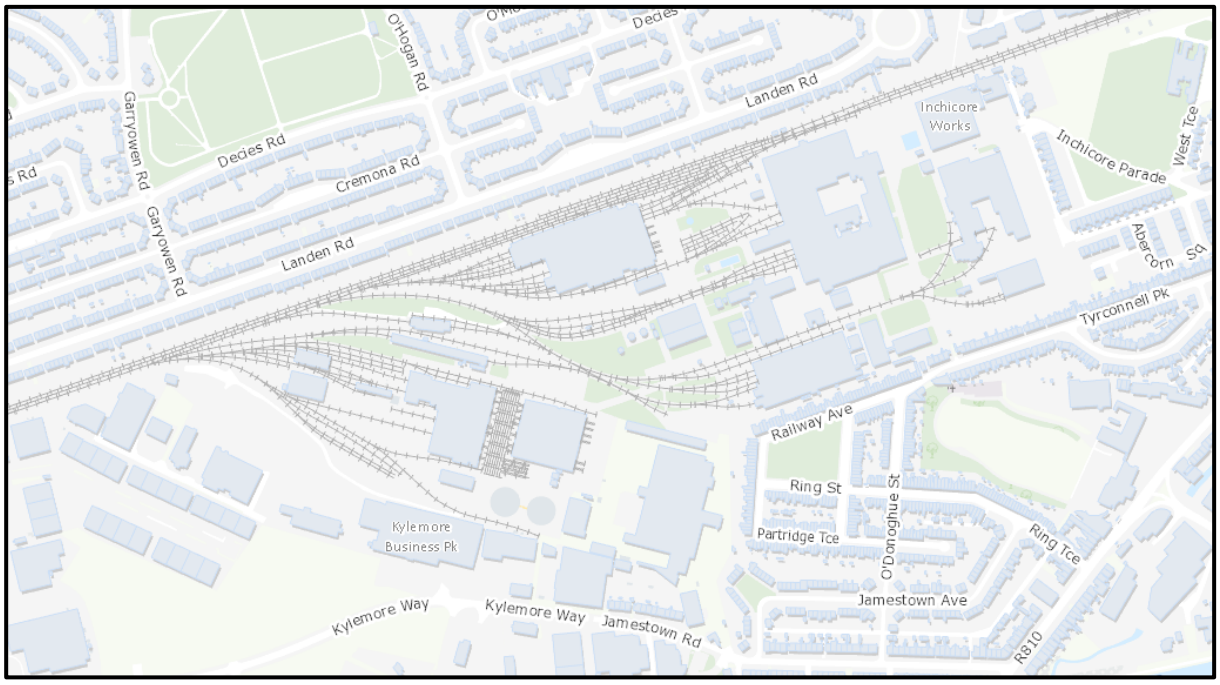


Figure 8.7: Location of Inchicore Works

A. Is the site equal or greater than 20 hectares?

The total area of Inchicore works comprises approximately 28.5 hectares.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 800-850m linear length off the operational railway line.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

The minimum site area threshold is satisfied, however, the minimum linear length threshold is not satisfied.

In order to accommodate a new DART Expansion depot at Inchicore all existing site activities would need to be relocated to alternative sites. Even with an unencumbered site, significant compromises would be required.

Therefore, it is not considered practical to investigate development of a maintenance depot at Inchicore Works.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There is a commercial business park to the south and west of Inchicore Works. There is residential development along the entire northern fringe of the works.

Therefore, it is not considered practical to investigate development of a maintenance depot in the wider area at Inchicore Works.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The minimum threshold criteria is not met. Inchicore Works has been in use for construction and maintenance of rolling stock since the mid-1800's. Therefore, contaminated ground conditions are likely to be encountered during ground excavations.

Conclusion: Consideration of Inchicore Works as a strategic location for a Maintenance Depot is discontinued.

8.8 Drogheda Station / Depot

Drogheda Station/Depot is located on the Northern Line, approximately 50km north of Connolly Station.

Drogheda is the northern boundary of DART Expansion.

Drogheda Depot is currently utilised for the maintenance of diesel trains.

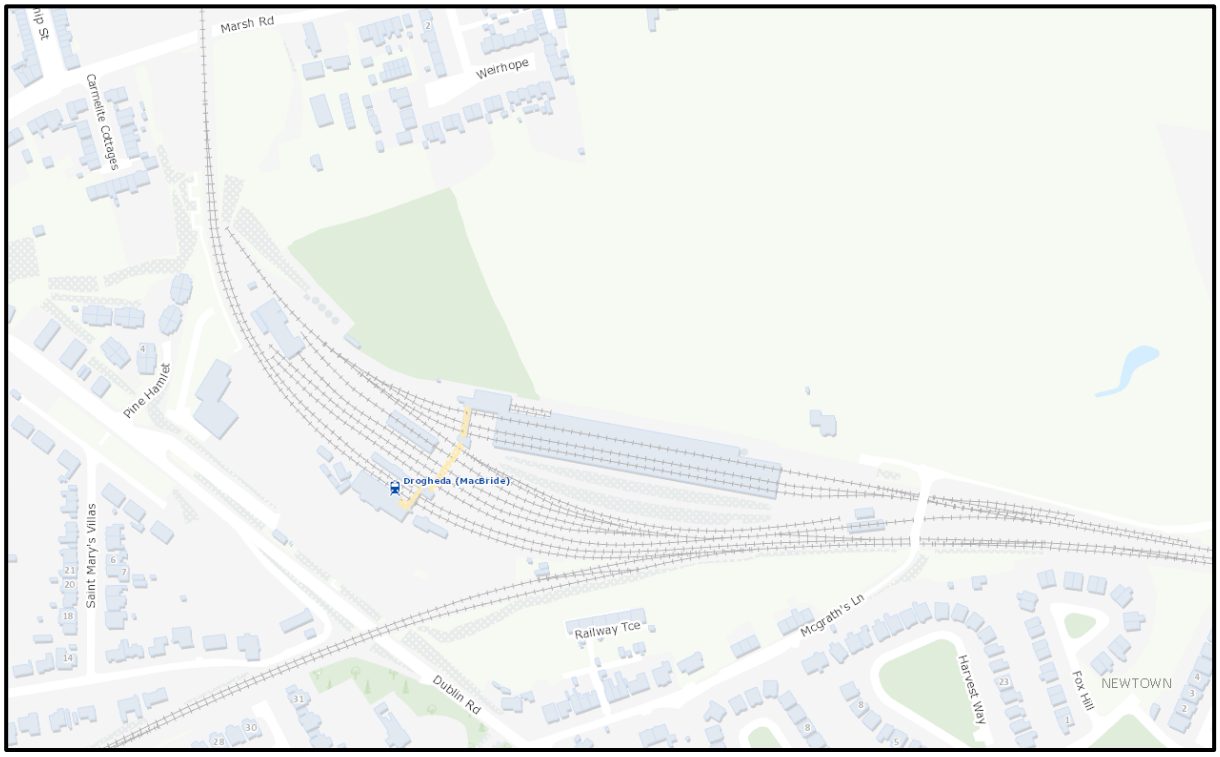


Figure 8.8: Location of Drogheda Station

A. Is the site equal or greater than 20 hectares?

The land available to the north of the existing operational railway and existing maintenance depot comprises 3 hectares.

Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 800m linear length off the operational railway line.

B. Is it practical to develop a Maintenance Depot at the exact strategic node?

Drogheda Station/Depot is constructed on artificially raised lands above the surrounding streetscape. The lands slope steeply off this railway platform.

Drogheda Depot will continue to maintain diesel trains whilst DART Expansion comes into operation. Therefore, it is not feasible to interrupt the current maintenance regime in this area.

Given the challenging topography and on-going maintenance requirements at Drogheda, it is not considered practical to investigate development of an EMU maintenance depot at Drogheda Station/Depot.

C. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There are potential landbanks outside Drogheda urban boundary. Therefore, further assessment of a maintenance depot in the wider area at Drogheda is deemed warranted.

D. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

No fundamental issues identified at the pre-appraisal stage.

Conclusion: Consideration of the wider Drogheda area as a strategic location for a Maintenance Depot is carried forward to full appraisal.

8.9 Maynooth Station

Maynooth Station is located on the Sligo Line, approximately 26km west of Connolly Station.

Maynooth is the western boundary of DART Expansion.

Figure 8.9: Location of Maynooth Station

A. Is the site equal of greater than 20 hectares?

Maynooth Station is a through running station, it is bound immediately to the north by the Royal Canal and to the south by residential development. There is minimal available land for development of a depot at the station location.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of 600m between the Straffon Road and Newtown Road.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

Maynooth Station is situated in the urban town centre and is bound to the north by the Royal Canal and to the south by existing residential development.

It is not considered practical to investigate development of a maintenance depot at Maynooth Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There are potential landbanks outside Maynooth urban boundary. Therefore, further assessment of a maintenance depot in the wider area at Maynooth is deemed warranted.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

No fundamental issues identified at the pre-appraisal stage.

Conclusion: Consideration of the wider Maynooth area as a strategic location for a Maintenance Depot is carried forward to full appraisal.

8.10 M3 Parkway Station

M3 Parkway is a large park and ride site north of Dunboyne, County Meath, approximately 21km west of Connolly.

M3 Parkway is situated at the end of the Phase 1 of the Clonsilla to Navan Line. Phase 2 (M3 Parkway to Navan) is no longer part of the Transport Strategy for the Greater Dublin Area (2016-2035).

M3 Parkway is the western boundary of DART Expansion.

M3 Parkway is located on artificially raised lands, above the River Tolka floodplain. The site is bound to the east by the River Tolka and M3 motorway and to the west by the Park and Ride carpark. The track continues for approximately 400m north of the station.

Figure 8.10: Location of M3 Parkway Station

A. Is the site equal of greater than 20 hectares?

The entire M3 Parkway site comprises 6 hectares in area, which includes the Park and Ride Car Park.

Is there 1,800m linear length directly adjacent to the operational railway line?

There is a maximum of approximately 250m linear length off the operational railway line.

B. Is it practical to develop a Maintenance Depot at the exact strategic node?

M3 Parkway Station was originally designed as an interim terminus until Phase 2 of the railway line was completed (i.e. M3 Park to Navan). The lack of development in the immediate environs of the M3 Parkway is due to its position within the River Tolka floodplain. During the construction of the M3 Parkway station, the entire station carpark was raised above the maximum flood level.

Due to the lack of space and the lack of linear space, the development of a maintenance depot in the immediate environs of the M3 station is not considered practicable.

C. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There are potential landbanks outside the M3 Parkway boundary. Therefore, further assessment of a maintenance depot in the wider area at M3 Parkway area is deemed warranted.

D. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The River Tolka floodplain will provide challenges. No fundamental issues identified at the pre-appraisal stage.

Conclusion: Consideration of the wider M3 Parkway area as a strategic location for a Maintenance Depot is carried forward to full appraisal.

8.11 Hazelhatch Station

Hazelhatch Station is approximately 2km south of Celbridge town centre on the Cork Mainline. Hazelhatch is approximately 16km west of Heuston Terminus and approximately 22km west of Connolly Station.

Hazelhatch is the southwestern boundary of DART Expansion and at the end of the 4-track section of the Cork Mainline.

Hazelhatch is a small urban centre concentrated around the railway station and the Grand Canal.

Figure 8.11: Location of Hazelhatch Station

A. Is the site equal or greater than 20 hectares?

Hazelhatch Station is a through running station with minimal land for depot development within the existing land holding. However, the land immediately south of Hazelhatch Station is set to agricultural use and would be sufficient to accommodate a maintenance depot.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

Agricultural lands continue for approximately 2km south of Hazelhatch Station.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

It is considered practical to investigate development of a maintenance depot immediately south of Hazelhatch Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

Further assessment of a maintenance depot in the wider area of Hazelhatch Station is deemed warranted.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

No fundamental issues identified at the pre-appraisal stage.

Conclusion: Consideration of the wider Hazelhatch area as a strategic location for a Maintenance Depot is carried forward to full appraisal.

8.12 Greystones Station

Greystones Station is located on the Southeast (Rosslare Line) approximately 32km south of Connolly Station.

Greystones is at the end of the existing DART network and at the proposed southeastern boundary of DART Expansion.

Figure 8.12: Location of Drogheda Station

A. Is the site equal or greater than 20 hectares?

Given the geographic setting of Greystones Station, there is minimal land availability for development of a maintenance depot.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

The railway line continues south of Greystones Station along the coastal fringe. There are agricultural lands south of Charlesland Golf Club, but these lands are very exposed.

Give the critical importance of the maintenance depot to continuance of DART Expansion, it is not considered prudent to position the depot in a zone of potential influence from natural coastal risk.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

There is single electrified track from Bray to Greystones (8km). The network hugs the coast and more especially the coastal cliff face of Bray head between Bray and Greystones

Greystones station itself is bound to the east by the coast and inland to the west by the town centre.

It is not considered practical to investigate development of a maintenance depot at Greystones Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

Further assessment of a maintenance depot in the wider area of Greystones Station area is not deemed warranted. The same constraints, i.e. coastal exposure and extended single line track, will exist in the wider Greystones area.

