DART+ Coastal North

ANNEX 3.5

Technical Optioneering Report: Works around Clongriffin Station

ARUP

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Abbreviations

Abbreviation	Definition
APIS	Authorisation for Placing in Service
ATP	Automatic Train Protection
BGL	Below ground level
CAF	Common Appraisal Framework
CAPEX	Capital expenditure
CAWS	Continuous Audible Warning System
CCE	Chief Civil Engineer's Department
CCTV	Closed Circuit Television
CRR	Commission for Railway Regulation
CSO	Central Statistics Office
CTC	Centralised Traffic Control
D&D	Dublin and Drogheda
DART	Dublin Area Rapid Transit
DHLGH	Department of Housing, Local Government & Heritage
DMUs	Diesel Multiple Units
Eir	Eircom Limited
EMC	Electromagnetic compatibility
EMUs	Electric Multiple Units
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESRI	Economic and Social Research Institute
FIHS	Fingal Industrial Heritage Survey
FRAM	Flood Risk Assessment and Management
GI	Ground Investigation
GNR(I)	Great Northern Railway of Ireland
GSI	Geological Survey Ireland
GSM-R	Global System for Mobile Communications – Railway
HTHJ	Howth - Howth Junction
IÉ	Iarnród Éireann/Irish Rail
INF	Infrastructure
ITM	Irish Transverse Mercator
LAP	Local Area Plan
LOC	Locations Case
MAI	Maintenance
MCA	Multi-Criteria Analysis
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NMS	National Monuments Service
OHLE	Overhead Line Equipment

Abbreviation	Definition
OPE	Operation and Traffic Management
OPEX	Operational expenditure
OPW	Office of Public Works
OSI	Ordinance Survey of Ireland
P&C	Points and Crossings
PTS	Points
RMP	Record of Monuments and Places
RSC	Railway Safety Commission (now Commission for Rail Regulation CRR)
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SDH	Synchronous Digital Hierarchy
SEB	Signalling Equipment Box
SET	Signalling Electrification and Telecoms
SPA	Special Protection Area
SSI	Solid State Interlocking
TER	Telecoms Equipment Rooms
TPH	Trains per hour
TSS	Train Services Specification
UPS	Uninterruptible Power Supply
WFD	Water Framework Directive

1 Introduction

The purpose of this report is to provide the technical input to the Preliminary Option Selection Report. This report provides details of the technical assessment at Clongriffin Station from option selection through to the emerging preferred option, including the options considered and how an emerging preferred option was chosen.

The report includes:

- An introduction and description of the study;
- A summary of the option assessment approach undertaken;
- A description of the existing situation;
- The relevant requirements;
- The relevant constraints;
- The option assessment containing:
    - Longlist of options;
    - Sifting of longlist of options;
    - Summary and details of the shortlisted options;
    - Multi-criteria analysis (MCA);
    - The emerging preferred option.

1.1 Packages of Work

The scope of work for DART+ Coastal North covers a wide range of interventions on the Northern Line needed to meet the Train Service Specification (TSS) requirements. To appropriately assess options against each other, the scope of work has been split into separate work packages, as contained within the various Annexes. Where appropriate, the Annexes have then been further split down into 'Sections' which define the system which has been subject to the optioneering and design process.

This report refers to the optioneering assessment for the works at Clongriffin Station. The scope is to consider Clongriffin Station for suitability as a turnback to achieve the TSS and maximise capacity, and to design any associated re-configuration works. This report considers all feasible longlist options with a view to reducing them via reasoned sifting, including the likes of cost, impact, and the TSS requirements.

1.2 References

This report should be read in conjunction with the following related optioneering reports:

Table 1-1: List of key documents associated with this report

Annex	Title	Description
N/A	DART+ Coastal North Preliminary Option Selection Report	This is the main report which summarises the optioneering process and the different packages of proposed works on the DART+ Coastal North project.
N/A	DART+ Coastal North Preliminary Option Selection Report – Executive Summary	This report summarises the main Preliminary Option Selection Report.
1	Emerging Preferred Option Maps	Includes drawings for each Emerging Preferred Option, to support the Preliminary Option Selection Report.
2.1	Policy Context	This presents a detailed review of the European, National, Regional and Local policy context for the DART+ Programme and the DART+ Coastal North Project
2.2	Useful Links	Useful links to documents/websites relating to the DART+ Coastal North project.
3.1	Constraints Report	This report reviews the DART+ Coastal North constraints.
3.2	Technical Optioneering Report: Electrification of the Northern Line between Malahide and Drogheda.	The Technical Optioneering Report for the Electrification of the Northern Line between Malahide and Drogheda. The report is divided into a series of sections.
3.3	Technical Optioneering Report: Works around Drogheda MacBride Station	The Technical Optioneering Report for Works around Drogheda MacBride Station. The report addresses track and station modifications to allow for the increased number of DART services.
3.4	Technical Optioneering Report: Works around Malahide Station	The Technical Optioneering Report for Works around Malahide Station. The report addresses track modifications required to allow trains to be turned back clear of through running services.

Annex	Title	Description
3.5	Technical Optioneering Report: Works around Clongriffin Station	The Technical Optioneering Report for Works around Clongriffin Station. The report addresses track modifications required to allow trains to be turned back clear of through running services.
3.6	Technical Optioneering Report: Works around Howth Junction & Donaghmede Station	The Technical Optioneering Report for Works around Howth Junction & Donaghmede Station. The report addresses the addition of tracks to allow a higher frequency shuttle service.
3.7	Technical Optioneering Report: Howth Branch Level Crossings	The Technical Optioneering Report for the Howth Branch Level Crossings. The report addresses the impacts of all proposed increases in train frequency on existing level crossings on the Howth Branch.

1.3 Option Assessment Approach

The works proposed at Clongriffin Station were assessed using the Department of Transport's Common Appraisal Framework for Transport Projects and Programmes (CAF) as the options have the potential to be geographically different from each other and have a material difference on external parties or the environment. Further details can be found in the option selection process section of the Preliminary Option Selection Report.

2 Existing Situation

2.1 Overview

Clongriffin Station is located on the Dublin to Belfast Line at approximate mileage 6 miles. The centre of the station is located at 723085.417E, 740791.354N based on the ITM grid system.

Clongriffin Station comprises 3 platforms: Platforms 1 and 2 are located Up and Down the Belfast Lines and Platform 3 is located on a passing loop off of the Down Belfast Line. The current platform length is 190m for Platforms 1 through to 3. Access to the platforms is provided by an existing pedestrian overbridge at the station. The station was designed and constructed in 2010 with a fourth track in mind and has an unused platform face on the east side which is not currently served by track.

An aerial view of the site is shown in Figure 2-1.

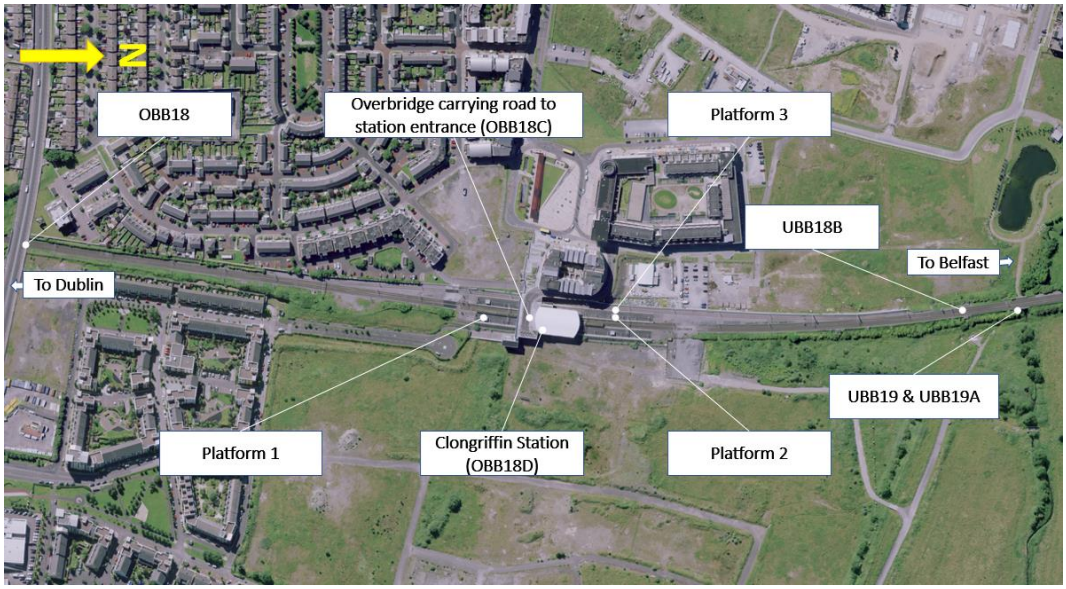

Figure 2-1: Aerial view of Clongriffin Station (source: Ordinance Survey of Ireland (OSI) aerial mapping)

2.2 Structures

There are seven existing structures associated with Clongriffin Station as shown in Figure 2-1: , in Annex 1.10 (Emerging Preferred Option Map 10 of 38), and as listed here:

- Overbridge OBB18;
- Culvert UBB18A;
- Culvert UBB18B;
- The access road at Clongriffin Station OBB18C;

- Clongriffin Station building OBB18D;
- Underbridge UBB19; and
- Culvert UBB19A.

OBB18 is a single 9.2m span reinforced concrete road bridge carrying the R809 (Grange Road) over the railway – see Figure 2-2 and Figure 2-3.

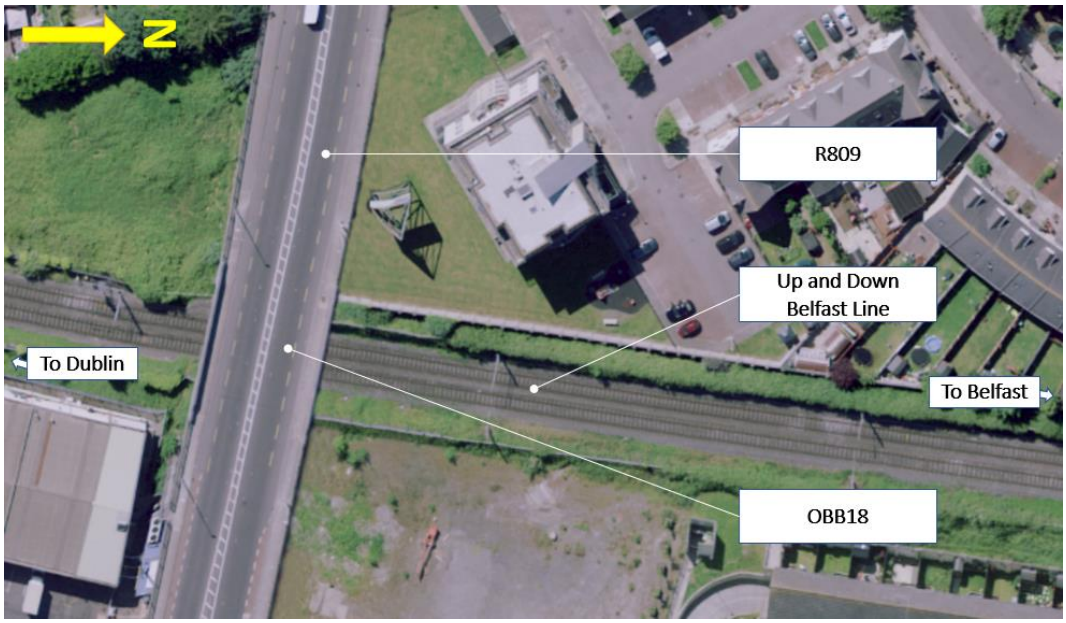

Figure 2-2: Aerial view on OBB18 carrying the R809 over the Up and Down Belfast Lines (source: OSI aerial mapping)

Figure 2-3: View looking North towards OBB18 (Source: Irish Rail)

UBB18A is a box culvert directing a steam beneath or around Clongriffin Station and culvert UBB18B is north of the station, just south of underbridge UBB19/UBB019A and routes a stream under the railway line - see Figure 2-4.

Underbridge UBB19/UBB19A is a protected, mid-19th century double-arch railway bridge which carries the Up and Down Belfast Lines over the River Mayne and a cattle pass. The structure is listed as a protected structure in Fingal County Council's Development Plans.

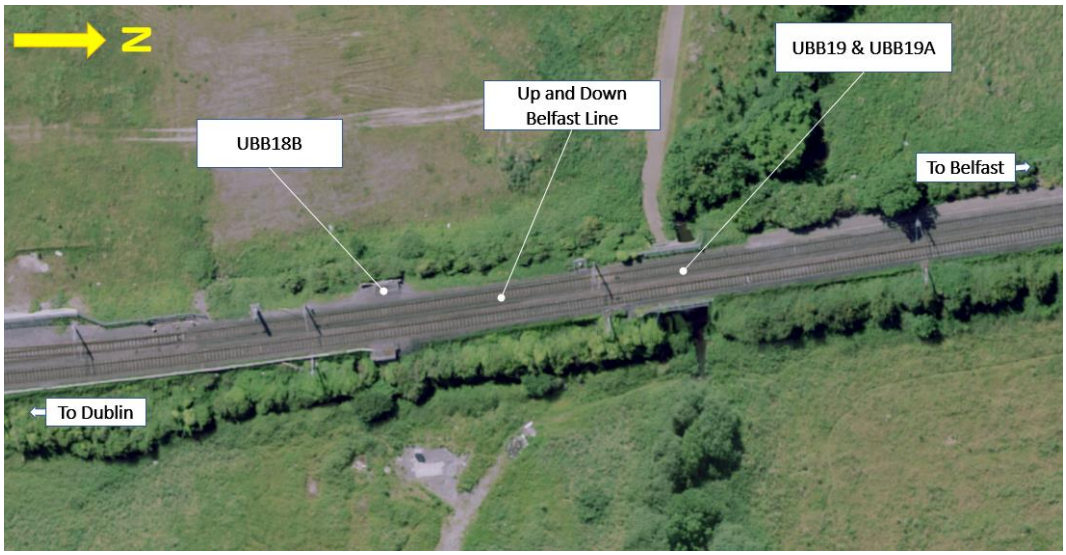

Figure 2-4: View of UBB18B, UBB19 & UBB19A (Source: OSI aerial mapping)

Overbridge OBB18C is the access road at Clongriffin Station. It is a 3-span reinforced concrete bridge which carries Station Way over the railway - see Figure 2-5.

Figure 2-5: View looking north to OBB18C (Source: Irish Rail)

Overbridge OBB18D is the station building itself which spans the railway and provides access between the platforms - see Figure 2-6.

Figure 2-6: View of OBB18D, Clongriffin station building (Source: Irish Rail)

2.3 Permanent Way and Tracks

Clongriffin Station comprises two lines, namely the Down and Up Belfast Lines, with a current line speed of 90mph. In addition to the main lines, a passing loop is provided to the east of Clongriffin Station affording access to Platform 3; this loop line has a line speed of 20mph. The loop is accessed from the bi-directional Down Belfast Line via PTS 606 to the south of Clongriffin, and connection is made back to the Main Line via PTS 604 to the north of the station.

Movements to the Up Belfast Line from the loop at present are only feasible via a double shunt movement or wrong line running to Howth Junction and Donaghmede Station, where services are afforded the use of PTS 612B.

Figure 2-7: View on existing Platform 1 showing existing wide platform

Figure 2-8: Looking north from the end of Platform 1

Figure 2-9: Looking north from the north end of Platform 1

2.4 Other Railway Facilities

2.4.1 Signalling

Clongriffin is controlled from Centralised Traffic Control (CTC) using the Solid State Interlocking (SSI) covering Dublin North HTHJ (the light green lines in Figure 2-10: below) that was first commissioned in 2012/2013. The installations are therefore new and in very good condition. The Clongriffin area is controlled from Portmarnock and the signalling equipment is located there.

