DART+ Coastal North

ANNEX 3.3

Technical Optioneering Report: Works around Drogheda MacBride Station

ARUP

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Abbreviations

Abbreviation	Definition
ABP	An Bord Pleanála
APIS	Authorisation for Placing in Service
ATP	Automatic Train Protection
BEMU	Battery Operated Multiple Unit
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
CET	Controlled Emission Toilet
CRR	Commission of Railway Regulation
CSO	Central Statistics Office
CTC	Central Traffic Control
DART	Dublin Area Rapid Transit
DMUs	Diesel Multiple Units
EMUs	Electric Multiple Units
ECS	Empty Coaching Stock
EIR	Eircom Limited
EPA	End Point Assessment
EPO	Emerging Preferred Option
FCC	Fingal County Council
FIHS	Fingal Industrial Heritage Survey
FLU	Full Length Unit
GAA	Gaelic Athletic Association
GNI	Gas Networks Ireland
GSI	Geological Survey Ireland
GSM-R	Global System for Mobile Communications – Railway
IÉ	Iarnród Éireann/Irish Rail
INF	Infrastructure
IPPC	Integrated Pollution Prevention Control
LED	Light emitting diode
MAI	Maintenance
MCA	Multi-Criteria Analysis
MHSS	Malahide Skerries
NTA	National Transport Authority
OHLE	Overhead Line Equipment
OPE	Operation and Traffic Management
OPEX	Operational expenditure

Abbreviation	Definition
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
P&C	Points and crossings
pNHA	Proposed Natural Heritage Area
RPS	Record of protected structures
RSC	Railway Safety Commission
SAC	Special Area of Conservation
SEB	Signalling Equipment Box
SET	Signalling, Electrification and Telecoms
SDH	Synchronous Digital Hierarchy
SPA	Special Protected 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 the report is to provide the technical input to the Preliminary Option Selection Report. This report provides details of the technical assessment at Drogheda MacBride Station from option selection through to the draft 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 assessment (MCA);
  - The draft 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 in order 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 Drogheda MacBride Station and depot. The scope is to consider Drogheda for suitability as a turnback to achieve the TSS and maximise capacity, and to design any associated re-configuration works including stabling roads. This report has considered 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.

Annex	Title	Description
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.
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 Drogheda have been 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

Drogheda MacBride Station is located on the Dublin to Belfast Line at approximate mileage 31 ¾ miles. The centre of the station is located at 709889.323 E and 774877.398 N based on the ITM grid system. The station consists of three platforms: Platform 1 on the Down Main line, Platform 2 on the Up Main line and Platform 3 on a spur.

Drogheda Depot is located to the north of the station. Directly to the north-west of the depot is Underbridge UBB82 (Boyne Viaduct, Drogheda) which creates a constraint to the overall curved layout of the track in this area (see Figure 2-1). The bridge, along with multiple other features in and around the study area are listed on the Record of Protected Structures, as detailed within Section 2.6.4.

The Navan Freight Branch (also known as the Drogheda Freight Sidings) connection to the mainline is in close proximity to the depot mainline connection.

Along the northern boundary to the depot is a Pitch & Putt facility, farmland and residential properties. The farmland has future proposals for housing developments.

Rail access to the depot is via one of the two mainline connections to the depot directly to the south-east of the station.

Road access to the depot is through the road underpass at the northern end of the depot. A secondary restricted access to the depot is by McGrath's Lane Overbridge. Pedestrian access is available to the depot building from the station via the pedestrian overbridge.

A landscaping bund is present in the centre of the depot. This is believed to have been created as a result of construction of the main line and a historic rail line along the north site from McGrath's bridge to the engine shed; it is not currently known whether this bund consists of reworked materials or is undisturbed original ground. The extent of the bund was later reduced during the construction of the existing depot building.

The depot has specific functions including stabling, a servicing road, wheel lathe, train wash and light/heavy maintenance within the main building. The site was originally designed for HLUs to suit the current DMU trains and the existing headshunt roads are predominantly sized to suit this.