E. **Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?**

The siting of a maintenance depot at Greystones would require trains to operate along a single track section, with very little ability for expansion to double track (i.e. due to railway tunnelled section under Bray Head). The railway is significantly exposed to coastal risks would not provide the necessary scheme resilience. Any issue that resulted in track closure would render the DART Expansion at risk of closure. Also, the

aspiration of Iarnród Éireann, the NTA and Wicklow County Council is to maximise passenger capacity on the operational line. The maintenance depot has the potential to interfere with this aspiration.

Conclusion: Consideration of the wider Greystones area as a strategic location for a Maintenance Depot is discontinued.

8.13 Bray Station

Bray Station is located on the Southeast (Rosslare) Line approximately 24km south of Connolly. Bray Station is at the end of the twin track network. The rail line is electrified from Connolly to Bray and continues electrified on the single track from Bray to Greystones (8km).

Bray Station is located in the urban centre on artificially raised lands. The station is bound to the east and west by residential development.

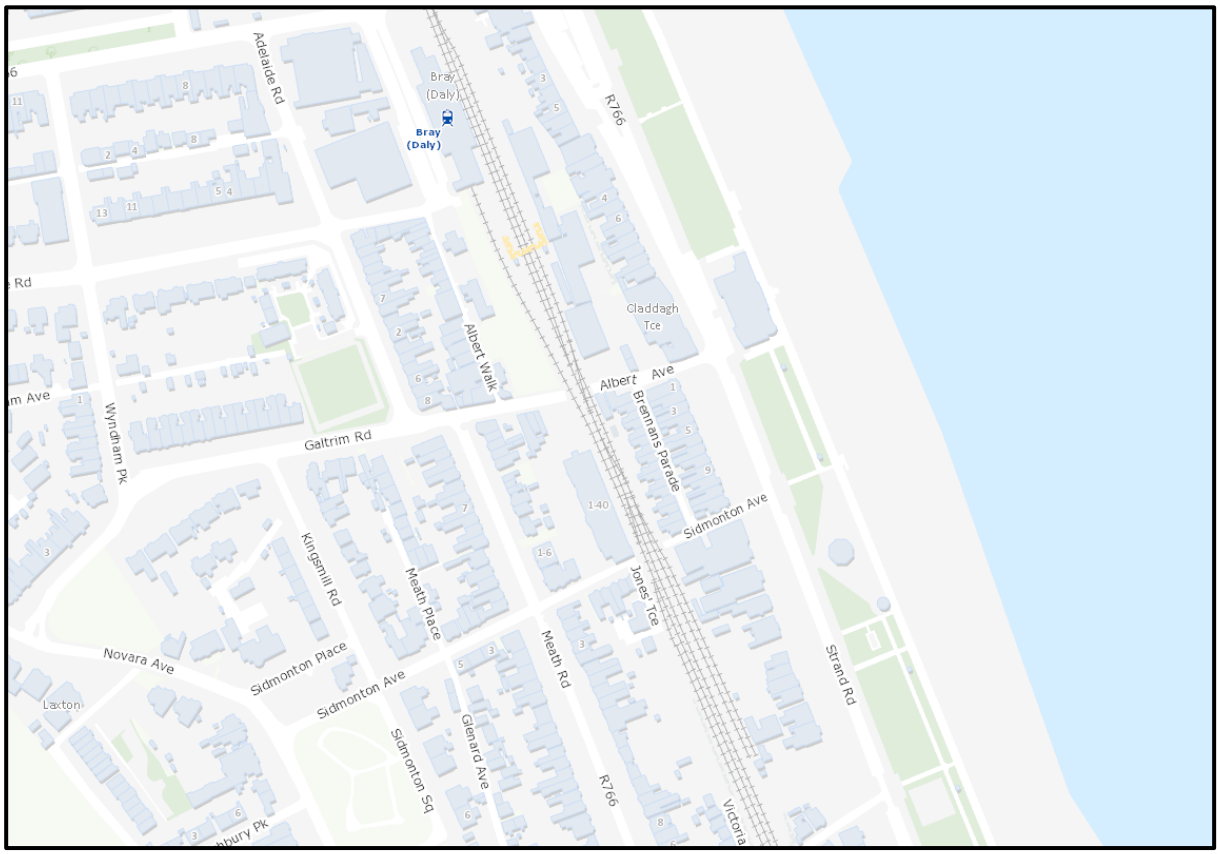


Figure 8.13: Location of Bray Station

A. Is the site equal or greater than 20 hectares?

There is minimal landholding in the environs of Bray Station. There is no sidings south of the station on viaduct. This viaduct is bordered to the east and west be residential development.

B. Is there 1,800m linear length directly adjacent to the operational railway line?

The railway south of Bray is heavily constrained by the topography of the land. The ground slopes steeply towards the coast and the railway hugs the coastline. Therefore it would not be feasible to provide a sufficiently wide linear length south of Bray.

C. Is it practical to develop a Maintenance Depot at the exact strategic node?

Due to spatial constraints, it is not considered practical to investigate development of a maintenance depot at Bray Station.

D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?

There is no significant landbanks available along the Southeast Line that are available for new maintenance depot development. Therefore, it is not considered practical to investigate further.

E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

The unavailability of lands and the position of the track along the coastal fringe.

Conclusion: Consideration of the wider Bray area as a strategic location for a Maintenance Depot is discontinued.

8.14 Pre-Appraisal Conclusion

Item	Strategic Location	Pre-Appraisal Conclusion
1	Fairview Depot	Discontinued from assessment
2	Connolly Station	Discontinued from assessment
3	Heuston Station	Discontinued from assessment
4	Pearse Station	Discontinued from assessment
5	North Wall Railway Yard	Discontinued from assessment
6	East Wall Railway Yard	Discontinued from assessment
7	Inchicore Railway Works	Discontinued from assessment
8	Drogheda Station/Depot	Taken forward for further assessment
9	Maynooth Station	Taken forward for further assessment
10	M3 Parkway Station	Taken forward for further assessment
11	Hazelhatch Station	Taken forward for further assessment
12	Greystones Station	Discontinued from assessment
13	Bray Station	Discontinued from assessment

9 Location Assessment

9.1 Introduction

Four locations have been shortlisted for consideration in the location appraisal. The shortlisted locations are general geographic zones and not taken to individual site areas.

- Drogheda Environs;
- Maynooth Environs;
- M3 Parkway Environs; and
- Hazelhatch Environs.

The geographic setting of these 4 areas is shown on Figure 9.1.

For the purpose of the location assessment, it is assumed that the capital cost of depot construction is neutral across all sites.