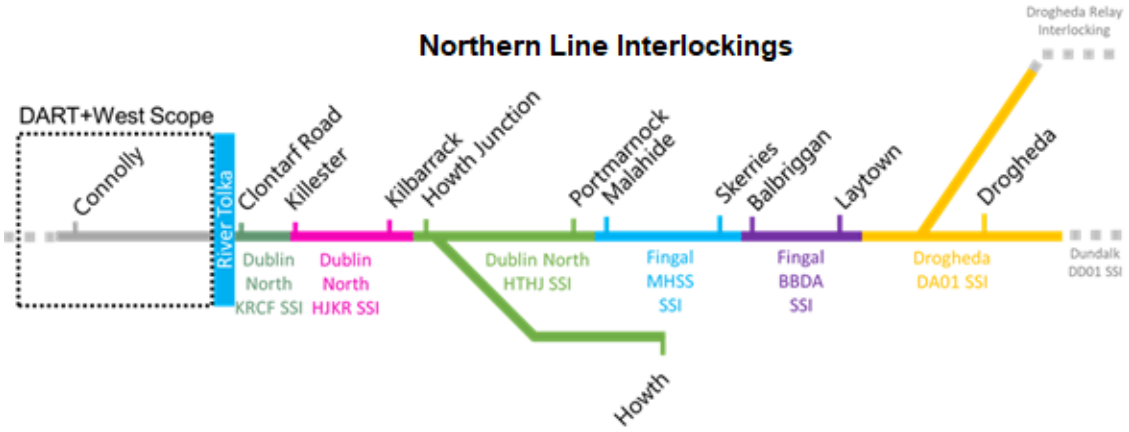

Figure 2-10: Interlocking control areas

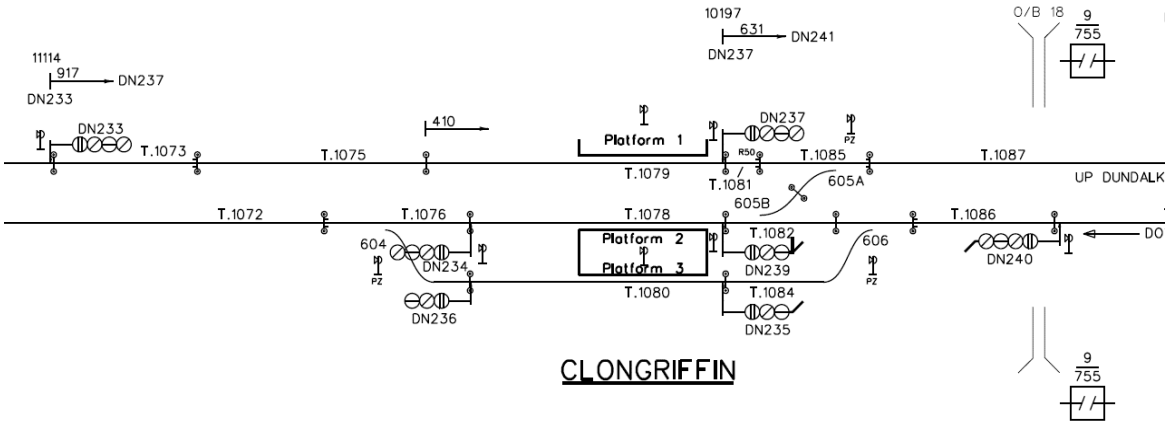

Figure 2-11: Signalling plan for Clongriffin area

There are seven signal heads comprising a mix of 3 and 4 aspect signals with relevant route indicators. Signalling is configured to support a reversing service from Platforms 2 and 3. However, reversing routes from signal DN235 appear to be limited due to the absence of a crossover to the Up Belfast Line from the Down Loop line. The area controls four point ends operating sets of points at each end of the Down Loop via Platform 3 and crossover PTS 605 which supports the reversing service from Platform 2.

Figure 2-12: Signalling Equipment Building (SEB) controlling Clongriffin located at Portmarnock

There is a power room for the SEB with a diesel generator set, uninterruptible power supply (UPS), and frequency generators located next to the SEB. The SEB has some space for additional equipment. However, overall the room appears to be relatively full and only capable of accommodating a limited amount of additional equipment.

2.4.2 Telecoms

The Telecoms Operational network is a legacy Synchronous Digital Hierarchy (SDH) which is in the process of being fully replaced by Irish Rail (IÉ). Existing cables which have a low number of available fibres will be fully replaced as part of the DART+ Coastal North and DART+ Coastal South projects.

On the supportive network side, the Gigabit network supports station communications equipment such as LED (Light Emitting Diode) platform indicators, Public Address Systems, CCTV (Closed-circuit television) and help points. GSM-R (Global System for Mobile Communications-Railway) coverage is provided from the cell mast located at Portmarnock.

2.4.3 Overhead Line Equipment (OHLE)

The OHLE was extensively reconfigured and renewed when the station was built in 2010 and consequently it is in good condition. The OHLE is supported by portal frames mounted on masts on the platforms. The OHLE on the Down Loop Platform 3 is fed from the south end via a section switch. New OHLE masts installed in 2010 entailed the use of four screw pile foundations on a steel base.

2.4.4 High Voltage supply

The traction current for the Clongriffin area is primarily provided by the substation located at Portmarnock. This substation is currently operating well below its designed capacity of 4.5 MVA.

2.4.5 Ancillary Electrical Systems

There are other minor systems that support the train operation including SCADA (Supervisory Control and Data Acquisition) responsible for the remote operation of the traction power supply to the OHLE, the Earthing and Bonding cable system that is required to ensure the safe management of traction return current and prevention of unsafe voltages on adjacent structures, and EMC (Electromagnetic compatibility) that is required to ensure that there are no unintentional generation, propagation or reception of electromagnetic energy which may cause undesirable effects on other equipment.

2.5 Ground Conditions

Historic mapping and aerial photography indicate that the site was originally agricultural land prior to the construction of the railway line from 1837 onwards. During the later 20th century, residential and light industrial developments appeared. Circa 2009, Clongriffin station and a road overpass were constructed.

To the north of Clongriffin Station, the River Mayne flows east and to the south of the site. According to the Rivers of Dublin map (Sweeney, 2017) for the area, the Grange Stream may have crossed the railway line.

Geological Survey Ireland (GSI) Quaternary sediment mapping indicates the presence of till derived from limestone over the entire site. Along the northern end of the site, alluvial deposits associated with the Mayne River are noted.

GSI bedrock mapping indicates the site is typically underlain by argillaceous bioclastic limestone and shale of the Malahide formation with Calcareous shale and limestone conglomerate of the Tober Colleen formation indicated at and south of the Grange Road. GSI depth to bedrock (Dublin County) mapping, indicates bedrock depths of 5 to 10m reducing to 3 to 5m at the southern portion of the site.

A number of historic ground investigations have been reviewed and include publicly available GI and historic GI provided by IÉ. These indicate a typical downward stratigraphy of made ground over Clay (glacial till) over limestone Bedrock. The Clay is recorded as comprising a firm consistency, increasing to very stiff at depth. Limestone bedrock was proven at Clongriffin station at 16m BGL and is recorded as strong to very strong.

At Clongriffin Station, the limited historic groundwater monitoring available indicates groundwater levels of 0.65 to 1.9m below ground level (BGL).

Immediately east of Clongriffin station, historical aerial photographs indicate potential construction works occurred in the area between 2005 and the present day. Therefore, there is a potential for widespread presence of made ground.

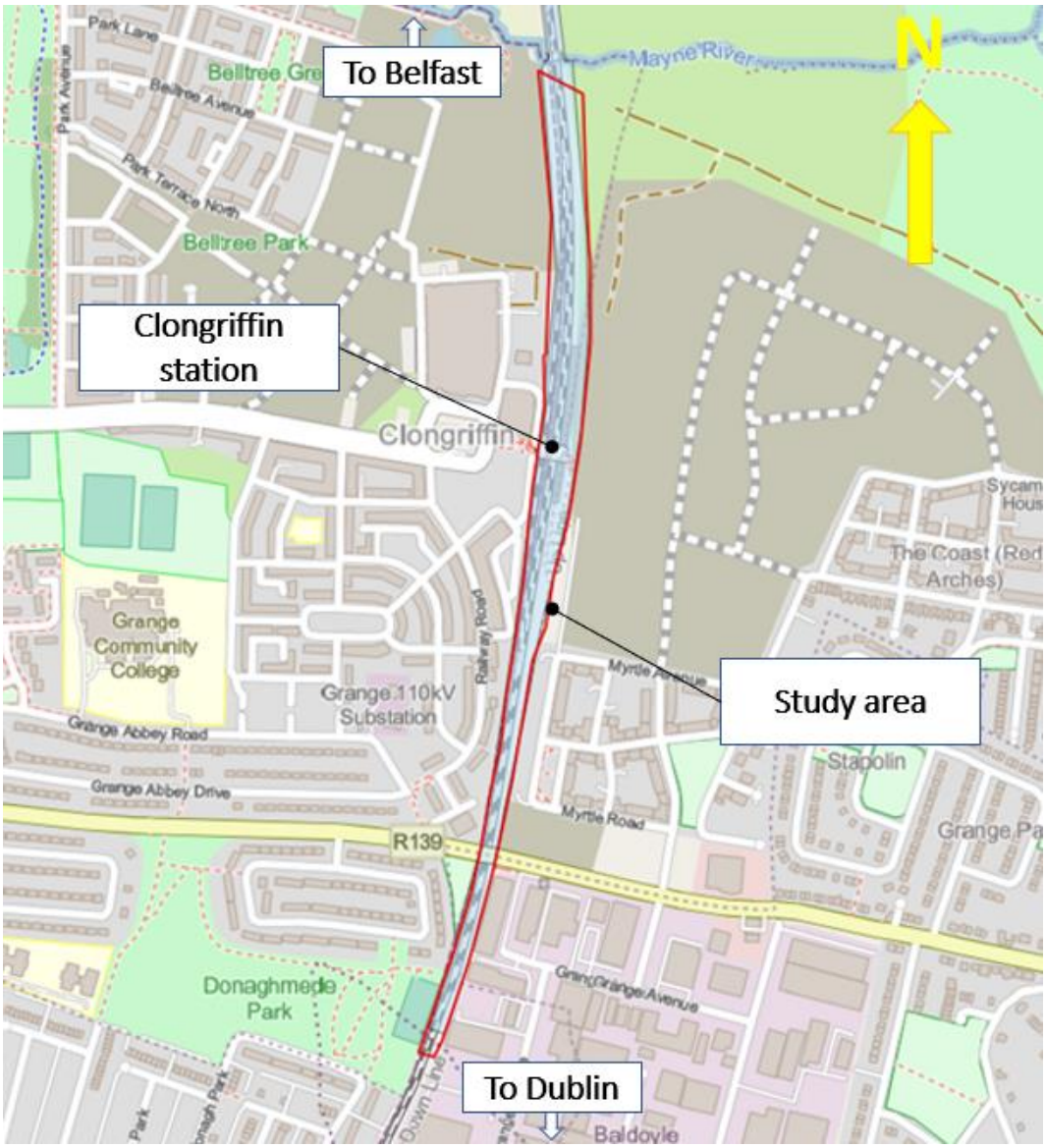

Figure 2-13: Aerial view showing the extent of the site over which ground conditions have been considered. (Map data © OpenStreetMap contributors, Map layer by Esri)

2.6 Environmental

The existing Clongriffin Station is located in Clongriffin town, which is on the northern fringe of Dublin. The town is within the administrative area of Fingal County Council, located to the north of Donaghmede, approximately 5 km east of the M1/M50 interchange and to the west of the former Baldoyle racecourse.

Much of the area to the west of the existing station and rail line is well developed, with residential and commercial development in the vicinity. There is further development planned/underway to the east of the existing station, where lands are zoned for residential development in the current Fingal Development Plan 2017 – 2023. Refer to *Annex 3.1 Constraints Report* for details of relevant existing

planning applications. Areas to the north (east and west of the existing railway line), are currently zoned as high amenity areas.

The River Mayne crosses under the railway line approximately 1km north of the existing station before discharging to the Baldoyle Estuary to the east. The estuary here is part of the Baldoyle Bay Special Area of Conservation (SAC) - Site Code 000199 - as well as forming part of the Baldoyle Bay Special Protection Area (SPA) - Site Code 004016. There are also a number of other European sites in the wider area, including both SPAs and SACs.

A brief overview of the baseline environment, under key environmental criteria, is provided in the following sections.

2.6.1 Traffic and Transportation

The site encompasses Clongriffin Station, which is an important commuting interchange catering for DART (Dublin Area Rapid Transit), Commuter Rail and bus services.

DART services operate along the Malahide - Dublin - Bray line; Commuter Rail services along the Dublin – Belfast line. Bus services are provided through route 15 and H1 (closest bus routes serving the station). The first runs from Ballycullen Road to Clongriffin Station (stop located approx. 100m from the station); whilst the second runs from Abbey Street Lower to Red Arches Rd. Baldoyle Industrial Estate is the closest stop, at approximately 750m from the station).

The site is accessible by local roads from both the east and the west. These are generally of a good standard and capable of accommodating construction vehicles. The nearest road link of regional importance is the R139/R809 that connects Baldoyle in the east with the M50/M1 junction in the west. A Park and Ride facility (400 bays) is located around 100m from the station (Clongriffin Park and Ride Car Park). It operates Monday-Friday (6am - 9:30pm), Saturday (6am - 1pm), and Sunday (8am - 4pm).

2.6.2 Landscape and Visual impact

The works area is located between the emerging residential areas of Clongriffin to the west of the railway and Stapolin to the east. North of these residential areas, the railway corridor crosses the River Mayne and the R123 Moyne Road with existing agricultural/planned open space lands to either side.

The lands east of the railway corridor and north of the Stapolin development areas (encompassing the River Mayne and the now abandoned Baldoyle Racecourse) are zoned as High Amenity and will form part of the planned ‘Racecourse Park’. This public park will serve the emerging residential communities in the area. The site of the former Stapolin House (demolished) is to be incorporated into a future open space. Development at Stapolin and the former racecourse lands are subject to the provisions of the Baldoyle/Stapolin Local Area Plan (extended).

The landscape is visually open and influenced by its near coastal location. The on-going emergence of primarily residential developments at Clongriffin and Stapolin is a prominent feature.

Other than security fencing, the boundary of the railway corridor is open to either side of Clongriffin Railway Station. Further north, the corridor is bounded by hedgerows and security fencing.

The Fingal Development Plan 2017-2023 identifies an objective to preserve views along the R106 Coast Road, circa 1km east of the railway. The development plan also includes a local objective (No. 95) on the lands at Stapolin, which states: '*Ensure that the visual impact of any development on the Greenbelt will be minimised by its siting, design and planting'*. Underbridge UBB19 which carries the railway over the River Mayne, is recorded as a Protected Structure ('No. 0919: Mid-19th century double-arch railway bridge').

Along the east side of the station, a notable drop in topography exists between the station platform level and the level in the adjacent land plot.

2.6.3 Archaeology and cultural heritage

The Record of Monuments and Places (RMP) shows no recorded monuments (i.e. no RMP sites) located within the area proposed for railway improvement works. The nearest is a cluster of newly revealed archaeological sites in Grange townland, approximately 180m to the west of the railway line, comprising an enclosure site and two burnt mounds, all of which are now built over (DU015-064001, -096 & -097) (License Nos. 04E0342 and 04E0367).

Until the end of the 20th century, the study area had been open green fields set within a coastal and riverine context, all environments that have an inherent archaeological potential. This potential is borne out to the north and west in the townlands of Grange, Maynetown and Drumnigh, where there are recorded archaeological sites, in addition to more recently discovered sites identified through geophysical survey and archaeological testing. However, whilst this suggests that the wider area was a focus for both prehistoric and historic activity, archaeological investigations conducted for the Local Area Plan (LAP) lands at Clongriffin to the east of the railway line have, revealed nothing of archaeological significance as yet.

There are no sites of cultural heritage interest located within or in the vicinity of the proposed development lands. Of an industrial heritage interest, the Dublin and Drogheda Railway began operating in 1844. The Fingal Industrial Heritage Survey (FIHS) does not include the railway line itself as an item of industrial heritage interest, though it does list the 19th century stations located along it; none of the stations are located in the vicinity of the proposed works.

A review of aerial photography (Digital Globe 2011-2013 and Google Earth Pro 2020) shows that today, the area is characterised by construction activity associated with modern housing developments.

2.6.4 Architectural Heritage

The site of Clongriffin Station comprised open fields prior to the construction of the Dublin and Drogheda (D&D) Railway in 1840 to 1844. The D&D Railway would eventually extend to link Dublin to Belfast with the completion of the Boyne crossing in 1855, merging to form the Great Northern Railway of Ireland (GNR(I)) in 1876, and operated by Iarnród Éireann (Irish Rail) since 1987.

Following the construction of the railway, the surrounding lands remained in agricultural use until the implementation of the Northern Fringe Development plan began in 2005. Clongriffin Station was built under the Plan, designed by Iarnród Éireann Architects and Pascall and Watson architects, and opened in 2010. It comprises four platforms and features an elevated concourse.

No features of built-heritage interest have been identified as part of the preliminary desk-based baseline review of the study area at Clongriffin Station. There are no Protected Structures, no buildings or features included in the National Inventory of Architectural Heritage (NIAH) Building Survey in relation to the Station. The area is not included in an Architectural Conservation Area or a Conservation Area. Underbridge UBB19, which lies approximately 440m north of the station, is listed as a protected structure in Fingal County Council's Development Plans.

One designed landscape was identified to the east of the station. This is the landscape associated with the now demolished Stapolin House, which was situated approximately 450m to the east of Clongriffin Station. The house included a small demesne landscape which is included in the NIAH's Garden Survey (NIAH 2534). As shown on the first edition Ordnance Survey maps surveyed c.1847, Stapolin House was set in parkland, with outbuildings and walled gardens to the rear or north, and entrance with gate lodge to the south, approaching the house via a long, tree-lined avenue. The boundary of the designed landscape was approximately 300m to the east of the modern Clongriffin Station. The remains of the house were demolished under the Baldoyle Stapolin Local Area Plan, 2013, though features of the historic landscape are retained within the modern development.

2.6.5 Noise and Vibration

The existing noise and vibration levels in the vicinity of Clongriffin Station are influenced by operations at the station. This includes passenger and freight trains passing through the station, passenger trains stopping at the station, and existing rail infrastructure at the station, including points and crossings.

Both passenger and freight trains operate on the line passing through Clongriffin Station, with passenger trains stopping at Clongriffin Station, and freight and passenger trains passing through the station.

The speed limit on the existing line also influences the existing noise and vibration levels. Clongriffin Station comprises two lines, namely the Down and Up Belfast Lines, with a current line speed of 90mph. In addition to the main lines, a passing loop is provided to the east of Clongriffin Station affording access to Platform 3; this loop line has a line speed of 20mph.

The existing rail line in the vicinity of Clongriffin Station includes points and crossings to the south and north of the station.

There are existing noise and vibration sensitive receptors in the vicinity of Clongriffin Station, including apartment buildings, houses, and commercial premises to the west, south-west, and south-east of Clongriffin Station. There are also new residential developments proposed on the eastern side of the station.

2.6.6 Air quality and climate

The nearest Environmental Protection Agency (EPA) air quality monitoring station to Clongriffin Station is located in Swords. The quality of air in Swords in 2019 was very good with measured concentrations of pollutants well within air quality standards.

The Climate Action and Low Carbon Development (Amendment) Act 2021 supports Ireland's transition to Net Zero and achieve a climate neutral economy by no later than 2050. It commits to a reduction of 51% in the total amount of greenhouse gas emissions by 31 December 2030, relative to 2018 emissions.

2.6.7 Agricultural and Non-Agricultural Land

Agricultural Land

Farms in County Dublin are larger than the national average. There are fewer dairy and other livestock farms and more tillage farms. In the environs around Clongriffin Station. there is no agricultural land.

Table 2-1: Agriculture in County Dublin (2010[1] Agricultural Census, Central Statistics Office (CSO))

Farm enterprise type (Table 2, 2010 Ag Census, CSO)	Co Dublin	Nationally
Mainly dairy	3.5	11
Non - dairy grazing livestock (beef cattle) and mixed field	65	72.5
Mainly tillage	25.5	3.5
Mixed crops & livestock	3	2
Other	1	1
Total	100	100
Average size (ha)	47.6	32.7

[1] The proposed 2020 Agri Census was postponed due to Covid-19 and therefore the 2010 census is the most recent enterprise type data for County Dublin.

Non-Agricultural land/population assessment

Clongriffin Station is located immediately beside a recently built apartment development on Station Hill and within 75m of a recently built apartment development along Station Street, Dargan Street and Clongriffin Road. This development includes a small mosque and the Tasnuva Foundation which aims to further the integration of ethnic communities in Ireland. The station is also within 100m of relatively new residential development on the Beau Park Estate and a Park and Ride facility. Further residential development is placed to the east of the railway

tracks. The station in within 1.5km of the Coast Road and the Baldoyle to Portmarnock Walking and Cycle Way to which it provides good access.

There are permitted developments for mixed use urban centre for the area directly east of the station. This comprises 882 residential units and 3,314 sq.m of non-residential space (commercial, restaurants, play areas, storage units). This application was approved in 2017 and amended most recently in 2021.

Also in the vicinity of Clongriffin Station, immediately to the south west, is an area with an approved planning application for the development of 139 apartment units and 5 retail units within a building ranging from 6 to 16 floors. This application was approved in 2017.

2.6.8 Geology and Soils

The expected ground conditions at Clongriffin are outlined in section 2.5 with the area predominantly underlain by made ground over glacial till deposits with limestone bedrock at depth; along the Mayne River overlying alluvial deposits are expected to be present.

The Corine Land Cover 2018 classifies the land use in the area around Clongriffin DART Station as construction sites (now recently completed residential developments and discontinuous urban fabric with industrial and commercial units). The geomorphology of the study area comprises mega scale glacial lineations, meltwater channels and deglacial landforms. The existing Mayne River overlies a meltwater channel.

2.6.9 Water resources

Surface water bodies

The study area is within the Mayne_010 river sub-catchment. The River Mayne crosses under the railway line approximately 1km north of the existing station in an easterly direction and discharges to the Mayne Estuary, a transitional waterbody. The estuary is part of the Baldoyle Bay SAC and Baldoyle Bay SPA. No other surface water features have been identified at the site area.

The Q-value system describes the relationship between water quality and the macroinvertebrate community in numerical terms. Q5 waters have high diversity of macroinvertebrates and good water quality, while Q1 waters have little or no macroinvertebrate diversity and poor water quality. Nearest to the study area, water quality is monitored in the Mayne River at Wellfield bridge 1km upstream from the site. Since 1988, the water quality has been assigned as either Q2 or Q3, with the latest measurement being assigned as Q3. For the purposes of assigning water quality and 'Ecological Status' under the Water Framework Directive (WFD, 2000/60/EC), this equates to a WFD classification of Poor, as a moderately polluted watercourse with an impoverished pollution tolerant fauna evident in low numbers. Under the WFD, the minimum objectives for a water body are to achieve at least Good status (or Good potential for artificial/ highly modified water bodies), and no deterioration of existing status. The river is classified as 'At Risk', indicating that the waterbody may not maintain that status.

Groundwater

There are no significant karst features identified near the site. The site is underlain by Dinantian Limestone which is part of the Malahide Formation. The aquifer is classified as a locally important (Ll) aquifer which is Moderately Productive only in Local Zones. The groundwater vulnerability at the site is low and there is low potential for groundwater recharge through the low permeability soil.

The study area lies within the Dublin (WFD Code: IE_EA_G_008) groundwater body. The groundwater body spans across Dublin City into County Kildare and County Meath. Groundwater flow in the water body is towards the River Liffey and the coast. The Dublin groundwater body is currently at Good WFD Status for the 2013-2018 monitoring cycle and currently Not at Risk with regard to achieving its WFD objectives.

There are no high yielding water supply springs and wells i.e., public water supplies or group water scheme supplies within the site. No Source Protection Zones associated with public, or group groundwater supply schemes are located with the site.

Flooding

Historical flooding has been assessed by examining reports and maps from the Office of Public Works' (OPW) National Flood Hazard mapping. There are no records of flood events within the site area. The closest flood event to the site occurred on Grange Road in November 1982.

Risk of flooding from the River Mayne has been assessed and mapped by the OPW as part of the Fingal East Meath Flood Risk Assessment and Management (FRAM) study. According to the OPW predictive flood maps (floodinfo.ie), the site is shown to be located adjacent to areas at medium and high risk of fluvial flooding. The River Mayne flows underneath a railway line bridge. According to the maps, there is no risk of fluvial flooding on the line. The risk of tidal flooding is low. There is a localised risk of pluvial flooding at the Clongriffin Station, potentially caused by ponding or poor drainage.

2.6.10 Biodiversity

The works location is at the existing Clongriffin railway station which is set within the residential area of Clongriffin and includes some partially completed residential developments. Baldoyle Bay lies a short distance to the east and the Mayne River, which traverses the works area, drains into Baldoyle Bay. Attenuation ponds (presumably serving the adjacent residential developments) are located to the east and west of the works area. The area between Baldoyle Bay and the works area is taken up by grasslands, scrub and sports pitches within the Baldoyle Racecourse Park.

The nearby Baldoyle Bay is designated as a Special Area of Conservation, a Special Protection Area and a proposed Natural Heritage Area, as shown on the maps below.

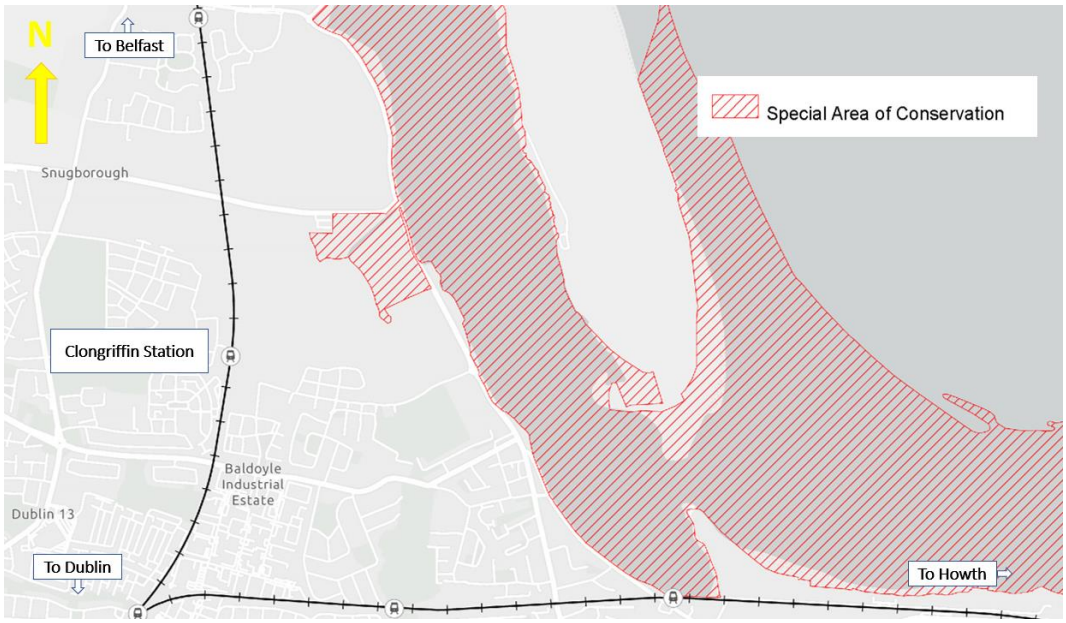

Figure 2-14: Baldoyle Bay Special Area of Conservation

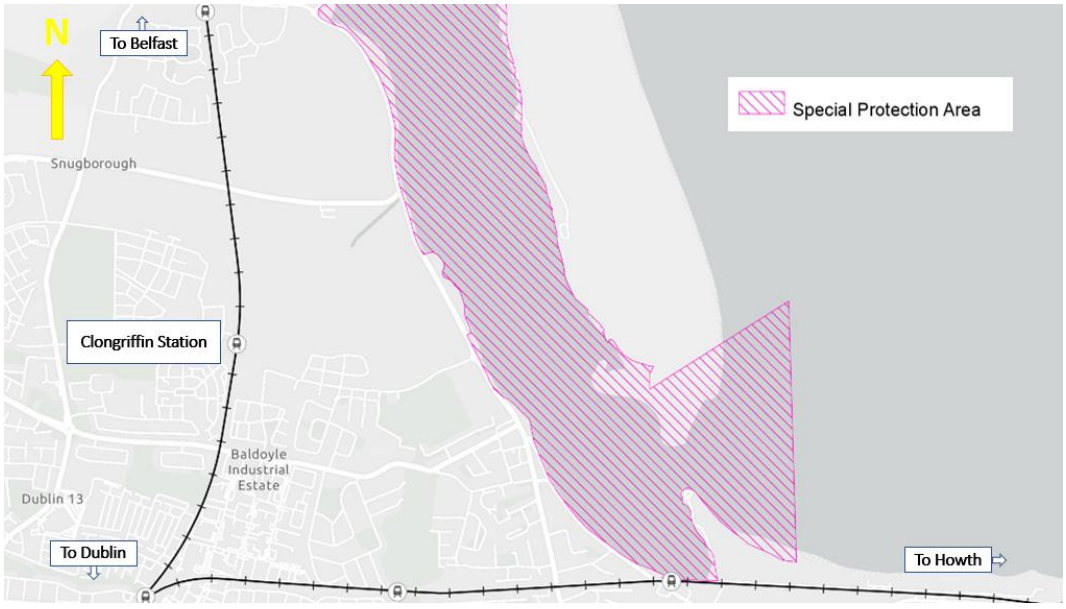

Figure 2-15: Baldoyle Bay Special Protection Area

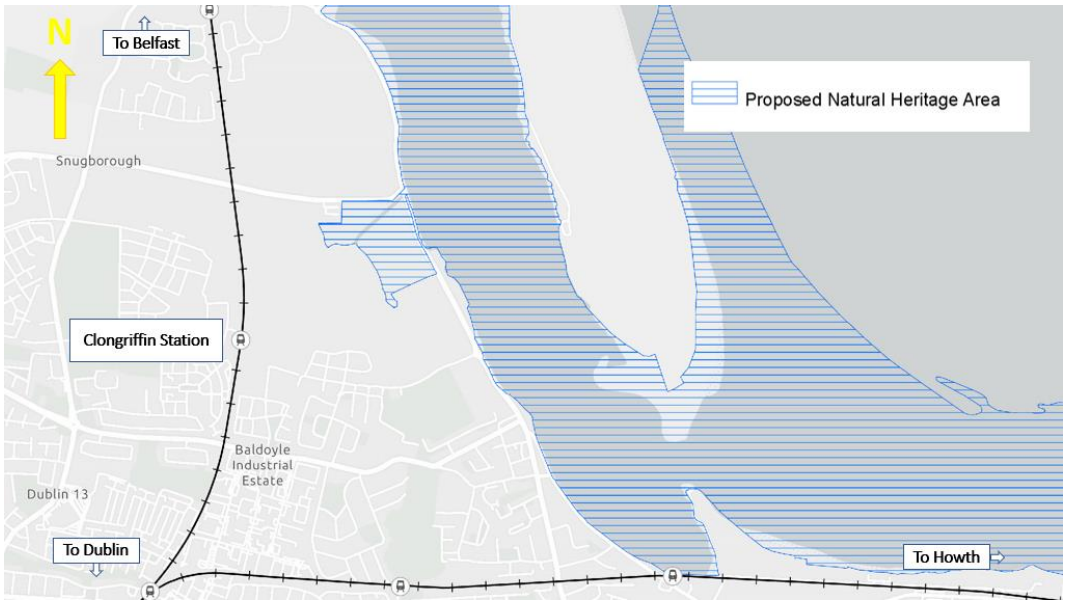

Figure 2-16: Baldoyle Bay proposed Natural Heritage Area

2.7 Utilities

There are extensive utility networks in the area, typical of an urban environment such as that surrounding Clongriffin Station. Service providers with network assets in the area, from whom records have been obtained, include:

- Gas Networks Ireland;
- Irish Water (Water Supply);
- Irish Water (Foul Water Sewers);
- Dublin City Council (Storm Water Sewers);
- Fingal County Council (Storm Water Sewers);
- ESB Networks - Low and Medium Voltage Network;
- Eir;
- BT Ireland;
- Lineside cables running along the length of the railway line.

Utility service records have been obtained from all providers in the area. Most services are located within the existing street network surrounding the railway, and railway line bridge crossing at Grange Road Bridge (OBB18). All records should be considered indicative only and must be verified prior to any intrusive works occurring.

The records indicate that there are services at track level or within the railway corridor. These include possible data cable/fibre optic running parallel to the railway that are not indicated as crossing the railway in the immediate vicinity of Clongriffin Station.

There is an existing ESB Networks medium voltage electrical line running parallel to the railway and crossing under the railway to the south of Clongriffin Station. This goes from Railway Road on the west side of the railway to Myrtle Close on the east side.

There is an existing 450mm diameter ductile iron watermain running under the railway to the north of Clongriffin Station. Close to this watermain there is also an existing stormwater culvert running under the railway. Both go from Marrsfield Avenue on the west side of the railway to the future development area on the east side.

3 Requirements

3.1 Specific Requirements

In addition to the general feasibility requirements of constructability and safety, this section describes the specific requirements for this area to achieve the project Train Service Specification – referred to as TSS 1C. In order to achieve TSS 1C, Clongriffin Station must, as a minimum, be able to handle the following quantum and pattern of train services:

- 2 trains per hour (TPH) DART terminating/departing services;
- 7 TPH DART through services;
- 2 TPH Diesel Multiple Unit (DMU) through services;
- 1 TPH Enterprise non-stop through service.

To match with more constrained pathing requirements around Connolly and the Loop Line between Connolly and Pearse Stations, the 2 TPH terminating/departing services must dwell for long periods in platform. This timetable requirement means that it would be difficult to operate TSS 1C at Clongriffin Station with fewer than two dedicated turnaround platforms. In addition, due to the 10 TPH through services, it would be impractical to operate Clongriffin Station with fewer than two dedicated through platforms.

3.2 Systems Infrastructure and Integration

Overall Signalling, Electrification and Telecommunications (SET) requirements are defined in the functional requirements specifications for the DART+ Programme. These documents support IÉ SET standards covering the requirements for the signalling, electrification and telecommunication (telecoms) and may need some adaptation to the conditions that are peculiar to the Clongriffin Station development.

Changes and additions to the signalling, telecoms and OHLE will be required to support operation over additional and special trackwork. Signalling will be adapted to enable the safe and efficient use of new routes to support the operation according to the new track configuration selected.

Similarly, additional OHLE will be installed and/or adapted to ensure that Electric Multiple Units (EMUs) are able to fully utilise the revised track layout using components that are similar or identical to the existing installation comprising galvanised masts and suspension equipment providing a nominal contact wire height of approximately 4.7m.

Figure 3-1: Example of existing OHLE cantilever support

Telecoms changes will be required to support the communication between additional/new equipment providing passengers with enhanced information and considering new operating patterns that can be provided by an altered layout.

3.3 Design Standards

Table 3-1 contains some of the applicable standards that will be used to develop the design. This list of standards is not exhaustive and other IÉ Standards may be used.

Prior to completing the detailed design, Arup will undertake a fully detailed risk assessment in accordance with The Commission of Railway Regulation (CRR) mandatory requirements as set out within the documents listed below:

- CRR-G-009-G: Guideline for the Process of Authorisation for Placing in Service of Railway Sub Systems;
- CRR-G-009-G Sections 2.2.3 – 2.2.4: Guideline providing List of Parameters and Requirements for Authorisation for Placing in Service (APIS) of Heavy Rail INF & related OPE/MAI Parameters.