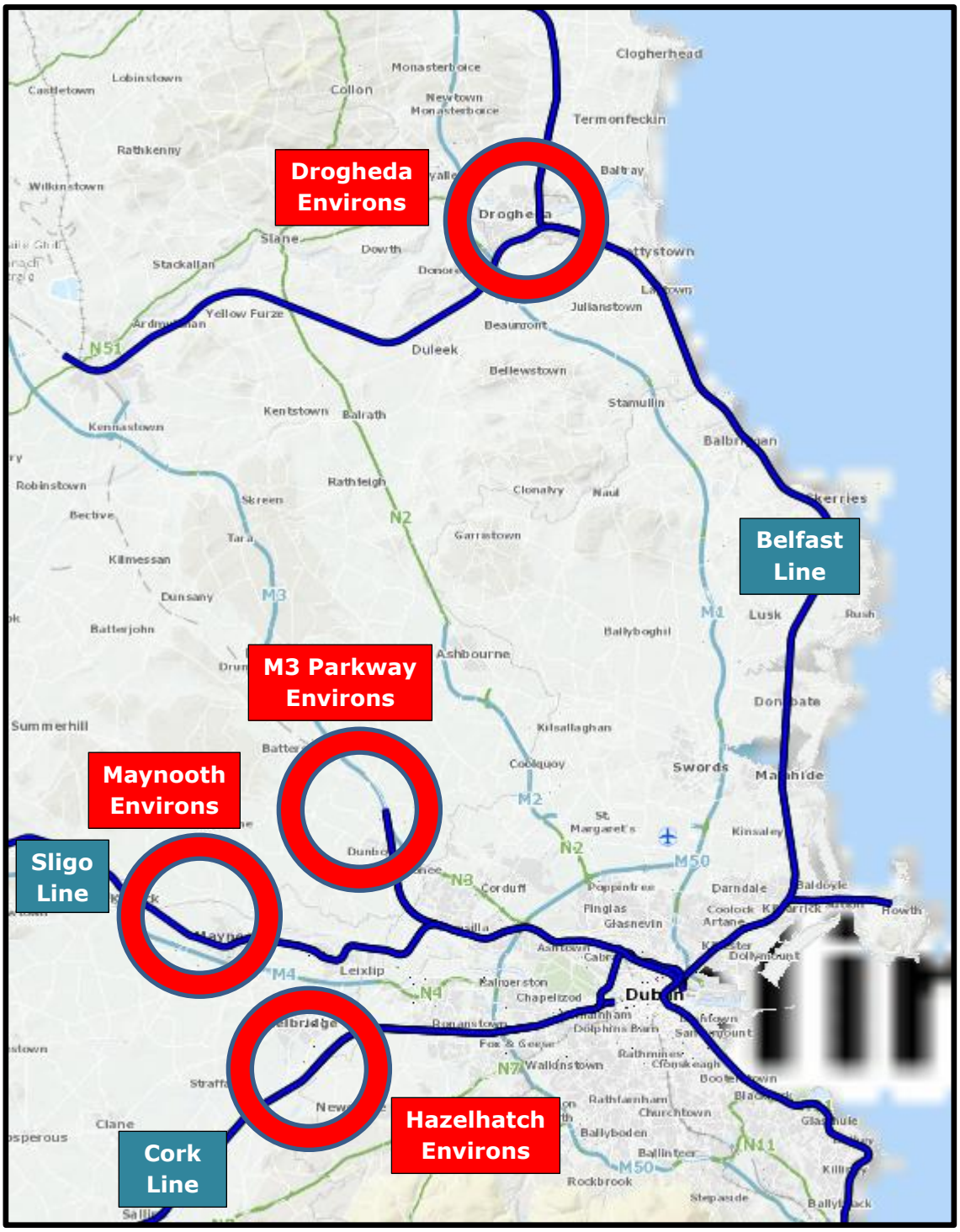


Figure 9.1: Regional Location of Potential Depot Site for Assessment

9.2 Drogheda Environs

The potential for siting a single, centre of excellence maintenance depot in the Drogheda environs is assessed. It has previously been determined that there is no potential for siting the depot in the immediate environs of Drogheda Station. Therefore, a new depot is considered in the context that it will be located either north of south of Drogheda town centre. Given the differences in geographic setting, Drogheda South and Drogheda North are assessed separately.

Drogheda South

The potential sites south of Drogheda are along the operational twin track railway approximately 44-48km north of Connolly. The DART Expansion Drogheda end node is significantly further that the other network end nodes.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Drogheda environs will result in highest empty running cost and has significant disadvantages to other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Drogheda will result in earliest and latest train movements into/out of depot and will have higher magnitude	

	impacts on possession times. This will have some disadvantages to other options by virtue of greater travel distance.	
Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot south of Drogheda will result in a high complexity of train movements as the depot is not at end of the line and is within the high frequency network. This will result in significant disadvantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential site is south of Drogheda town centre and immediately west of Bettystown/Laytown in an agricultural setting. There are 100 year pluvial flood zones adjacent to the railway corridor on the site south of Drogheda. There are no recorded National Monuments or buildings of national importance on any of the potential sites. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. By virtue of the sites proximity to existing Bettystown residential development, this option has some disadvantages to other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicular access to this site will generally be reliant on the M1 motorway. To access the potential sites north of Drogheda, vehicles will leave the M1 at Junction 10 and travel via N51/R132 and then the local Cockle Road towards Termonfeckin. Access to site is not precluded for HGV vehicles, therefore this site has some advantages over other options.	

Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas outside the zoned boundaries of Drogheda	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Northern Line is currently comparatively well served with train services into the city centre, comprising Intercity, Outer Commuter and Inner Commuter (DART) service sharing twin track. At present 11 train services enter the city centre in the morning AM Peak and this is anticipated to grow to 12 services in 2021. The planned service pattern under DART Expansion is 13 train service into the city centre. The 2018 rail census shows train occupancy levels of 87% for inbound trains in the morning Am peak hour, with the vast majority of passenger boarding inbound from Drogheda. The land-use along the eastern rail corridor is well established. The extension of electrification from Malahide to Drogheda will not result in a significant increase in train path capacity. However additional passenger capacity will be provided by increase train lengths. If DART Expansion progressed with the maintenance depot at Drogheda: 1. The passenger demand for services is anticipated to grow annually in a gradual increasing manner as no significant major land holdings remain undeveloped; 2. Extension of electrification will bring no significant increase in train path capacity. However additional	

	passenger capacity will be provided by increase train lengths; 3. The 38km Northern Line electrification is the most expensive electrification section to complete and would only be completed early to provide access to the depot; 4. The Northern line will not be capable of fully absorbing the planned early fleet deliveries and this will require acceleration of the programme for electrification of other radial line and impact the cashflow; 5. Based on the current Working Timetable, electrification of the Northern Line would displace 6 ICR/DMU trains which will be cascaded to other non-electrified lines. This is less than the cascade effect on the Maynooth Line. Therefore, a depot at Drogheda would have significant disadvantages to other options as it would amend the rolling stock delivery schedule and/or adversely impact on the NDP funding profile. Extension of electrification on the Northern Line is not the highest priority for DART Expansion, as the diesel rolling stock, albeit a higher levels of service, will be capable of meeting passenger demand in the short to medium term. If the depot was sited at Drogheda, the extension of northern line electrification would have to be prioritised and this would divert finding from other radial lines where infrastructural improvements would be potentially delayed with resultant impact on capacity increases.	