Table 3-1: Design Standards

Source	Description	Comments
European Commission Regulation	EU/1299/2014	Technical Specification for Interoperability for the 'Infrastructure' subsystem
European Commission Regulation	EU/1302/2014	Technical Specification for Interoperability for the "rolling stock subsystem - Locomotives and passenger rolling stock"
Irish Rail	I-PWY-1101	Requirements for Track and Structures Clearances
Irish Rail	CCE-TMS-300	Track Construction Requirements and Tolerances
Irish Rail	CCE-TMS-340	Horizontal Curvature Design
Irish Rail	CCE-TMS-341	Vertical Curvature Design
Irish Rail	CCE-TMS-344	Requirements for Undertrack Crossings and Pressure Pipelines
Irish Rail	CCE-TMS-345	Engineering Requirements for Passenger Platforms and Barrow Paths
Irish Rail	CCE-TMS-410	Civil Engineering Structures Design Standard
Irish Rail	CCE-TRK-SPN-007	Specification for Track Ballast
Irish Rail	CCE-TRK-SPN-021	Specification for Permanent Way Signs
Irish Rail	MAY-MDC-ELE-DART-SP-E-0002	Electricity Functional Specifications System-Wide
Irish Rail	MAY-MDC-TEL-DART-SP-Y-0001	Telecommunications Generic Functional Requirement Specification DART Wide

Source	Description	Comments
Irish Rail	MAY-MDC-SIG-DART-SP-E-0001	Signalling Functional Requirements Specifications System-Wide
Irish Rail	MAY-MDC-LVP-DART-SP-E-0001	SET Electricity Functional Specifications System-Wide for LV Power

4 Constraints

This section describes the constraints that are relevant to this package of work.

4.1 Technical

The technical constraints are described in the following sub-sections.

4.1.1 Permanent Way and Track

No constraints have been identified. The area uses standard track units.

4.1.2 Geotechnical

A number of historic Ground Investigations (GIs) have been completed at and alongside the railway line. These do not appear to indicate the presence of onerous ground conditions. However, made ground is noted to be present and recent developments in the area (post 2005) may have resulted in changes to the upper stratigraphy. Alluvium deposits may be present to the north of the site in the vicinity of the Mayne river. Site specific ground investigation is required at the location of the proposed works to investigate the current strata type and strength.

Furthermore, no geoenvironmental information is available on these strata. Material excavated during the works may not be suitable for reuse on site and may require disposal or recovery to a suitably licenced facility. Recent site walkovers (for GI scoping) have identified the presence of mounds of material (crushed stone, clays and concrete) outside the fencing at the north-eastern end of the station - see Figure 4-1.

Figure 4-1: Mounds of material near the north end of platform (view north taken 07/08/2021)

4.1.3 Structures

This area currently accommodates a two-track railway with three tracks through the station. Any reconfiguration of the horizontal track alignment or increase in the number of tracks may require alteration to the structures in the area as described in Table 4-1.

Table 4-1: Structural constraints along the site

Name	ID	Function	Constraint
18 Grange Rd / Shaws Bridge / Talevera	OBB18	Overbridge	Any alteration to the tracks at this location may require a modification to the bridge should additional width be required here.
18A Stream	UBB18A	Culvert	Details of this culvert are currently unknown but it is anticipated that any significant modifications to the horizontal alignment or number of tracks will require modification to this culvert.
18B Stream	UBB18B	Culvert	It is anticipated that any significant modifications to the track alignment or earthworks will require modification to this culvert.

Name	ID	Function	Constraint
Access road at Clongriffin Station	OBB18C	Overbridge	The bridge spans the tracks, with piers located on the platforms and in the cess. The position of the piers form a constraint to any significant modification of the track or platforms through the station - see Figure 2-5. Further investigation is required to confirm whether OHLE provision is possible beneath the bridge. The existing bridge drawings indicate that the piers were set out to accommodate a new potential track running along the platform edge, providing a minimum horizontal clearance of 4.5m between pier and outer running rail.
Clongriffin Station Building	OBB18D	Overbridge	The bridge spans the central tracks between Platforms 1 and 2 with piers located on each platform. The position of the piers forms a constraint to any significant modification of the platforms through the station.
19 Mayne River & Cattle Pass - Protected	UBB19	Underbridge	Any significant alteration to the track at this location may require widening of the structure or construction of a new structure adjacent to the existing. The structure is listed as a protected structure in Fingal County Council's Development Plans.
19A Culvert	UBB19A	Culvert	Details of this structure is currently unknown but it is anticipated that any significant alteration to the track at this location may require widening of the structure.

4.1.4 Utilities

Utility locations are a consideration when designing and implementing a new turnback (whether at an existing station or elsewhere along the railway line), as this usually requires all the existing utilities in that location to be diverted – either temporarily or permanently. Underground services can impact on the placement of OHLE masts, as they must be placed on either side of the utilities and may not be placed on top of them. Above ground utilities that cross the railway line overhead can impact on the minimum clearance required by the OHLE.

As outlined in section 0, there are several utilities traversing and alongside the existing rail corridor, within the study area for the works around Clongriffin Station. Most services are located within the existing street network surrounding the railway, and railway line bridge crossing at Grange Road bridge (OBB18). Underground utilities present are high voltage and medium voltage electrical cables, low pressure gas mains, telecommunications, watermains, wastewater sewers and surface water drainage networks.

There are lineside telecommunications running parallel to the railway in this area. There is an existing ESB Networks medium voltage electrical line running parallel to the railway and crossing under the railway to the south of Clongriffin Station. This goes from Railway Road on the west side of the railway to Myrtle Close on the east side.

There is an existing 450mm diameter ductile iron watermain running under the railway to the north of Clongriffin Station. Close to this watermain there is also an existing stormwater culvert running under the railway. Both go from Marrsfield Avenue on the west side of the railway to the future development area on the east side.

Options that involve adding an additional track and platform on the eastern side of Clongriffin Station could cause disruption to existing services. Construction work within the railway corridor to add additional track is likely to impact on the existing medium voltage electrical to the south of Clongriffin Station. It is also likely to impact the existing 450mm diameter watermain and the existing storm water culvert to the north of the station. It will be necessary to liaise with the relevant utility companies prior to construction to ensure that existing services are protected during construction, and that any diversions or outages are minimised.

The existing utilities in Grange Road and at Clongriffin Station are shown in Figure 4-2 below. The existing utilities in Strand Road to the north of Malahide Station are shown in Figure 4-3 below.

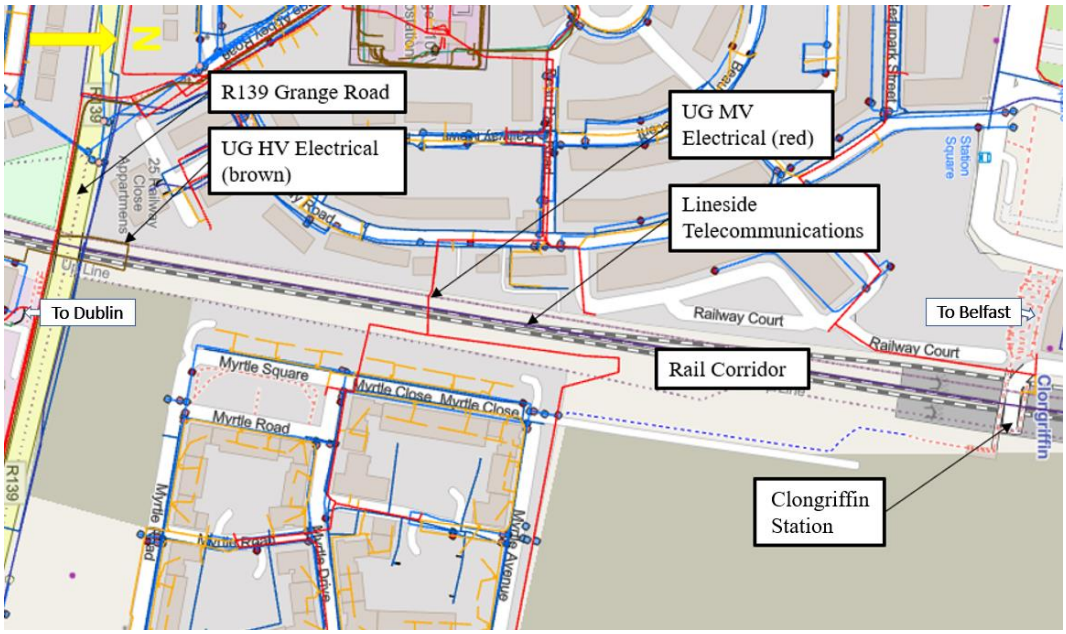

Figure 4-2: Existing Utilities to the south of Clongriffin Station

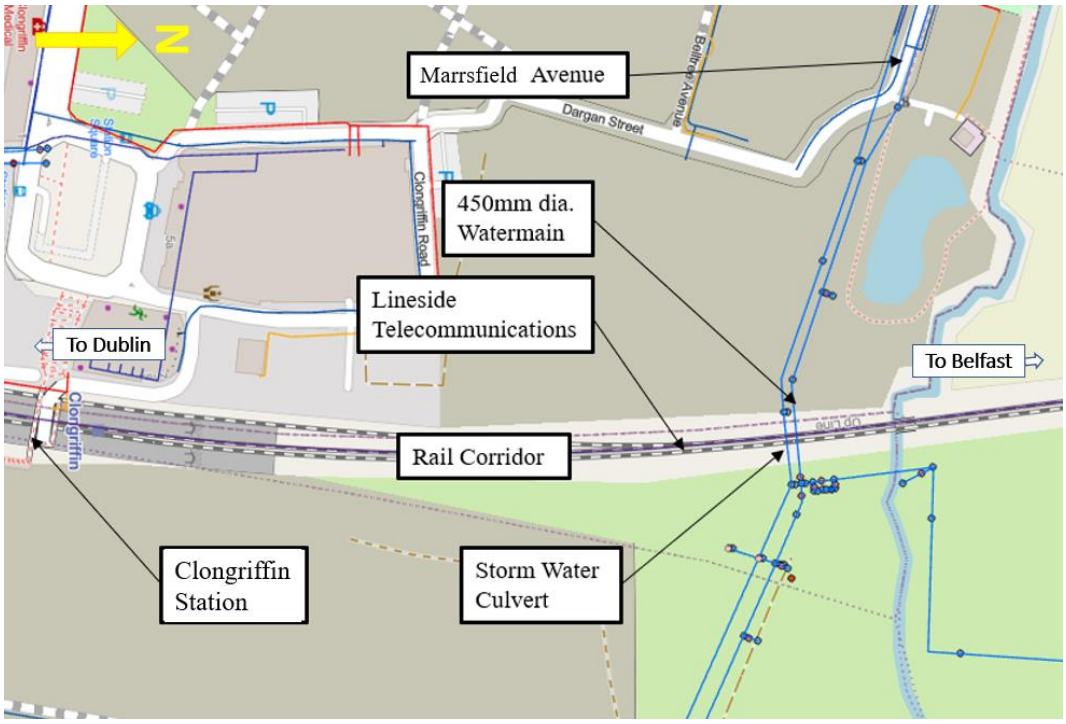

Figure 4-3: Existing Utilities to the north of Clongriffin Station

4.1.5 Other Railway Facilities

Signalling

The current signalling SSI interlocking is constrained to be only able to take 63 Trackside Functional Modules. This might be an insufficient number depending on the outcome of the chosen solution. Given the relatively young age of the installation, it is expected that there will be sufficient capacity to accommodate the additional requirements, however this will be confirmed in the next design stage.

The bi-directional signalling is also constrained due to the absence of a crossover to the Up Belfast Line from the Down Loop line.

The current Train Protection System CAWS/ATP is obsolete and is difficult to source. The existing TPS will be replaced with a new TPS based on the preferred solution identified by IÉ.

The Signalling Equipment Room at Portmarnock is also a constraint in terms of its physical size as there is not sufficient space to add a significant amount of equipment. Given that some additional equipment could be accommodated in the existing SER, as well as lineside, the need for an additional SER is not foreseen at this stage.

Telecoms

The main Telecoms constraint is that the Telecoms Operational network is constrained to the low number of available fibres. Currently IÉ only has 12 fibres along the Coastal Line. As part of the project, these will be replaced by two 96 fibre trunk cables throughout the length of the alignment.

Telecoms is also limited by the amount of space available in the TER at Portmarnock (Telecoms Equipment Room). As this stage the need for a new TER is not foreseen, but this will be confirmed at the next design stage once the telecoms design has been developed.

OHLE

The OHLE is constrained by the available capacity from the substation. Mast pole placements need to take utilities into account and be placed in such a way as to allow access to the utility infrastructure in the future.

4.1.6 Roads

No road constraints have been identified in the permanent scenario. During construction, access to the station and nearby residential and business areas must be maintained. Interface with the proposed development to the east and proposed road will need to be coordinated as designs develop.

A number of car parking areas and pedestrian facilities associated with the existing station need to be considered and accommodated by the proposed scheme's construction and operation.

The low speed and low traffic character of the surrounding streets will also need to be considered in the context of construction traffic. Traffic diversions may be necessary.

4.2 Environmental

For an overview of the existing environmental constraints for DART+ Coastal North refer to Annex 3.1 Constraints Report.

Section 2.6 above describes the baseline environment for the various options being considered under this package of work. Building on this information, the key constraints associated with the options being considered, under the various environmental criteria, are summarised below.

Archaeology and cultural heritage

The proposed lands for the railway development have been subjected to a number of disturbances related to the development of earlier phases of the Baldoyle-Stapolin LAP lands. Whilst this is likely to have reduced the archaeological potential, nonetheless, it is possible that archaeologically enriched soils, features and deposits may survive subsurface. Monitoring of topsoil-stripping associated with the proposed works will be undertaken as an archaeological exercise, to determine whether there are any archaeological features or deposits present. Archaeological monitoring, under licence to the Department of Housing, Local Government and Heritage (DHLGH) and the National Monuments Service (NMS), will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface.

Noise and vibration

The main noise and vibration constraint to development relates to the proximity of sensitive receptors to the works, during both construction and operation. Noise and vibration limits for construction and operation will be in place for nearby sensitive receptors. These will most likely be based on existing measured noise and vibration levels in the vicinity, as well as guidance from local councils, and the Environmental Protection Agency.

Noise and vibration monitoring will be undertaken during construction works, and during operation to ensure compliance with the limits is maintained.

Air quality and climate

The main air quality constraint to development relates to the proximity of sensitive receptors (dwellings, amenity areas, ecological sensitive sites, etc.) to the works during construction. There are a number of residential developments located on the western side of the station, with new residential developments proposed on the eastern side (F16A/0412 (SHD/011/20), 3634/16)).

Mitigation measures will be required during the construction phase to minimise dust impacts at sensitive locations.

In general, the modernisation and improvement of rail services will expand train capacity, thereby increasing the attractiveness of rail travel. This will reduce reliance on private car travel and contribute to reductions in carbon emissions.

Landscape and visual impact

The key landscape and visual constraints are:

- High Amenity lands to either side of the Mayne River, east of the railway;
- Trees and hedgerows bounding the railway corridor;
- The rail bridge over the Mayne River (Protected Structure);
- Protected Views along the R106 Coast Road; and
- Emerging residential communities and associated open space lands to either side of the railway corridor.

Architectural Heritage

No buildings or features of built-heritage interest were identified at or in the vicinity of Clongriffin Station.

Agricultural

In the environs around Clongriffin Station, there is no agricultural land – and therefore there are no agricultural constraints.

Non-Agricultural/population assessment

The proximity of residential development to the station satisfies planning objectives for compact development close to transport facilities. There is a potential constraint in terms of any increase in noise, particularly at night-time, however it should be noted that the existing environment already includes the main railway line.

Geology and Soils

Considering the location of the station both in the urban environment and in a railway setting, there are likely to be some sources of contamination within the made ground throughout the study area.

There are no Geological Heritage Areas identified in the study area around the station.

Water resources

The constraints to the development in terms of water resources include the River Mayne, the underlying locally important (LI) aquifer, areas at medium to high risk of fluvial flooding and the protected sites where changes to the watercourse could have a negative impact.

The site is in close proximity to the Baldoyle Bay SAC and SPA. One of the objectives of the SAC relates to the flooding regime, and specifically the natural tidal regime. The pioneer saltmarsh community at the SAC requires regular tidal inundation. Changes to the hydrological regime as part of the proposals could have a negative impact.

Biodiversity

Key ecological constraints in this area are the Baldoyle Bay SAC (460m downstream) and Baldoyle Bay SPA (935m downstream) which are designated for marine habitats and overwintering birds (see Figure 2-14 and Figure 2-15 in section 2.6 above) and the overlapping pNHA designation. These designate international and national biodiversity importance.

The qualifying interests (reasons for designation) of the Baldoyle Bay SAC and SPA are listed below.

Table 4-2: Baldoyle Bay SAC and SPA qualifying interests

Baldoyle Bay SAC	Baldoyle Bay SPA
• 1140 Mudflats and sandflats not covered by seawater at low tide • 1310 *Salicornia* and other annuals colonising mud and sand • 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • 1410 Mediterranean salt meadows (*Juncetalia maritimi*)	• A046 Brent Goose *Branta bernicla hrota* • A048 Shelduck *Tadorna* • A137 Ringed Plover *Charadrius hiaticula* • A140 Golden Plover *Pluvialis apricaria* • A141 Grey Plover *Pluvialis squatarola* • A157 Bar-tailed Godwit *Limosa lapponica* • A999 Wetlands

A number of inland feeding sites for wintering birds (primarily Brent geese) that are qualifying interests of adjacent SPAs occur in the area; the Red Arches playing pitches, an amenity grassland area, and the recently created brent goose fields also known as the "bird quiet zone" and a re-seeded area on the 'murrough spit' (see locations indicated by figure graphic below).

Works could cause disturbance to birds using these sites if the works occur during winter months, however the impacts are unlikely to be significant due to the distance from the proposed works and the likely nature of the works (unlikely to involve piling or other significantly noisy works).

Figure 4-4: Inland Feeding Sites for Wintering Birds (Brent Geese) in the vicinity of Baldoyle Bay SPA

Other potential ecological constraints include:

- The Mayne River which drains to Baldoyle bay
- Potential for roosting bats in the bridge structure crossing the Mayne River and other structures
- Vegetation (scrub, hedgerows or treelines) which may provide foraging, nesting, and commuting corridors for fauna species (e.g. birds, bats, small mammals)
- Potential for the railway to support interesting flora species and habitats due to the calcareous nature of the ballast and their often relatively undisturbed nature
- Potential for invasive species to occur along the railway line.

4.3 Planning

Clongriffin-Belmayne Local Area Plan (LAP) was published in 2012 and extended until December 2022.

The vision of the plan is to facilitate the development of a highly sustainable, mixed use urban neighbourhood with a distinct identity based around high quality public transport nodes.

The LAP areas are located on the northern border of Dublin City Council and are primarily zoned Z14, the objective of which is *"to seek the social, economic and physical development and/or rejuvenation of an area with mixed use of which residential and "Z6" (enterprise and employment) would be the predominant uses"*.

The main goal of the Plan in relation to movement and transport is:

"To promote ease of movement within and access to the area by incorporating a high quality, integrated transport network through improvements to the existing road, rail and public transport network, together with improved cycling and pedestrian facilities within the local area."

The key aims of the Movement and Transport Section of relevance are:

"To improve accessibility and maximise the use of public transport.

Cater not only for travel demand but also for reductions in congestion and pollution.

Place a stronger emphasis on sustainable forms of transport such as walking, cycling and public transport, particularly for short trips."

Objective MT05 is also relevant:

"To liaise with Irish Rail and promote greater frequency and enhanced services at Clongriffin Rail Station for commuters as the area continues to grow."

Clongriffin Station is recognised as a key development node with additional height and densities permitted in proximity to the station.

The DART + Coastal North project, including the upgrades to Clongriffin Station, complements the aims and objectives of the LAP enabling the development of a sustainable, mixed use urban quarter adjoining a high quality public transport node.

There are no policies, objectives or designated areas that would be directly impacted by the DART + Coastal North project at Clongriffin Station.

Refer to *Annex 3.1 Constraints Report* for details of relevant existing planning applications.

5 Options

The following section runs through the optioneering process from the longlist of options to the selection of the emerging preferred option. The option selection process is defined in the Preliminary Option Selection Report

5.1 Longlist of options

This section describes the options which have been considered at Clongriffin. The discussion is limited to items which will have a bearing on the development or selection of an option. A more detailed technical description of the works is included for the shortlisted options. It should be noted that, for track modifications that are essential to facilitate the increase in train services (i.e. the subject of this report), no 'Do-Minimum' option exists as some intervention is required in order to meet the project objectives and requirements.

The options which have been considered are summarised in Table 5-1.

Table 5-1: Longlist of options considered

Option	Description
Option 0	Do-Nothing
Option 1	Increased speed on Platform 3
Option 2	Terminating trains on Platform 3
Option 3	New low speed Platform 0
Option 3a	New low speed Platform 0 with new crossover
Option 4	New low speed Platform 0 with new double crossover
Option 5	New higher speed Platform 0 and 3
Option 6	New higher speed Platform 3

5.1.1 Option 0 – 'Do-Nothing' Option

'Do-Nothing' represents a scenario where infrastructure works and interventions to meet the project objectives and requirements are absent. For this option there will be no change to the current layout and terminating services will terminate at Platform 2. It should be noted that there is an existing 20mph restriction on turnout speeds which will remain.

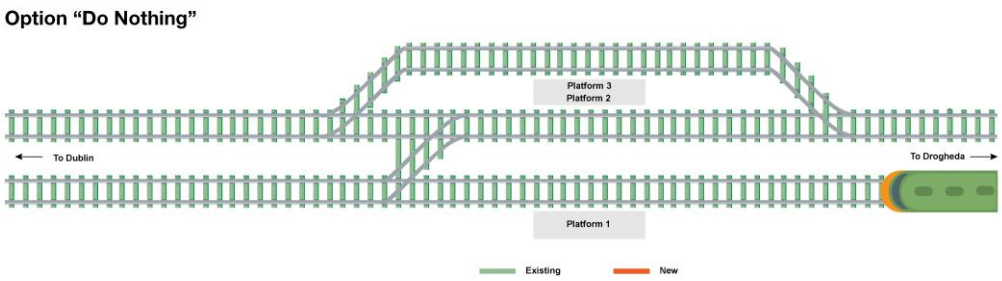

Figure 5-1: Schematic of 'do-nothing' option

5.1.2 Option 1 – Increased speed on Platform 3

Option 1 introduces a faster turnout speed through removal of the 20mph restriction and/or new points and crossings (P&C) to allow an improved approach of passing speed to Platform 3. Terminating services will terminate on Platform 2.

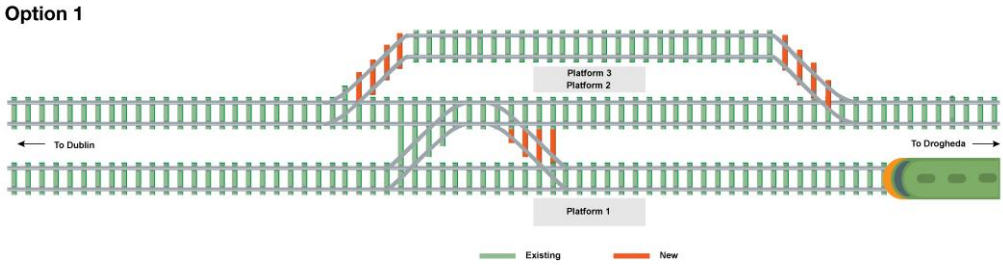

Figure 5-2: Schematic of Option 1

5.1.3 Option 2 - Terminating trains on Platform 3

In Option 2, an additional crossover is introduced to allow Platform 3 to be used as the terminating platform.

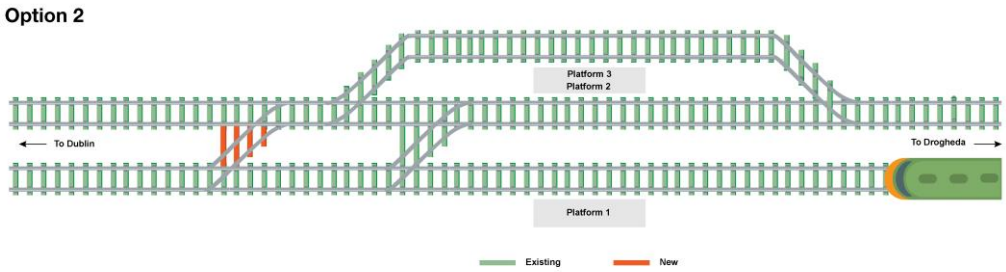

Figure 5-3: Schematic of Option 2

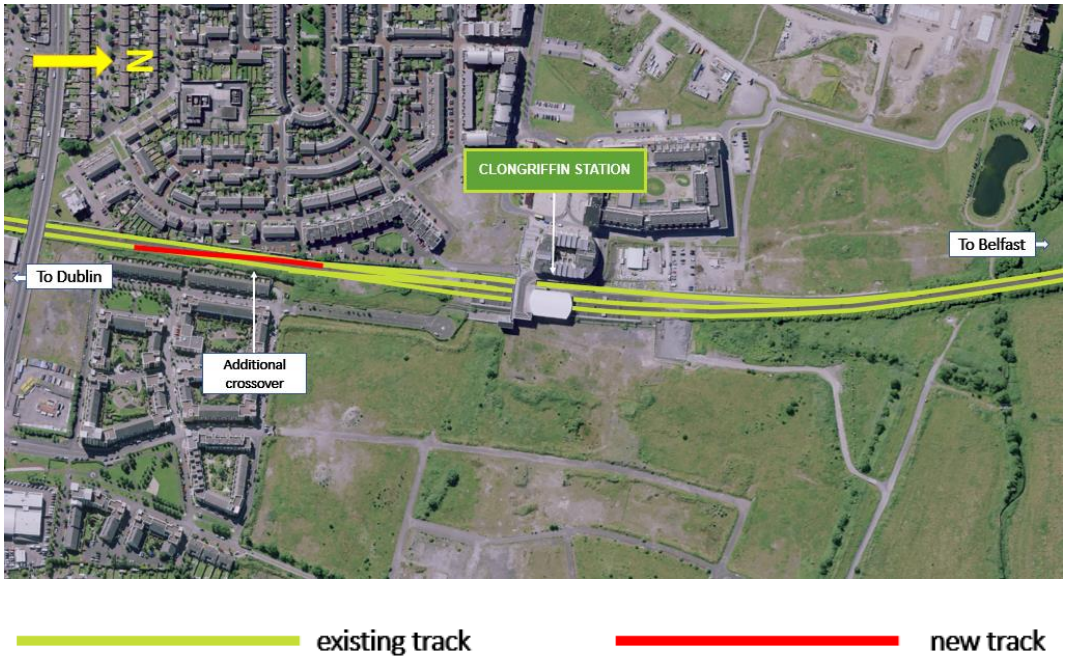

Figure 5-4: Aerial view of Option 2

5.1.4 Option 3 – New low speed Platform 0

For Option 3 a new low speed platform, numbered Platform 0 is introduced. In this option, terminating trains use Platforms 0 and 2. The platforms can also be used to hold a DART service to allow a non-stop service to pass. This option provides the additional benefit of allowing the Enterprise service to pass (at slow speed if the DART service is held on Platform 2, and the Enterprise passes on Platform 3). The use of Platform 0 for terminating services involves a length of bi-directional running from the Down Main. Trains would normally use Platform 2 to terminate to avoid conflicting moves.

There is also an alternative with a dead-ended Platform 0 to minimise land take at the expense of being able to pass services.

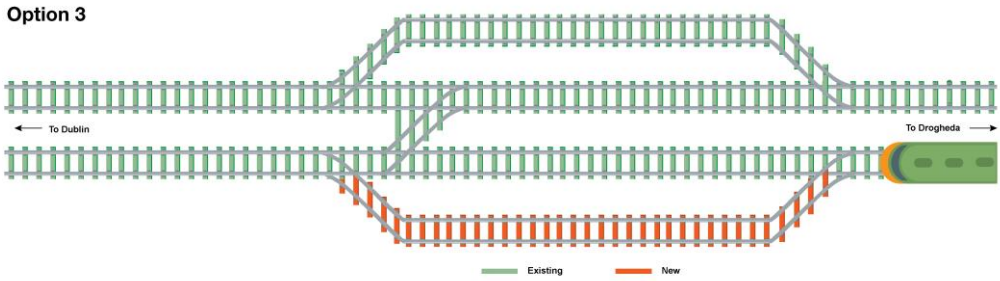

Figure 5-5: Schematic of Option 3

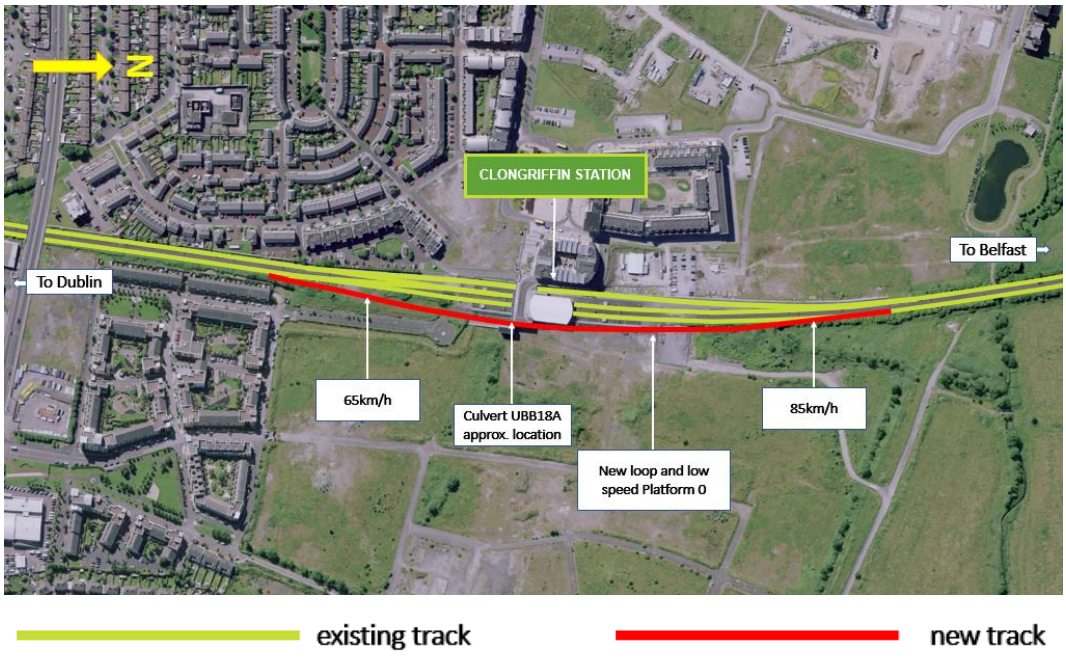

Figure 5-6: Aerial view of Option 3

5.1.5 Option 3a – New low speed Platform 0 with new crossover

For Option 3a a new low speed platform, numbered Platform 0, and a new crossover are introduced. In this option terminating trains will use Platforms 0 and 2. The platforms can also be used to hold a DART service to allow a non-stop service to pass. This option provides the additional benefit of allowing a non-stopping service to pass at speed on Platform 1. Trains would normally use Platform 2 to terminate to avoid conflicting moves.

There is also an alternative with a dead-ended Platform 0 to minimise land take at the expense of being able to pass services. There is a further alternative to use Platform 1 and 2 for terminating services (with through services using Platform 0 & 3). This is achieved by moving the proposed crossover and this would remove any conflicting moves but removes some flexibility.

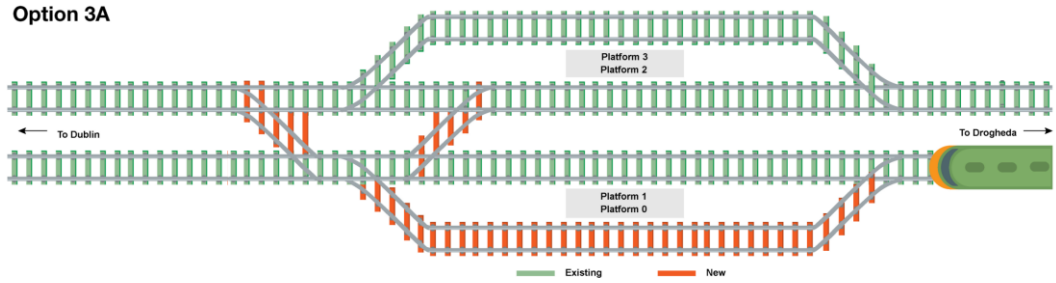

Figure 5-7: Schematic of Option 3A

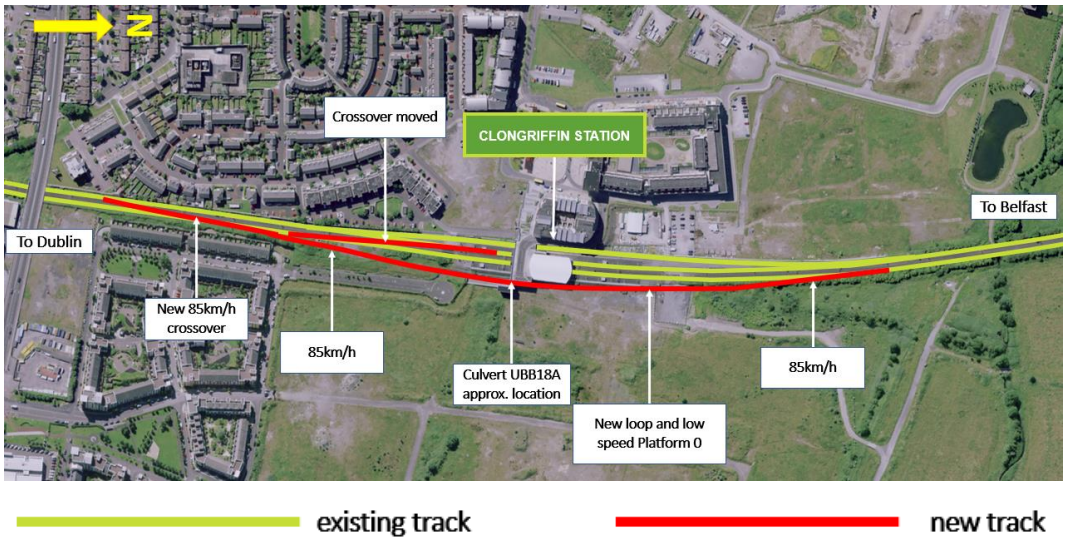

Figure 5-8: Aerial view of Option 3a

5.1.6 Option 4 – New low speed platform 0 with new double crossover

For Option 4 a new low speed platform, numbered Platform 0, and a new double crossover are introduced. Terminating trains will use Platform 0 and Platform 3, although the use of either platform would result in conflicting moves. In this option, the platforms can also be used to hold a DART service to allow a non-stop service to pass. It also provides the additional benefit of allowing non-stop services to pass a terminating service on platforms 0 and 3 at speed. It should be noted that taking an empty path of a terminating service north of Clongriffin is how non-stop services going north are expected to be timetabled.

There is also a variation with a dead-ended Platform 0 to minimise land take at the expense of being able to pass services and a diamond crossover could also be replaced with a pair of crossovers.