Drogheda North

The potential sites north of Drogheda are also along the operational twin track railway approximately 53-56km north of Connolly. The DART Expansion Drogheda end node is significantly further that the other network end nodes.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Drogheda environs will result in highest empty running cost and has significant disadvantages to other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Drogheda will result in earliest and latest train movements into/out of depot and will have higher magnitude impacts on possession times. This will have some disadvantages to other options by virtue of greater travel distance.	
Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling.	

	A depot north of Drogheda is at the end of line and will only interface with three trains/hour passenger services. The access/egress from the operational line to the depot is not considered complex. This will result in some advantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential site is north of Drogheda town centre in an agricultural setting. There are a number of watercourses crossing the sites north of Drogheda which are within the 100 year fluvial flood zone. There are also 100 year pluvial flood zones adjacent to the railway corridor on the site. There are no recorded National Monuments or buildings of national importance on any of the potential sites. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. By virtue of the flood risks identified on the site, this option has some disadvantages over other options.	
Vehicle routing for access to site	Vehicles access a Drogheda depot will generally be reliant on the M1 motorway. To access the potential sites north of Drogheda, vehicles will leave the M1 at Junction 7 and travel via R132 and then the local L5615 or L1611 towards potential sites. Access to site is not precluded for HGV vehicles, therefore this site has some advantages over other options.	
Road vehicle routing for access to site (Construction Deliverability)	The potential sites are north and south of Drogheda town centre in agricultural settings. There are 100 year pluvial flood zones adjacent to the railway corridor on the sites south of Drogheda. There are no recorded National Monuments or buildings of national importance on any of the potential sites. Residential development is generally	

	associated with agricultural holdings and has also developed in ribbon fashion along local roads.	
Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas outside the zoned boundaries of Drogheda	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Northern Line is currently comparatively well served with train services into the city centre, comprising Intercity, Outer Commuter and Inner Commuter (DART) service sharing twin track. At present 11 train services enter the city centre in the morning AM Peak and this is anticipated to grow to 12 services in 2021. The planned service pattern under DART Expansion is 13 train service into the city centre. The 2018 rail census shows train occupancy levels of 87% for inbound trains in the morning Am peak hour, with the vast majority of passenger boarding inbound from Drogheda. The land-use along the eastern rail corridor is well established. The extension of electrification from Malahide to Drogheda will not result in a significant increase in train path capacity. However additional passenger capacity will be provided by increase train lengths. If DART Expansion progressed with the maintenance depot at Drogheda:	

	1. The passenger demand for services is anticipated to grow annually in a gradual increasing manner as no significant major land holdings remain undeveloped; 2. Extension of electrification will bring no significant increase in train path capacity. However additional passenger capacity will be provided by increase train lengths; 3. The 38km Northern Line electrification is the most expensive electrification section to complete and would only be completed early to provide access to the depot; 4. The Northern line will not be capable of fully absorbing the planned early fleet deliveries and this will require acceleration of the programme for electrification of other radial line and impact the cashflow; 5. Based on the current Working Timetable, electrification of the Northern Line would displace 6 ICR/DMU trains which will be cascaded to other non-electrified lines. This is less than the cascade effect on the Maynooth Line. Therefore, a depot at Drogheda would have significant disadvantages to other options as it would amend the rolling stock delivery schedule and/or adversely impact on the NDP funding profile. Extension of electrification on the Northern Line is not the highest priority for DART Expansion, as the diesel rolling stock, albeit a higher levels of service, will be capable of meeting passenger demand in the short to medium term. If the depot was sited at Drogheda, the extension of northern line electrification would have to be prioritised and this would divert finding from other radial lines where infrastructural improvements would be potentially delayed with resultant impact on capacity increases.	

9.3 Maynooth Environs

The potential for siting a single, centre of excellence maintenance depot in the Maynooth environs is assessed. It has previously been determined that there is no potential for siting the depot at Maynooth Station. Therefore, a new depot is considered in the context that it will be located either east or west of Maynooth town centre.

Maynooth East

The potential sites east of Maynooth are along the operational twin track railway approximately 20-23km west of Connolly.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Maynooth environs has some advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Maynooth will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	
Complexity of access and egress to / from	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the	

depot (Public Service Obligation / Train Planning Logistics)	depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot east of Maynooth will result in a high complexity of train movements as the depot is not at end of the line and is within the high frequency network. This will result in significant disadvantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	There are no significant watercourses crossing the potential sites east of Maynooth. There are some 100 year pluvial flood zones adjacent to the railway corridor. Donaghmore Church and graveyard (National Monuments) are situated close to the railway corridor and would be potentially impacted by depot development. The Rye Water Valley/Carton Special Area of Conservation borders the potential depot site to the north of the railway corridor. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. The Intel complex and St Catherine's Park are situated east of the potential depot sites. By virtue of the ecological and heritage issues, this option has some disadvantages over other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicles access to a Maynooth East depot will generally be reliant on the M4 motorway. Vehicle will leave the M4 at Junction 6 and travel on the R449 and R148 to access the potential sites. Improved localised assess from the R148 to the potential depot site will need to be provided to facilitate HGV vehicle access. Therefore, this site has some disadvantages in comparison to other options.	

Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas outside the zoned boundaries of Maynooth.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Maynooth /M3 Line is currently comparatively poorly served with train services into the city centre, comprising Intercity and Commuter diesel service sharing twin track. At present 6 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 15 train service into the city centre. The 2018 rail census shows train occupancy levels of 92% for inbound trains in the morning AM peak hour, with the vast majority of passenger boarding inbound from Maynooth. The land-use along Maynooth /M3 rail corridor is moderately well established, with some significant major land holding still not yet developed. If DART Expansion progressed with the maintenance depot at Maynooth or M3 Parkway: 1. The passenger demand for services will grow annually in a significant increasing manner as a latent population demand exists for train services that cannot be accommodated at present due to rail infrastructure constraints. Developing remaining land holdings will add population demand for increased services; 2. Extension of electrification, together with city centre enhancement works and removal of level crossing conflicts will bring a very significant increase in train path capacity;	

	3. The 32km Maynooth Line upgrade is more expensive electrification than the Northern Line upgrade, but the service benefits of Maynooth line upgrade is significantly higher; 4. The Maynooth Line will be capable of fully absorbing the planned early fleet deliveries and this will not affect the overall programme for electrification of other radial lines, nor impact the cashflow; 5. Based on the current Working Timetable, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the highest cascade effect which will provide increase passenger capacity benefits to the other lines. Therefore, a depot at Maynooth / M3 Parkway would have significant advantages to other options as it would locate the depot on the line with a high service capacity increase. Therefore, the DART Expansion delivery programme would be optimised and passenger benefits would accrue in tandem.	