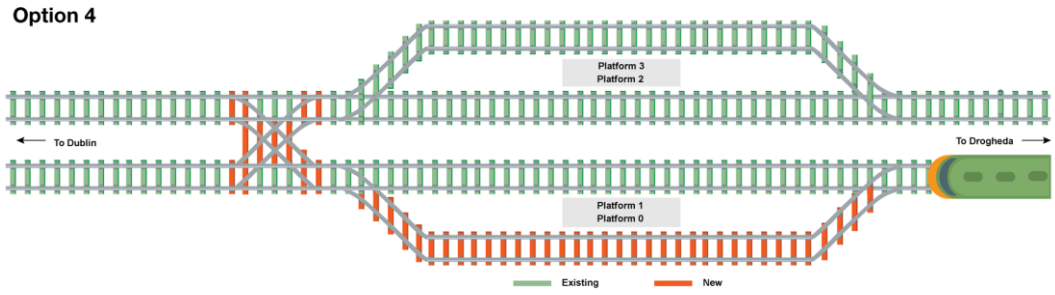

Figure 5-9: Schematic of Option 4

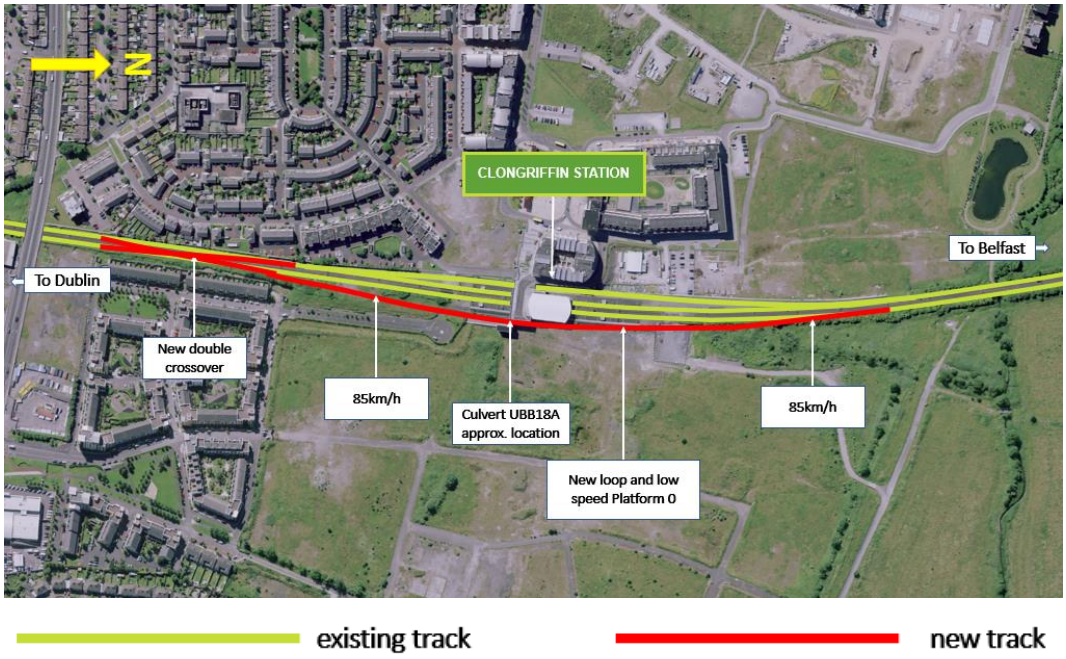

Figure 5-10: Aerial view on Option 4

5.1.7 Option 5 – New higher speed Platform 0 and 3

Option 5 involves the introduction of new higher speed Platforms 0 and 3. In this option the terminating trains would use Platform 1 and 2 and platforms can also be used to hold a DART service to allow a non-stop service to pass.

This option provides the additional benefit of allowing non-stop services to pass a terminating service on Platform 0 and 3 at speed. It should be noted that taking an empty path of a terminating service north of Clongriffin is how non-stops going north are expected to be timetabled. However, this option does require a new bridge over the River Mayne.

A variation on this option includes replacing the diamond crossover with a pair of crossovers.

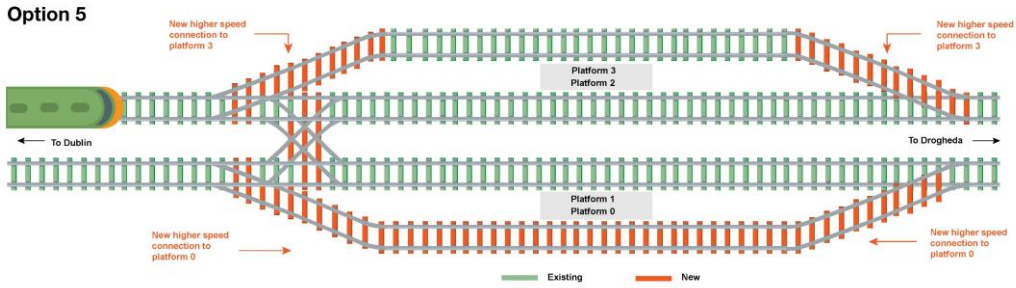

Figure 5-11: Schematic of Option 5

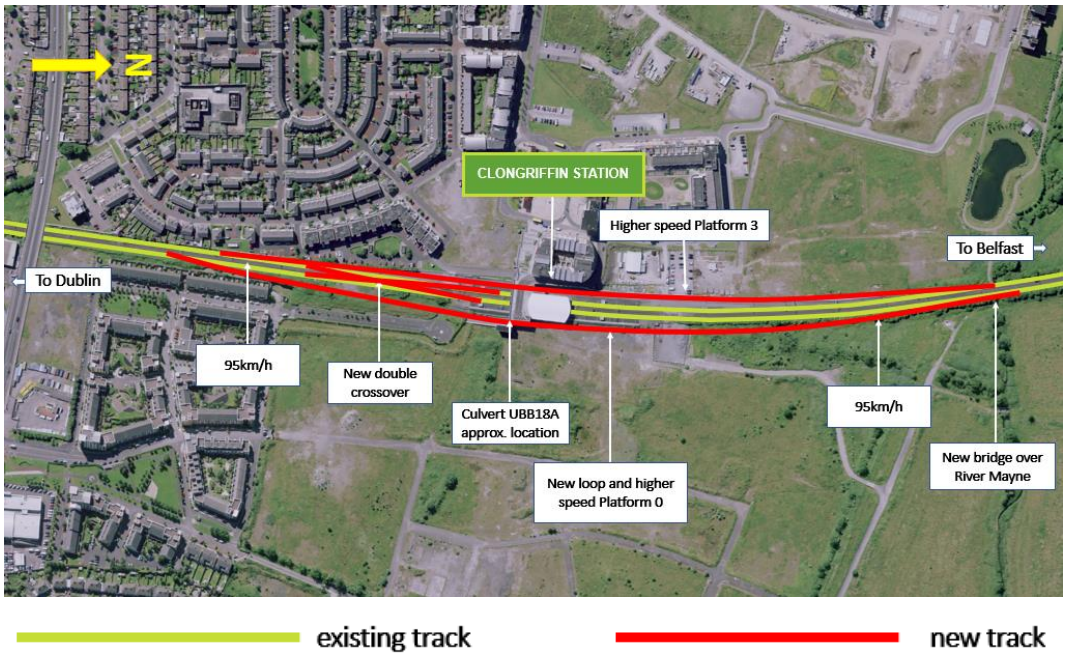

Figure 5-12: Aerial view on Option 5

5.1.8 Option 6 – New Platform 0 and higher speed Platform 3

Option 6 involves the introduction of a new Platform 0 and a new higher speed Platform 3. In this option, the terminating trains would use Platforms 0 and 2 and the platforms can also be used to hold a DART service to allow a non-stop service to pass.

This option provides the additional benefit of allowing non-stop services to pass a terminating service on Platforms 1 and 3 at speed. It should be noted that taking an empty path of a terminating service north of Clongriffin is how non-stops going north are expected to be timetabled.

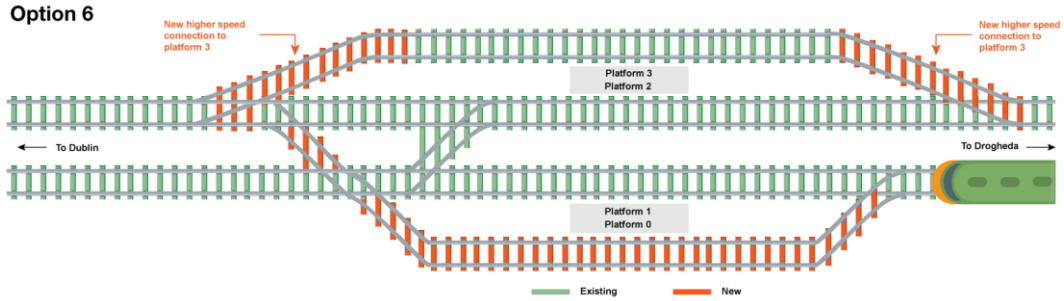

Figure 5-13: Schematic of Option 6

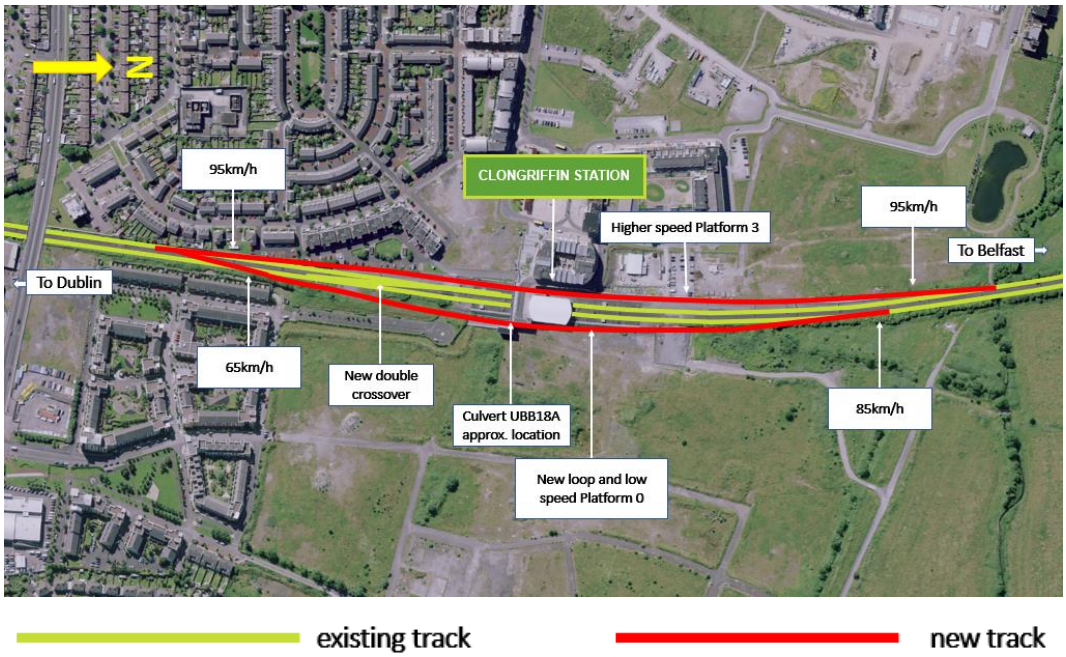

Figure 5-14: Aerial view on Option 6

5.2 Sifting of Longlist of Options

This sifting process considers the project objectives and project requirements. Each option presented in section 5.1 will be assessed on its ability to meet the project objectives and requirements.

The results of this screening process are presented in Table 5-2 and Table 5-3.

Table 5-2: Assessment of longlist of options against project objectives and requirements

Project objectives and requirements	Description	Do nothing option		Option 1 – Increased speed on Platform 3		Option 2 - Terminating trains on Platform 3		Option 3 – New low speed Platform 0		Option 3a – New low speed Platform 0 with new crossover	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable, electrified route to enable an increased DART service frequency between Drogheda and Central Dublin.	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• Extent of bi-directional running on Up Main would not allow DART services levels to be met, especially in times of perturbation	**Pass**	• Use of Platform 2 for normal terminating services minimises conflicting moves • No improvement for passing trains in the northbound direction from existing
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.	Pass	• No changes from current situation	Pass	• Minor improvements to service pattern possible through faster passing of non-stop trains	Pass	• No significant changes from current situation	Pass	• Minor improvements to service pattern possible through additional capability of passing of non-stop trains in the Up direction	Pass	• Minor improvements to service pattern possible through additional capability of passing of non-stop trains in the Up direction
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works.	**Pass**	• No changes from current situation	**Pass**	• Largely re-uses current infrastructure	**Pass**	• Largely re-uses current infrastructure	**Pass**	• Largely re-uses current infrastructure	**Pass**	• Largely re-uses current infrastructure

Project objectives and requirements	Description	Do nothing option		Option 1 – Increased speed on Platform 3		Option 2 - Terminating trains on Platform 3		Option 3 – New low speed Platform 0		Option 3a – New low speed Platform 0 with new crossover	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	• No interventions required • No significant change to current operations and maintenance regimes	**Pass**	• Minimal capital cost associated with track and S&C interventions • No significant change to current operations and maintenance regimes	**Pass**	• Capital cost associated with track and S&C interventions for new crossover • No significant change to current operations and maintenance regimes	**Pass**	• Capital cost associated with track and S&C interventions for new platform track	**Pass**	• Capital cost associated with track and S&C interventions for new crossover and platform track • Options for diamond crossover shown to be replaced with a pair of crossovers for more standard maintenance
Project objective	To minimise adverse impacts on the natural and built environment associated with construction, operation and maintenance of the project	**Pass**	• No changes from current situation	**Pass**	• No significant impacts expected	**Pass**	• No significant impacts expected	**Pass**	• Some impacts on existing areas of vegetation • Check needed against IÉ land boundary	**Pass**	• Some impacts on existing areas of vegetation • Check needed against IÉ land boundary
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	**Pass**	• No changes from current situation	**Pass**	• Minor impacts to rail during construction	**Pass**	• Minor impacts to rail during construction	**Pass**	• Minor impacts to rail during construction • Traffic generated by construction activities expected to be negligible and likely to be well accommodated within the local road network	**Pass**	• Minor impacts to rail during construction • Traffic generated by construction activities expected to be negligible and likely to be well accommodated within the local road network
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No changes from current situation	**Pass**	• No integration issues identified at this stage	**Pass**	• No integration issues identified at this stage	**Pass**	• No integration issues identified at this stage	**Pass**	• No integration issues identified at this stage

Project objectives and requirements	Description	Do nothing option		Option 1 – Increased speed on Platform 3		Option 2 - Terminating trains on Platform 3		Option 3 – New low speed Platform 0		Option 3a – New low speed Platform 0 with new crossover	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.	Pass	• No changes from current situation	Pass	• No non-compliances identified at this stage	Pass	• No non-compliances identified at this stage	Pass	• No non-compliances identified at this stage	Pass	• No non-compliances identified at this stage • Options for diamond crossover shown to be replaced with a pair of crossovers
Project requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification	**Pass**	• No changes from current situation	**Pass**	• No non-compliances identified at this stage	**Pass**	• No non-compliances identified at this stage	**Pass**	• No non-compliances identified at this stage	**Pass**	• No non-compliances identified at this stage • Options for diamond crossover shown to be replaced with a pair of crossovers
Project requirement	Provision of appropriate new turnback infrastructure at Clongriffin which will meet the Train Service Specification.	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• TSS requires 2 turnback platforms due to dwell time • Single platform would limit ability to regulate service (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation	**Fail**	• Extent of bi-directional running on Up Main would not allow DART services levels to be met, especially in times of perturbation	**Pass**	• Use of Platform 2 for normal terminating services minimises conflicting moves • No improvement for passing trains in the north bound direction from existing

Table 5-3: Assessment of longlist of options against project objectives and requirements (continued)

Project objectives and requirements	Description	Option 4 – New low speed Platform 0 with new double crossover		Option 5 – New higher speed Platform 0 and 3		Option 6 – New higher speed Platform 3	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To deliver a higher frequency, higher capacity, reliable, electrified route to enable an increased DART service frequency between Drogheda and Central Dublin.	**Pass**	• The use of Platform 0 and 3 for terminating trains would result in conflicting moves which would need further operational modelling to confirm the ability to meet the TSS especially in times of perturbation	**Pass**	• Provides near optimal layout allowing two terminating trains to use the centre platforms and non-stop trains to pass at speed on outside platforms	**Pass**	• Allows conflict free moves for one terminating train on platform 2. • Non-stop or passing services can pass terminating services at speed • Platform 0 used as a secondary terminating platform as it requires conflicting moves
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.	Pass	• Minor improvements to service pattern possible through additional capability of passing of non-stop trains in the up direction	Pass	• Minor improvements to service pattern possible through additional capability of faster passing of non-stop trains in the up and down directions	Pass	• Minor improvements to service pattern possible through additional capability of passing of non-stop trains in the up directions • Minor improvements to service pattern possible through additional capability of faster passing of non-stop trains in the down directions