Maynooth West

The potential sites west of Maynooth are along the operational single track railway approximately 25-28km west of Connolly. A depot at this location will require the construction of up to 3-4km of new track to provide twin track directly to the potential depot site.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Maynooth environs has some advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Maynooth will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance. A depot at Maynooth will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	
Complexity of access and egress to / from depot (Public Service	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services	

Obligation / Train Planning Logistics)	operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot west of Maynooth is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex. This will result in significant advantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential site west of Maynooth is set to agricultural use. There are no significant watercourses crossing the potential sites. There are pockets of 100 year pluvial flood zones adjacent to the railway corridor on the sites adjacent to the railway. There is a single National Monuments record within the potential sites (Barrow). There are no buildings of national importance on any of the potential sites. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. The environmental issues identified are not considered significant to preclude development of the site. Therefore, this option has some advantages over other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicles access to a Maynooth West depot will generally be reliant on the M4 motorway. Vehicle will leave the M4 at Junction 7 and travel on R406 through Maynooth and on to R148 and L5041 to access the potential sites. Alternatively the potential sites could be accessed by leaving the M4 at Junction 8 and travelling via R148 through Kilcock and then the L5041. Access to site is not precluded for HGV vehicles, therefore this site has some advantages over other options.	

Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas outside the zoned boundaries of Maynooth and Kilcock.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Maynooth /M3 Line is currently comparatively poorly served with train services into the city centre, comprising Intercity and Commuter diesel service sharing twin track. At present 6 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 15 train service into the city centre. The 2018 rail census shows train occupancy levels of 92% for inbound trains in the morning AM peak hour, with the vast majority of passenger boarding inbound from Maynooth. The land-use along Maynooth /M3 rail corridor is moderately well established, with some significant major land holding still not yet developed. If DART Expansion progressed with the maintenance depot at Maynooth or M3 Parkway: 1. The passenger demand for services will grow annually in a significant increasing manner as a latent population demand exists for train services that cannot be accommodated at present due to rail infrastructure constraints. Developing remaining land holdings will add population demand for increased services; 2. Extension of electrification, together with city centre enhancement works and removal of level crossing conflicts will bring a very significant increase in train path capacity;	

	3. The 32km Maynooth Line upgrade is more expensive electrification than the Northern Line upgrade, but the service benefits of Maynooth line upgrade is significantly higher; 4. The Maynooth Line will be capable of fully absorbing the planned early fleet deliveries and this will not affect the overall programme for electrification of other radial lines, nor impact the cashflow; 5. Based on the current Working Timetable, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the highest cascade effect which will provide increase passenger capacity benefits to the other lines. Therefore, a depot at Maynooth / M3 Parkway would have significant advantages to other options as it would locate the depot on the line with a high service capacity increase. Therefore, the DART Expansion delivery programme would be optimised and passenger benefits would accrue in tandem.	

9.4 M3 Parkway Environs

The potential for siting a single, centre of excellence maintenance depot in the M3 Parkway environs is assessed. It has previously been determined that there is no potential for siting the depot at M3 Parkway Station. Therefore, a new depot is considered in the context that it will be located either north or south of the Station.

M3 Parkway South

The potential sites is south of M3 Parkway between Dunboyne Station and M3 Parkway Station along the operational twin track railway approximately 17-19km west of Connolly.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the M3 Parkway environs has significant advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at M3 Parkway will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	

Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot south of M3 Parkway will result in a high complexity of train movements as the depot is not at end of the line. The potential depot is on a spur to the Maynooth Line and joins at an at-grade junction at Clonsilla. This will result in significant disadvantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The site would have to be outside the lands zone at M3 Parkway for a major town centre. This poses some disadvantages in comparison to other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential sites south of M3 Parkway is set to agricultural use. There are no significant watercourses crossing the potential sites. A significant portion of the site is within the 100 year fluvial flood zones of the River Tolka adjacent to the railway corridor on the sites adjacent to the railway. There are no National Monuments record within the potential sites. There are no buildings of national importance on any of the potential sites. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. By virtue of the regularity of flooding on the River Tolka this option has significant disadvantages to other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicles access to an M3 Parkway depot (south) will generally be reliant on the M3 motorway. Vehicle will leave the M3 at Junction 5 and travel on R157 and then L2228 and old Navan Road through Dunboyne, through built up residential area. Therefore, this site has some disadvantages in comparison to other options.	

Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas but bordered by zoned lands north and south.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Maynooth /M3 Line is currently comparatively poorly served with train services into the city centre, comprising Intercity and Commuter diesel service sharing twin track. At present 6 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 15 train service into the city centre. The 2018 rail census shows train occupancy levels of 92% for inbound trains in the morning AM peak hour, with the vast majority of passenger boarding inbound from Maynooth. The land-use along Maynooth /M3 rail corridor is moderately well established, with some significant major land holding still not yet developed. If DART Expansion progressed with the maintenance depot at Maynooth or M3 Parkway: 1. The passenger demand for services will grow annually in a significant increasing manner as a latent population demand exists for train services that cannot be accommodated at present due to rail infrastructure constraints. Developing remaining land holdings will add population demand for increased services; 2. Extension of electrification, together with city centre enhancement works and removal of level crossing conflicts will bring a very significant increase in train path capacity;	

	3. The 32km Maynooth Line upgrade is more expensive electrification than the Northern Line upgrade, but the service benefits of Maynooth line upgrade is significantly higher; 4. The Maynooth Line will be capable of fully absorbing the planned early fleet deliveries and this will not affect the overall programme for electrification of other radial lines, nor impact the cashflow; 5. Based on the current Working Timetable, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the highest cascade effect which will provide increase passenger capacity benefits to the other lines. Therefore, a depot at Maynooth / M3 Parkway would have significant advantages to other options as it would locate the depot on the line with a high service capacity increase. Therefore, the DART Expansion delivery programme would be optimised and passenger benefits would accrue in tandem.	

M3

Parkway North

The potential sites is north of M3 Parkway, on lands north of M3 Parkway that are currently not along operational railway. M3 Parkway Station is approximately 17-19km west of Connolly. Development will require the construction of approximately 4-5km of twin track railway.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the M3 Parkway environs has significant advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at M3 Parkway will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	
Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot north of M3 Parkway will result in a high complexity of train movements, albeit the depot is at end of the line.	

	The potential depot is on a spur to the Maynooth Line and joins at an at-grade junction at Clonsilla. This will result in significant disadvantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway and outside the lands zone at M3 Parkway for a major town centre. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential sites north of M3 Parkway is set to agricultural use but with significant ribbon residential development along the L2225. Some of the potential depot lands are situated within the 100 year fluvial flood zones of the River Tolka, There are no National Monuments record within the potential sites. There are no buildings of national importance on any of the potential sites. Residential development is generally associated with agricultural holdings and has also developed in ribbon fashion along local roads. By virtue of the position of the site in close proximity to the River Tolka, the site has some disadvantages to other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicles access to an M3 Parkway depot (north) will generally be reliant on the M3 motorway. Vehicle will leave the M3 at Junction 5 and travel northbound on R147 and then via R154 and L2225. Access to site is not precluded for HGV vehicles, therefore this site has some advantages over other options.	
Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas but bordered by zoned lands to the south.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs;	

with Policy / Compliance with Funding)	• Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Maynooth /M3 Line is currently comparatively poorly served with train services into the city centre, comprising Intercity and Commuter diesel service sharing twin track. At present 6 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 15 train service into the city centre. The 2018 rail census shows train occupancy levels of 92% for inbound trains in the morning AM peak hour, with the vast majority of passenger boarding inbound from Maynooth. The land-use along Maynooth /M3 rail corridor is moderately well established, with some significant major land holding still not yet developed. If DART Expansion progressed with the maintenance depot at Maynooth or M3 Parkway: 1. The passenger demand for services will grow annually in a significant increasing manner as a latent population demand exists for train services that cannot be accommodated at present due to rail infrastructure constraints. Developing remaining land holdings will add population demand for increased services; 2. Extension of electrification, together with city centre enhancement works and removal of level crossing conflicts will bring a very significant increase in train path capacity; 3. The 32km Maynooth Line upgrade is more expensive electrification than the Northern Line upgrade, but the service benefits of Maynooth line upgrade is significantly higher; 4. The Maynooth Line will be capable of fully absorbing the planned early fleet deliveries and this will not affect the overall programme for electrification of other radial lines, nor impact the cashflow; 5. Based on the current Working Timetable, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the highest cascade effect which will provide increase passenger capacity benefits to the other lines. Therefore, a depot at Maynooth / M3 Parkway would have significant advantages to other options as it would locate the	

	depot on the line with a high service capacity increase. Therefore, the DART Expansion delivery programme would be optimised and passenger benefits would accrue in tandem.	

9.5 Hazelhatch Environs

The potential for siting a single, centre of excellence maintenance depot in the Hazelhatch environs is assessed. It has previously been determined that there is no potential for siting the depot at Hazelhatch Station. Therefore, a new depot is considered in the context that it will be located either east or west of the Station.

Hazelhatch East

The potential sites are east of Hazelhatch Station, along the 4 track section, approximately 14-16km west of Heuston Station. The short to medium term configuration will operate DART trains on the northernmost tracks. Therefore, the maintenance depot would have to be on the northside of the railway corridor to prevent capacity restrictions. In the longer term with DART Underground in-situ, DART train will operate on the southernmost tracks. At this stage, the maintenance depot will result in network capacity restrictions.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Hazelhatch environs has significant advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night	

	time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Hazelhatch will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance. A depot at M3 Parkway will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	
Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot east of Hazelhatch on a 4 track section does not introduce a high level of complexity, because Intercity/Outer Commuter services are separated from Inner Commuter services. This will result in some advantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The potential site is immediately adjacent to the Adamstown SDZ boundary. This poses some disadvantages in comparison to other options.	
Consideration of neighbouring environment (Construction Deliverability)	The potential site east of Hazelhatch is set to agricultural use, with some residential landholdings. The site is generally free of fluvial or pluvial flood risks. There are no National Monuments record within the potential sites. There are no buildings of national importance on any of the potential sites. The eastern boundary of the potential site abuts the Adamstown SDZ lands. Given the location of the potential site adjacent to Adamstown SDZ, this site has some disadvantages to other options.	
Road vehicle routing for access to site	Vehicles access to Hazelhatch East depot will generally be reliant on the M4 motorway. Vehicle will leave the M4 at	

(Construction Deliverability	Junction 5 and travel southbound on R403 and then via Stackumny Lane to access the potential site. Access to site is not precluded for HGV vehicles, therefore this site has some advantages over other options.	
Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas but bordered by zoned lands to the east. The site straddles Kildare Co and South Dublin Co functional area.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Kildare Line is currently comparatively well served with train services into the city centre, comprising Intercity, Outer Commuter and Inner Commuter diesel service sharing a section of 4 track from Hazelhatch to Park West, with the remainder reducing to twin track. At present 12 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 26 train service into the city centre (12 Intercity/Outer Commuter and 14 DART services). The 2018 rail census shows train occupancy levels of 65% for inbound trains in the morning AM peak hour, with relatively low passenger boarding inbound from Hazelhatch (albeit Hazelhatch to GCD is only newly added to the Working Timetable). The land-use along the Hazelhatch-Heuston rail corridor is not well established, with significant remaining undeveloped land. Development at Adamstown and Clonburris has progressed at a slower pace than originally anticipated.	

	If DART Expansion progressed with the maintenance depot at Hazelhatch: 1. The passenger demand for services could grow annually in a significant increasing manner only if development rate accelerates. The potential level of train service if Kildare Line Upgrade was developed early may be excessive until the lands are fully completed; 2. Extension of electrification, together with completion of 4 tracking from Park West to Heuston and the city centre enhancements will bring a very significant increase in train path capacity; 3. The 20km Kildare Line electrification is the most expensive radial line for early delivery but the service benefits are also high. However, the passenger demand for services may not materialise in the short term if land development is not completed; 4. The Kildare Line will be capable of fully absorbing the planned early fleet deliveries. Early progression of the Kildare Line will impact the cashflow; 5. Based on the current Working Timetable, electrification of the Kildare Line would displace 4 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the lowest cascade effect which will provide the lowest passenger capacity benefits to the other lines. Therefore, a depot at Hazelhatch would have some disadvantages to other options as it would negatively impact on the cashflow and the service levels delivered may not be utilised if future land development is delayed.	

Hazelhatch West

The potential sites are west of Hazelhatch Station, on a twin track section, approximately 16-18km west of Heuston Station. A depot west of Hazelhatch will require the extension of the 4 tracking to the point of entry to the depot, so that the capacity of the Mainline is not compromised. The short to medium term configuration will operate DART trains on the northernmost tracks. Therefore, the maintenance depot would have to be on the northside of the railway corridor to prevent capacity restrictions. In the longer term with DART Underground in-situ, DART train will operate on the southernmost tracks. At this stage, the maintenance depot will result in network capacity restrictions.