Project objectives and requirements	Description	Option 4 – New low speed Platform 0 with new double crossover		Option 5 – New higher speed Platform 0 and 3		Option 6 – New higher speed Platform 3	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To deliver a sustainable, low carbon and climate resilient design solution including making use of existing infrastructure where possible with targeted improvement works	**Pass**	• Largely re-uses current infrastructure	**Pass**	• More extensive work than other options	**Pass**	• Largely re-uses current infrastructure
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective	**Pass**	• Capital cost associated with track and S&C interventions for new crossover and platform track	**Pass**	• Capital cost associated with track and S&C interventions for new crossover and platform track • Increased capital costs compared to other options due to new bridge structure and embankment widening	**Pass**	• Capital cost associated with track and S&C interventions for new crossover and platform track • Capital cost associated with allowing new higher speed passing of Platform 3
Project objective	To minimise adverse impacts on the natural and built environment associated with construction, operation and maintenance of the project	Pass	• Some impacts on existing areas of vegetation • Potential for land purchase required. Check needed against IÉ land boundary	Pass	• More impacts on existing areas of vegetation than other options • Potential for land purchase required. Check needed against IÉ boundary	Pass	• Some impacts on existing areas of vegetation • Potential for land purchase required. Check needed against IÉ land boundary

Project objectives and requirements	Description	Option 4 – New low speed Platform 0 with new double crossover		Option 5 – New higher speed Platform 0 and 3		Option 6 – New higher speed Platform 3	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To minimise adverse impacts on existing rail services, road users and landowners associated with the construction, operation and maintenance of the project.	**Pass**	• Minor impacts to rail during construction • Traffic generated by construction activities expected to be negligible and likely to be well accommodated within the local road network	**Pass**	• Minor impacts to rail during construction • Traffic generated by construction activities expected to be negligible and likely to be well accommodated within the local road network	**Pass**	• Minor impacts to rail during construction • Traffic generated by construction activities expected to be negligible and likely to be well accommodated within the local road network
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No integration issues identified at this stage	**Pass**	• No integration issues identified at this stage	**Pass**	• No integration issues identified at this stage
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.	**Pass**	• Options for diamond shown to be replaced with a pair of crossovers	**Pass**	• Options for diamond shown to be replaced with a pair of crossovers	**Pass**	• No non-compliances identified at this stage

Project objectives and requirements	Description	Option 4 – New low speed Platform 0 with new double crossover		Option 5 – New higher speed Platform 0 and 3		Option 6 – New higher speed Platform 3	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification	Pass	• Options for diamond shown to be replaced with a pair of crossovers	Pass	• Options for diamond shown to be replaced with a pair of crossovers	Pass	• No non-compliances identified at this stage
Project requirement	Provision of appropriate new turnback infrastructure at Clongriffin which will meet the Train Service Specification.	**Pass**	• The use of Platform 0 and 3 for terminating trains would result in conflicting moves which would need further operational modelling to confirm the ability to meet the TSS especially in times of perturbation	**Pass**	• Provides near optimal layout allowing two terminating trains to use the centre platforms and non-stop trains to pass at speed on outside platforms	**Pass**	• Allows conflict free moves for one terminating train on Platform 2. • Non-stop or passing services can pass terminating services at speed • Platform 0 used as a secondary terminating platform as it requires conflicting moves

5.3 Summary of Longlist Sifting

The outcome of the Longlist Sifting is summarised in Table 5-4.

Table 5-4: Summary of Longlist Sifting

Option	Description	Screening Result	Summary
'Do-Nothing'	No interventions made to meet the Project Objectives and Requirements	**FAIL**	Does not meet requirements due to the following: • TSS requires 2 platforms dedicated to turning back trains due to dwell time, in addition to 2 platforms dedicated to through trains. • Single platform would limit ability to regulate services (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation
Option 1	Increased speed on Platform 3	**FAIL**	Does not meet requirements due to the following: • TSS requires 2 platforms dedicated to turning back trains due to dwell time, in addition to 2 platforms dedicated to through trains. • Single platform would limit ability to regulate services (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation
Option 2	Terminating trains on Platform 3	**FAIL**	Does not meet requirements due to the following: • TSS requires 2 platforms dedicated to turning back trains due to dwell time, in addition to 2 platforms dedicated to through trains. • Single platform would limit ability to regulate services (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation
Option 3	New low speed Platform 0	**FAIL**	Does not meet requirements due to the following: • TSS requires 2 platforms dedicated to turning back trains due to dwell time, in addition to 2 platforms dedicated to through trains. • Single platform would limit ability to regulate services (through constraint at Connolly) • Single turnback would limit ability to recover in times of perturbation

Option 3a	New low speed Platform 0 with new crossover	**PASS**	Meets project objectives and requirements
Option 4	New low speed Platform 0 with new double crossover	**PASS**	Meets project objectives and requirements
Option 5	New higher speed Platforms 0 and 3	**PASS**	Meets project objectives and requirements
Option 6	New higher speed Platform 3	**PASS**	Meets project objectives and requirements

5.4 Shortlisted Options

The following sections describe the shortlisted options in further detail.

5.4.1 Option 3a description

Refer to section 0 for an overview of the option. Detail is provided below under the following disciplines: Track, OHLE, Signalling and Civils/Structures

Track

Option 3a allows for the inclusion of a passing loop to Platform 0, from the Up Belfast Line, with a line running speed of 65kph. In order to allow traffic to access the loop, the introduction of an additional crossover is required to the south of the station (namely a P10 type crossover). This, however, does require there to be wrong line running over an 80m distance on the Up Belfast Line should this movement be undertaken, (note that there is an alternative to investigate at preliminary design phase for the crossover to be moved closer to the station to avoid wrong road running and utilise Platform 1 rather than Platform 0 as a second terminating platform).

To the north of the station, a single slip set of points are provided to allow for the through movement.

OHLE

OHLE masts and a variety of support structures will be needed to provide the revised OHLE configuration to equip the Up loop. Additional headspans or portal frames will be used to span the four tracks in the vicinity of the platforms and the new crossover to support feeders, catenary and contact wires. Cantilevers from the existing masts may be used in locations where these are suitable. As the loop is

shorter, the amount of new OHLE support equipment to be fitted will be less than for a higher speed loop.

Signalling

There will be a number of additional signals and point machines to be controlled. Additional signalling trackside locations will be needed to connect these signals, axle counter blocks and point machines to the interlocking via the Portmarnock SEB. The greater differential between the main and loop routes will imply some speed control on approach requirements to ensure that trains take the diverging routes at the correct speed.

Civils/Structures

This option does not have an impact on any of the major civil/bridge structures identified in this area.

Sufficient space is available between the platform edge and the eastern bridge pier of OBB81C to accommodate the additional track associated with Platform 0, hence there is no modification proposed on the existing bridge.

A new retaining wall (approx. 400 m long), parallel to the proposed Platform 0, will be required to retain the earthworks associated with the level difference between proposed track and existing ground levels.

UBB18A is likely to require widening.

5.4.2 Option 4 description

Refer to section 5.1.6 for an overview of the option. Detail is provided below under the following disciplines: Track, OHLE, Signalling and Civils/Structures.

Track

In a similar manner to Option 3A a passing loop to Platform 0 has been provided. This option, however, has a line speed increase of 85kmph as opposed to the former 65kmph.

In order to allow flexibility with respect to operations and maximising the use of the loop to Platform 3, a scissors crossover has been provided. Again, a short section of wrong line running will be required. This solution could see the installation of a friction buffer stop at the end of Platform 0 to minimise the works due to trains terminating in this location; additional works could be undertaken at a later date to complete the loop should the need arise.

OHLE

OHLE masts and a variety of support structures will be needed to provide the revised OHLE configuration to equip the Up loop. Additional headspans or portal frames will be used to span the four tracks in the vicinity of the platforms and the new crossover to support feeders, catenary and contact wires. Cantilevers from the existing masts may be used in locations where these are suitable. The crossover will

require a slightly more complex arrangement of tensioned lengths and section breaks.

Signalling

There will be a number of additional signals and point machines to be controlled. Additional signalling trackside locations will be needed to connect these signals, axle counter blocks and point machines to the interlocking via the Portmarnock SEB. The additional crossover will provide for more routes and corresponding route indicators on the signals. The greater differential between the main and loop routes will imply some speed control on approach requirements to ensure that trains take the diverging routes at the correct speed.

Civils/Structures

This option does not have an impact on any of the major civil/bridge structures identified in this area.

Sufficient space is available between the platform edge and the eastern bridge pier of OBB18C to accommodate the additional track associated with Platform 0, hence there is no modification proposed on the existing bridge.

A new retaining wall (approx. 400 m long), parallel to the proposed Platform 0, will be required to retain the earthworks associated with the level difference between proposed track and existing ground levels.

UBB18A is likely to require widening.

5.4.3 Option 5 description

Refer to section 5.1.7 for an overview of the option. Detail is provided below under the following disciplines: Track, OHLE, Signalling and Civils/Structures.

Track

Option 5 sees the introduction of a higher speed passing loop, with a through line speed of 95kmph. The existing single crossover (PTS 605A & B) has been replaced with a scissors crossover to facilitate all movements on the approach and egress from the station.

Minor modifications to the Down Belfast Loop are required to allow for the higher speed passing. These Works could be undertaken via a tamping exercise, subject to a condition survey of the existing trackwork being undertaken with respect to suitability of the existing infrastructure.

OHLE

OHLE masts and a variety of support structures will be needed to provide the revised OHLE configuration to equip the Up loop. Additional headspans or portal frames will be used to span the four tracks in the vicinity of the platforms and the new crossover to support feeders, catenary and contact wires. Cantilevers from the existing masts may be used in locations where these are suitable. As the loop is much longer to facilitate the higher speed, the amount of new OHLE support

equipment to be fitted will be greater than for a low-speed loop. In other respects, the OHLE design will be similar to the low-speed loop.

Signalling

There will be a number of additional signals and point machines to be controlled. Additional signalling trackside locations will be needed to connect these signals, axle counter blocks and point machines to the interlocking via the Portmarnock SEB. The higher speed turnouts on the loops will reduce/avoid speed checks on non-stopping services, while speed controls will be in place for terminating services using the crossover.

Civils/Structures

This option results in a new section of track coming from Platform 0 to join in with the main line north of underbridge UBB19. This would require either widening of the existing bridge or potentially a new bridge adjacent to the existing at this location. The new bridge would need to cater for both the river and cattle crossing.

A new retaining wall (approx. 850 m long) is proposed on the east side of the tracks to accommodate the new horizontal alignments.

Culverts UBB18B and UBB19A are likely to require widening.

Sufficient space is available between the platform edge and the eastern bridge pier of OBB18C to accommodate the additional track associated with Platform 0, hence there is no modification proposed on the existing bridge.

5.4.4 Option 6 description

Refer to section 5.1.8 for an overview of the option. Detail is provided below under the following disciplines: Track, OHLE, Signalling and Civils/Structures.

Track

Option 6 provides both passing loops to the Up and Down Belfast lines. The Down loop has a line speed increase to 95kmph whilst the Up loop has a proposed line speed of 65kmph. The reduction in speed for the Up loop limits the amount of additional track and land take required to the south of the station.

Following the connection of the proposed set of points from the loop to the Main Line, an additional crossover will be provided in the form of a ladder arrangement - thus, whilst trains may be in conflict with wrong line running over a short distance, this arrangement provides redundancy should a piece of rolling stock fail when terminating the journey on Platform 2.

OHLE

OHLE masts and a variety of support structures will be needed to provide the revised OHLE configuration to equip the Up and Down loops. Additional headspans or portal frames will be used to span the four tracks in the vicinity of the platforms and the new crossover to support feeders, catenary and contact wires. Cantilevers from the existing masts may be used in locations where these are

suitable. As the Up loop is much longer than the down, the amount of OHLE equipment will be correspondingly reduced. In other respects, the OHLE design will be similar between the low speed up and the higher speed Down loop.

Signalling

There will be a number of additional signals and point machines to be controlled. Additional signalling trackside locations will be needed to connect these signals, axle counter blocks and point machines to the interlocking via the Portmarnock SEB. The higher speed turnouts on the Down loops will reduce/avoid speed checks on non-stopping services on the Down line, while speed controls will be in place for terminating services using the crossover or trains using the Up loop.

Civils/Structures

This requires minor modifications to the track at the location of underbridge UBB19, however the proposed track aligns closely with existing here and no modification to the existing bridge is proposed.

A new retaining wall (approx. 70 m long) north of Clongriffin Station is required to contain the earthworks to the west of the proposed alignment.

A new retaining wall (approx. 450 m long) is required to contain the earthworks to the east of the proposed alignment.

Culverts UBB18B and UBB19A are likely to require widening.

Sufficient space is available between the platform edge and the eastern bridge pier of OBB18C to accommodate the additional track associated with Platform 0, hence there is no modification proposed on the existing bridge.

5.5 Multi-criteria analysis

5.5.1 Methodology

For each shortlisted option, an assessment against the MCA criteria has been carried out. Each option has been relatively compared against each other based on the five-point colour coded ranking scale shown in Table 5-7.

5.5.2 MCA summary table

A Multi-Criteria Assessment table is presented in this section. This has been developed to reflect the relative rankings for all sub-criteria assessed for each of the options and is presented as a summary of the key issues considered.

This is a preliminary scoring undertaken by Arup. It will then be reviewed and moderated with IÉ during an optioneering workshop.

A more detailed table is provided in Appendix A with the full detailed rationale behind the scoring of each criteria and option.

Table 5-5: MCA Summary table

Criteria	Sub-Criteria	Option 3a	Option 4	Option 5	Option 6
		New low speed Platform 0 with new crossover	New low speed Platform 0 with new double crossover	New higher speed Platform 0 and 3	New higher speed Platform 3
Economy	CAPEX				
	OPEX				
	Train operations functionality/economic benefit				
	Traffic functionality and associated economic activities and opportunities				
Safety	Employer's Safety				
	Public safety				
Environment	Landscape and Visual Quality				
	Biodiversity				
	Noise and Vibration				
	Water resources				
	Archaeology, Architectural and Cultural Heritage				
	Geology and Soils				
	Agricultural and non-agricultural				
	Air Quality & Climate Change				
Accessibility & Social Inclusion	Accessibility				
	Social Inclusion				
Integration	Adaptability in the future				
	With other transport systems				
	Land Use Integration				
	Government policy integration				
	Geographical integration				
Physical Activity	Walking/cycling opportunities				

Table 5-6: Overall criteria MCA summary table

Criteria Summary	Option 3a	Option 4	Option 5	Option 6
	New low speed Platform 0 with new crossover	New low speed Platform 0 with new double crossover	New higher speed Platform 0 and 3	New higher speed Platform 3
Economy				
Safety				
Environment				
Accessibility & Social Inclusion				
Integration				
Physical Activity				

Table 5-7: Legend for MCA Summary Table

Significant comparative advantage over other options
Some comparative advantage over other options
Comparable to other options / neutral
Some comparative disadvantage over other options
Significant comparative disadvantage over other options

5.5.3 Economy

Economy has been divided into four sub-criteria which are considered below.

CAPEX

In terms of structures, Option 5 requires a new bridge next to the existing underbridge UBB19 north of Clongriffin Station as well as a significant new retaining structure and modifications to an existing retaining structure to the south. The scope of work is significantly more extensive than Options 3a and 4 which have limited to no impact on the key existing structures, although culvert UBB18A in the station vicinity may need modification or widening. Option 6 has a similar scope to Option 5 with the exception of the new bridge structure at underbridge UBB19 and extensive retaining structures on the approach to underbridge UBB19 which are not required for Option 6.

Regarding trackwork, Options 3a and 4 use single and double crossovers respectively and moderate speed standard sets of points, making them comparable and having some advantages over Options 5 and 6 which use long high-speed sets of points.

The OHLE interventions in Options 3a and 4 are comparable. Options 5 and 6 require modifications to more existing OHLE as well as longer lengths of new

OHLE and more supports, as the higher speed platforms require longer loops and therefore longer sections of OHLE. This gives Options 3a and 4 a comparable advantage over Options 5 and 6.

Regarding signalling, Option 3a and 4 have a comparative advantage over Options 5 and 6 as the turnouts to access Platform 3 will not be modified. Option 3a has a comparative advantage over Option 4 as it does not have the double crossover, therefore it requires less turnout modification.

From the perspective of stations, Options 3a and 4 are comparable and have a significant comparative advantage over Options 5 and 6 as no changes are required to Platform 3 where coping adjustments could be required.

In conclusion, Options 3a and 4 are comparable. They both provide some significant comparable advantage over Option 5 and 6 across all considered disciplines.

OPEX

All options would require the same level of staffing and rolling stock provision so are comparable from this perspective.

All options are comparable from the perspective of track maintenance costs as they all require four new point ends. Option 5 requires a new bridge adjacent to underbridge UBB19 and so has higher structural maintenance costs. Option 5 therefore has a marginal disadvantage against the other options.

Train operations functionality/economic benefits

The current TSS (and likely future timetables) must have the opportunity to pass trains at this location, as non-stop services will need to take an empty path of a terminating service north of Clongriffin.

In Option 3a most, but not all, services can terminate using conflict free moves. This option enables a high-speed passing move in the southbound direction, however the northbound direction would require a low speed passing move via Platform 3.

Option 4 has the largest comparative disadvantage as all terminating services would require conflicting moves. This will impact on reliability and the ability of operations to recover in perturbed conditions. This option does, however, enable a high-speed passing move in both direction, which supports the TSS and the likely structure of any future timetable.

Option 5 is the ideal layout in terms of operations, as it allows for all terminating services to be operated with conflict-free moves and allows for critical high-speed passing moves in both directions.

In Option 6, most but not all services can terminate using conflict free moves. It also allows for critical high-speed passing moves in both directions.

Option 5 therefore has a significant comparable advantage over Option 4. Option 6 has some advantages over Option 3a which in turn has some advantages over Option 4.

Traffic functionality and associated economic activities and opportunities

In all cases, the extent of disruption to traffic and transportation will depend upon the chosen construction access. At this stage, the exact location of construction access is not yet determined and a comparative assessment has therefore been made.

For Options 3a and 4, the disruption to traffic and transportation will be relatively slight, impacting local residential roads and not main highways.

There are third party buildings alongside the west side of the site for Options 5 and 6, which coupled with works for the widened/new culvert in these options, is likely to lead to a greater level of disruption than for Options 3a and 4. Option 5 is likely to lead to the greatest disruption as it also requires a new bridge adjacent to the existing underbridge UBB19.

Therefore, Options 3a and 4 are comparative and have a significant advantage over Option 5. Option 6 has some advantage over Option 5 but a significant comparable disadvantage against Options 3a and 4.

5.5.4 Safety

Safety has been divided into two sub-criteria which are considered below. It should be noted that all options are safe, but some will have the potential for greater residual risks to remain. This criterion considers relative advantages of each option on the criteria of safety.

Employer's Safety

Driver Safety is comparable across all options because the drivers are provided refuge via the existing platform for any changing or end switching in each case.

Options 3a and 4 have a lower line speed through the station which reduces the risk to station staff from non-stopping trains and the associated aerodynamic effects. This is not considered a material difference, however, as for Options 3a and 4 non-stop trains would pass at speed on Platforms 1 and 2 resulting in a similar risk profile.

Public safety

Public safety has been assessed in the same way as station staff safety. There is no material difference considered between the options.

5.5.5 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while Section 4.2 considers the key environmental constraints associated with this study area. Below is a summary of the key findings

of the MCA under the various environmental criteria, with an emphasis on differentiating aspects for the options considered.

Landscape and Visual Quality

There are no comparative landscape and visual differences between Options 3a, 4 and 6 - all of which have little or limited likelihood for landscape and visual impacts. Option 5 will involve widening of the rail bridge over the River Mayne (a Protected Structure) and removal of boundary trees / hedgerows.

Biodiversity

A sluice pipe exists at the outfall of the Mayne to Baldoyle Bay, and Fingal County Council is in the process of putting in place (or has already put in place) a management plan for the management of saline flooding within fields in the SAC in an order to restore them to salt meadows and to reinstate rare flora species which once occurred in this area. Any changes in hydrology to the Mayne River as a result of changes to river channel, hydrological flow or balance of saline/freshwater influence in the SAC lands to the east could cause significant impacts.

Works to the bridge and/or affecting the Mayne River at this location could impact on water quality in the downstream designated sites during construction works.

These issues are more likely and more significant in the case of Option 5 and to a lesser extent for Option 6 due to lesser works/interventions proposed.

A number of inland feeding sites for wintering birds (primarily Brent geese) that are qualifying interests of adjacent SPAs occur in the area: the Red Arches playing pitches, an amenity grassland area, the recently created Brent goose fields also known as the 'bird quiet zone' and a re-seeded area on the 'Murrough spit' (see locations indicated in Figure 4-4).

Works could cause disturbance to birds using these sites if the works occur during winter months, however the impacts are unlikely to be significant due to the distance from the proposed works and the likely nature of the works (unlikely to involve piling or other significantly noisy works). The potential impact is equal across all options and therefore does not differentiate between them.

The bridge structure appears to be a double arched masonry/brick structure and so has potential to support bats. Its location along the Mayne River, with supporting vegetation, increases the potential for it to be used by bats. Options 5 and 6 are less preferable given works to this structure are proposed and that this may result in impacts on bats.

There are a number of other potential works with ecological impacts, however these are similar across all options and do not differentiate the preference between options. These include:

- Vegetation removal with potential for removal of habitat of value as well as supporting foraging, nesting, commuting corridor for fauna species (e.g. birds, bats, small mammals). Option 5 appears that it would require the least vegetation removal (approx. 675m along the rail corridor), although this the least preferred option for reasons outlined above. Option 6 would result in the

most vegetation removal (approx. 1,000m). Options 3A and 4 would result in approx. 700m of vegetation removal;

- Works to structures: other than the double arched bridge discussed above, Options 5 and 6 will additionally require modifications to existing retaining structures. The nature of these is unknown but if they have potential to support bats then additional impacts on bat may arise here;
- All options involve some level of works on the existing tracks, with the order of most to least works of this nature being Option 5, Option 6, Option 4, Option 3a. Railway lines can often support interesting flora species and habitats due to the calcareous nature of the ballast and their often relatively undisturbed nature. However, given the age of this line, its urban location and likely level of routine maintenance this is unlikely to be the case at this location and ongoing surveys will confirm this. Even if it were the case, the level of impact is likely to be similar across all options and is unlikely to be a significant differentiator between options;
- It is not known whether invasive species may occur along the railway line. If present, then there would be risk of spreading these to adjacent areas with the nearby Baldoyle Bay SAC and SPA being a particularly sensitive receptor. Even if it were the case that invasive species are present in this area, the level of impact is likely to be similar across all options and is unlikely to be a significant differentiator between options;
- It is noted that the existing railway line is fenced with mammal proof fencing and therefore the proposals to replace or put in new fencing will not change the environment or add any additional level of barrier effect for mammals above what is already there;
- It is noted that additional lighting may be required, and this could result in impacts on bat populations in the area. However, this is unlikely to be a significant differentiator given that the issue is applicable across all options.

Also of note are Fingal County Council's proposal's for the Baldoyle Racecourse Park on the lands adjacent to the east of the railway line. The plans for the park have a heavy emphasis on biodiversity including restoration of the saltmarsh within the SAC fields as well as a range of other measures. Any works in this area should be cognisant of those plans and ensure there are no conflicts between the Irish Rail works and the Baldoyle Racecourse Park proposals. Given there is significant emphasis on biodiversity in the Baldoyle Racecourse Park, there are probably opportunities for biodiversity enhancement measures to be incorporated into the proposed works which will tie in with the objectives for the park. This opportunity is considered equal across all options.

Noise and Vibration

Options with higher speeds through platforms (i.e., Options 5 and 6) have the potential to cause more disruption to nearby sensitive receptors. Option 5 has the largest comparative disadvantage over other options, as it has the potential to affect sensitive receptors equally to the east and west of Clongriffin Station. Option 6 will have a similar impact to Option 5, but with lower levels of noise and vibration to

receptors to the west of Clongriffin Station, as Platform 3 is further away from these receptors.

Options 3a and 4 are expected to have similar effects on nearby sensitive receptors, with both being more favourable than Option 6 or Option 5.

Water resources

The comparative differences across the four options relate mainly to development adjacent to the River Mayne and the impact this might have in terms of flood risk and water pollution.

Option 5 requires the construction of a new bridge and bridge widening over the River Mayne. The new bridge has the potential to impact flow regime and water quality in the watercourse and result in impacts with regards to flooding and the downstream water-dependent SAC. The above concerns can be mitigated through design, however the information currently available does not allow for a full assessment.

As such, from a water resources perspective, Option 5 is deemed to have 'Some comparative disadvantage over other options'.

Archaeology, Architectural and Cultural heritage

No sites or features of an archaeological, architectural or cultural heritage interest have been identified within the lands proposed for the railway works and, as such, there is no significant difference between the identified options.

Geology and Soils

The comparative differences across the four options relate mainly to construction-related activities and the expected interaction with the underlying geology and soils as opposed to the operational considerations where there are no discernible differences. The main construction impact relates to the earthworks required for the proposed option and the potential generation of earthworks material requiring recovery or disposal on or off the site. Option 5, which requires the construction of a new bridge and bridge widening construction activities, will encounter soft ground associated with the River Mayne.

There is also the potential for Made Ground/contaminated land to require excavation, as well as land/topsoil/growing soil, associated with new track and track replacement. Earthworks volumes (and associated waste/re-use options and volumes) are yet to be determined but are likely to be significant in comparison to the other options. There is also a potential for slope stability issues associated with retaining wall modifications. As such, from a Land and Soils perspective, Option 5 is deemed to have a some comparative disadvantage over other options (from the point of view of construction).

Agricultural

There are no significant comparative differences for agriculture associated with the options considered.

Air quality and climate

Existing sensitive receptors are located on the western side of Clongriffin Station with new residential developments proposed on the eastern side (F16A/0412 (SHD/011/20), 3634/16)). All options involve works that have the potential to generate dust impacts at sensitive receptors, however the differences between the options are marginal.

As all options will generate a more efficient rail service, there are no comparative differences on climate.

5.5.6 Accessibility and Social Inclusion

The options are comparable from the perspective of Accessibility and Social Inclusion.

Regarding accessibility, all options provide the opportunity to make improvements to Platform 0 through ramps, shelters and help points. Options 5 and 6 may also provide the opportunity to make similar improvements at Platform 3.

For social inclusion, with Options 3a and 4 there is the opportunity to make improvements to the station with the additional Platform 0 reducing crowding. For example, additional facilities could be provided on Platform 0 including information screens and commerce outlets.

With Options 5 and 6, the changes to the track at Platform 3 may afford an opportunity to make improvements to the platform with regards to platform facilities such as sign posting, commerce, public information.

5.5.7 Integration

Integration has been assessed using the five sub-criteria described below.

Adaptability in the future

All options are comparable as the operation and construction of this station layout in all options has no impact on future internal transport links.

Transport integration

There is a comparable potential temporary impact on existing bus services, pedestrian walkways and park and ride access for all options.

Land use integration

In all options, the proposal complies with regional and local policies to improve public transport services including DART services, encouraging modal shift and allowing for increased density of development in certain areas. The development is contained within the existing ‘envelope’ of the rail line. There is no impact on existing land uses in the permanent case.

Government policy integration

All international, national, regional and local policies encourage improvements in relation to the efficiency of public transport. All the proposed options will facilitate this.

Geographical integration

All international, national, regional and local policies encourage improvements in relation to the efficiency of public transport. All the proposed options will facilitate this.

5.5.8 Physical Activity

The options are considered to be comparable with each other with regards to physical activity.

5.6 Construction Considerations

Constructability considerations for the shortlisted options at Clongriffin Station are as follows:

- Option 3a: Construction access is good, with minimal negative impact to third parties other than along a few residential roads. There would be some impact to the railway during construction, with possessions needed for P&C and OHLE work. The retaining wall required would be built largely away from the live railway with predominantly only the tie-ins needing track possession work. Disruptive possessions of the railway are anticipated, along with isolation of the OHLE.

- Option 4: Similar to Option 3a. Construction access is good, with minimal negative impact to third parties. There would be some impact to the railway during construction, with possessions needed for P&C and OHLE work (perhaps marginally more than Option 3a due to increased scope). The retaining wall required would be built predominantly away from the live railway with largely only the tie-ins needing track possession work. Disruptive possessions of the railway are anticipated, along with isolation of the OHLE.

- Option 5: The scope of works is significantly more extensive for Option 5 than Options 3a and Option 4, along with an increased site interface with the public. In addition to more platform and track works, there would be a new underpass/bridge to be built to the north, modification required to the retaining structure just to the south of the same, as well as provision of a new retaining wall too (extent to be determined) which would be predominantly built away from the live railway with largely tie-ins only needing track possession work. Collectively these works would need significantly more weekend possessions than Options 3a and 4, depending upon train paths needing to be maintained. Disruptive possessions of the railway are anticipated, along with isolation of the OHLE. Third party buildings on the west side of the station would be significantly impacted by

construction access arrangements which may need to be constrained to meet environmental requirements.

- Option 6: The scope of works is less than Option 5 (as Platform 0 works are omitted), but greater than Option 3a and Option 4. The level of construction risk and impact to train services is most similar to Option 5. The retaining wall required would be predominantly built away from the live railway with largely on the tie-ins needing track possession work. Disruptive possessions of the railway are anticipated, along with isolation of the OHLE. Note the widening of the bridge to the north is less than with Option 5. Construction access arrangements on the west side will be important to adjacent third-party properties.

Construction access for the Contractor's road/rail plant could be arranged from an access point already positioned at the station. These locations are shown in Figure 5-15. There would also be a local worksite compound near to the works to support the construction, on either side of the tracks, mindful of the plans to construct a new housing development on the east side. The details of these plans will need to be investigated for intended dates and site logistics so that the DART+ Coastal North project can proceed with as minimal negative impact as possible.

All works will be planned to minimise the extent of disruption to the railway as far as possible. During preliminary design of the track alterations, a sequence of work can be developed and costed.

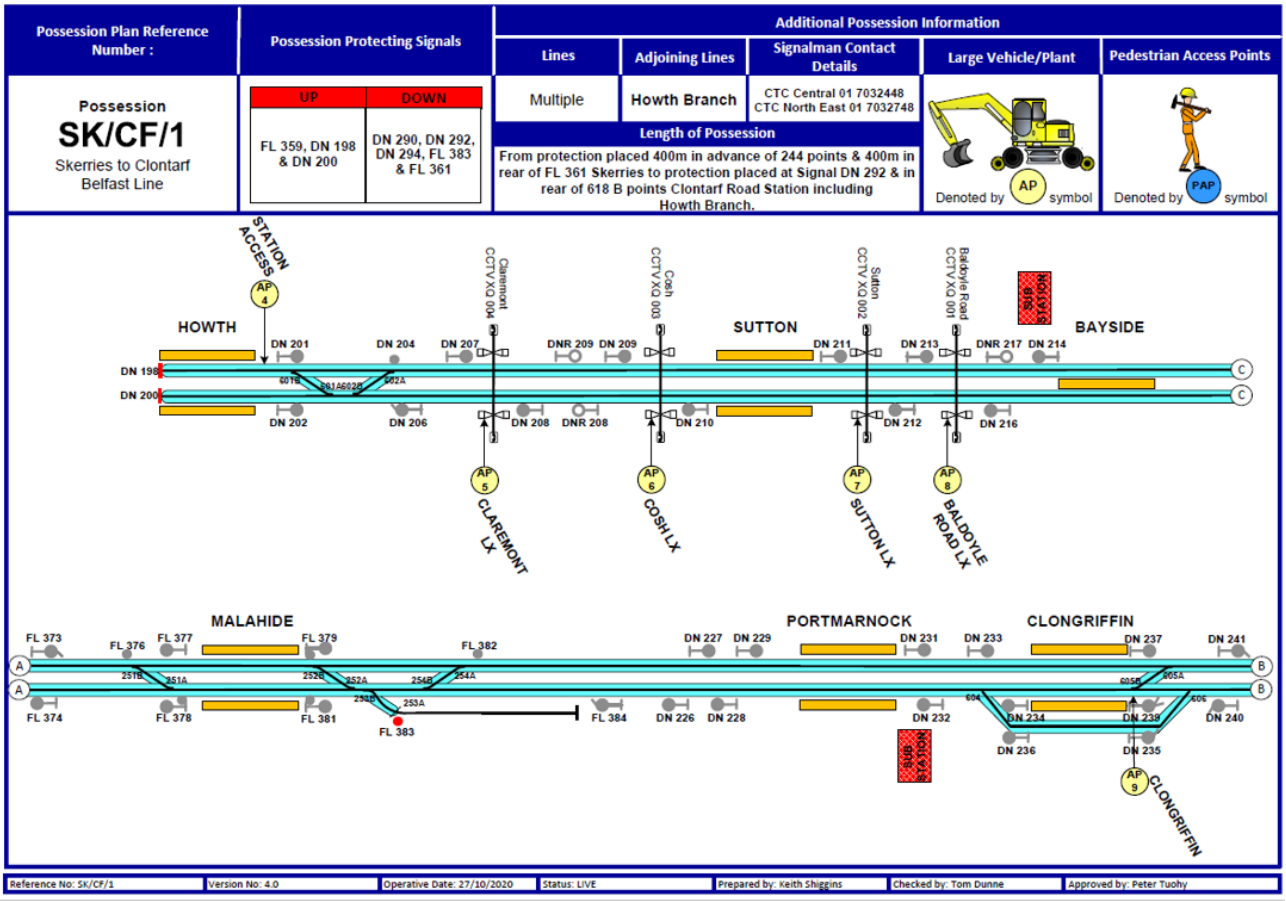

Figure 5-15: Existing Access Points

6 Summary and Conclusions

6.1.1 Non-preferred options

Option 4 is not preferred due to:

- The large number of conflicting moves that would be required to operate the service.

Option 5 is not preferred due to:

- The additional environmental impact and cost to provide the higher speed passing loop which has little benefit for the DART+ Programme.

Option 6 is not preferred due to:

- The additional environmental impact and cost to provide the higher speed passing loop which has little benefit for the DART+ Programme.

6.1.2 Emerging preferred option

Option 3a has been identified as the emerging preferred option. It has advantages over predominantly all assessment criteria compared to the other options.

It allows conflict free moves for trains terminating in Platform 2 and allows the DART TSS to be met. There is a choice to made on the exact location of the approach crossover between:

a) A crossover which allows terminating trains to use Platform 0, 1 and 2, but at the expense of Platform 0 & 1 requiring conflicting moves; or
b) A crossover which allows terminating trains to use only Platform 1 and 2 but with no conflicting moves.

Furthermore, this option does not preclude the option to upgrade the Platform 3 loop to a higher speed in the future once other infrastructure improvements are made, to facilitate non-stop services outside of the DART+ programme.

6.1.3 Key Risks/Next Steps

The following risks have been identified:

- Land boundary confirmation: There is currently some ambiguity as to the exact location of the Irish Rail land boundary. Work is underway to clarify this.
- The existing speed restriction on the diverging route on the Down loop needs to be resolved.