Criteria	Discussion	Assessment Conclusion
Minimised empty running for daily service commencement / ending service (Cost Implication)	With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Hazelhatch environs has significant advantages over other options.	
Maximise track access time for maintenance (Rail Safety / Public Service Obligation)	Maximising the time available for infrastructural maintenance is fundamental to the ongoing operation of the railway. A city centre depot would result in maximising possession times. Greater distances from city centre will result in shorter possession times being granted. Possessions need to be sufficient to allow a reasonable time to complete and handback required works. If possessions are too short it will extend non-disruptive possession time (i.e. normal night time work opportunity) into disruptive possessions (i.e. impacting on timetabled passenger services). A depot at Hazelhatch will result in lower magnitude impact on possession times and will have some advantages to other options by virtue of lower travel distance.	

Complexity of access and egress to / from depot (Public Service Obligation / Train Planning Logistics)	Trains entering and exiting the depot need to travel to timetabled service positions. The movement into/out of the depot will potentially impact with other passenger services operating on the line. The complexity in getting into position is a negative factor to logistics and rolling stock marshalling. A depot west of Hazelhatch is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex. This will result in significant advantages in comparison to other options.	
Availability of suitable lands (Construction Deliverability)	At preliminary desk based appraisal there appears to be agricultural lands adjacent to the operational railway that may be suitable for depot development. The location in a broadly agricultural setting offers some advantages over other options.	
Consideration of neighbouring environment (Construction Deliverability)	Residential density in the environs of Hazelhatch Station is quite low. Agricultural land use predominates to the west of the station. The lands are not within any fluvial flood risk areas. There are small localised pockets of pluvial flood risk across the sites. There are no National Monuments record within the potential sites. There are no buildings of national importance on any of the potential sites. Given the setting of this potential site, some advantages over other options.	
Road vehicle routing for access to site (Construction Deliverability	Vehicles access to Hazelhatch West depot will generally be reliant on the M4 motorway. Vehicle will leave the M4 at Junction 5 and travel southbound on R403 and then via Loughlinstown Road to access Hazelhatch Station and the potential sites to its west. There is an existing road to the west of Hazelhatch Station (The Lords Road) but this is access to residential dwellings. It is not considered suitable for HGVs access. Therefore a new road would be required from Hazelhatch Station to the proposed depot adjacent to the railway corridor. Therefore, this site has some disadvantages in comparison to other options.	

Compliance with Transportation and Land-Use Development Policy (Compliance with Policy)	The potential sites are in rural areas but bordered by zoned lands to the east. The site is within Kildare Co functional area.	
Short term impact on DART Expansion Programme delivery by 2027 (Compliance with Policy / Compliance with Funding)	The key requirements to enable delivery and deployment of new DART rolling stock are: • Commissioning of Maintenance Depot; • Increase City Centre capacity through enhancement works in the Connolly/Docklands environs; • Completion of the electrification on whichever line the depot is located. Until these works are complete, the train path capacities on all lines converging on City Centre are limited to present day levels. The funding limitations within the NDP program are a factor in this short term impact assessment to make best use of the available funding to provide additional capacity as soon as possible. In planning the DART Expansion delivery programme, IE has focused on providing increased passenger capacity in the short term, within the constraints of the path limits, by re-deploying carriages freed through new fleet deliveries to provide longer trains in areas where electrification is not completed. The Kildare Line is currently comparatively well served with train services into the city centre, comprising Intercity, Outer Commuter and Inner Commuter diesel service sharing a section of 4 track from Hazelhatch to Park West, with the remainder reducing to twin track. At present 12 train services enter the city centre in the morning AM Peak. The planned service pattern under DART Expansion is 26 train service into the city centre (12 Intercity/Outer Commuter and 14 DART services). The 2018 rail census shows train occupancy levels of 65% for inbound trains in the morning AM peak hour, with relatively low passenger boarding inbound from Hazelhatch (albeit Hazelhatch to GCD is only newly added to the Working Timetable). The land-use along the Hazelhatch-Heuston rail corridor is not well established, with significant remaining undeveloped land. Development at Adamstown and Clonburris has progressed at a slower pace than originally anticipated. If DART Expansion progressed with the maintenance depot at Hazelhatch: 1. The passenger demand for services could grow annually in a significant increasing manner only if development rate accelerates. The potential level of train	

	service if Kildare Line Upgrade was developed early may be excessive until the lands are fully completed; 2. Extension of electrification, together with completion of 4 tracking from Park West to Heuston and the city centre enhancements will bring a very significant increase in train path capacity; 3. The 20km Kildare Line electrification is the most expensive radial line for early delivery but the service benefits are also high. However, the passenger demand for services may not materialise in the short term if land development is not completed; 4. The Kildare Line will be capable of fully absorbing the planned early fleet deliveries. Early progression of the Kildare Line will impact the cashflow; 5. Based on the current Working Timetable, electrification of the Kildare Line would displace 4 ICR/DMU trains which will be cascaded to other non-electrified lines. This is the lowest cascade effect which will provide the lowest passenger capacity benefits to the other lines. Therefore, a depot at Hazelhatch would have some disadvantages to other options as it would negatively impact on the cashflow and the service levels delivered may not be utilised if future land development is delayed.	

10 Location Assessment Summary & Conclusion

Based on the assessment criteria and the methodology applied, the exercise has appraised each of the potential site is a consistent and objective manner. Table 10.1 present the aggregated scores for each of the sites.

Criteria	Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Minimised empty running								
Maximise track access								
Complexity of access and egress								
Availability of suitable lands								
Adjacent Environment								
Road vehicle access								
Transport and Land-Use Compliance								
Short term impact on DART Expansion Programme								

Table 10.1: Aggregated Summary of Site Appraisal

By virtue of their distance from the City Centre the two sites in Drogheda scores poorly for operating costs (minimised empty running and maximised track access) and for short term impact on the DART Expansion delivery programme. The Drogheda depot will also have some negative impacts on the neighbouring environment.

The depot in the environs of the M3 Parkway station scores poorly in terms of complexity of accessing and egressing the network, by virtue of its location on a branch line. The M3 Parkway also scored negatively to varying degrees, in terms of negative impacts on the neighbouring environment.

The Maynooth East and the Hazelhatch East sites perform relatively similarly. However, Maynooth East scores very poorly for the complexity of access and egress from depot to network start/end nodes and poorly for road access and impacts on the neighbouring environment; whilst Hazelhatch East scores poorly for availability of suitable lands, impacts on neighbouring environment and short term impacts on delivery of DART Expansion.

Maynooth West and Hazelhatch West are achieved the two best performance in the assessment. Maynooth West achieves a higher ranking than Hazelhatch West by virtue of better road access and less negative impact on the delivery of DART Expansion.

In conclusion, Maynooth West is appraised as the emerging preferred for location of the new DART Maintenance Depot.