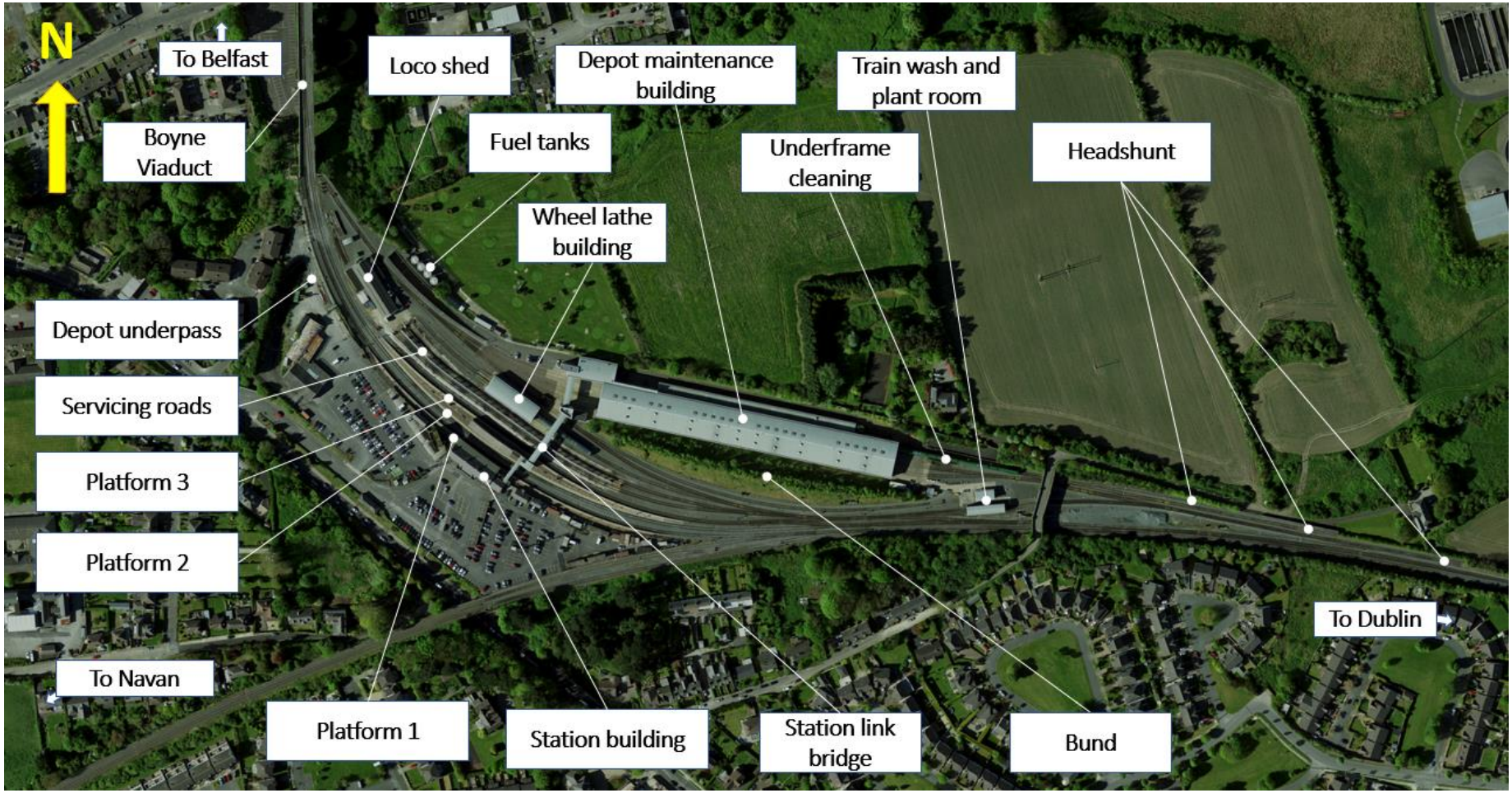


Figure 2-1: Drogheda MacBride Station Existing Arrangement (Source: OSI aerial mapping)

2.2 Structures

There are seven existing structures associated with Drogheda MacBride Station as shown in the Emerging Preferred Option (EPO) drawings and as listed here:

- Overbridges OBB80/80A/80B (carrying McGrath's Lane);
- Overbridge OBB81 (Drogheda MacBride Station footbridge);
- Culvert UBB81A;
- Underbridge UBB81B (Access subway to Drogheda depot);
- Overbridge OBB81C (Drogheda depot footbridge access);
- Underbridge UBB82 (Boyne Viaduct, Drogheda); and,
- Underbridge UBK1 (Dublin Road N1).

Figure 2-2: OBB80 from track level

Figure 2-3: OBB80 (left), OBB80B (centre) and OBB80A (right) from track level

Figure 2-4: OBB80A (left) and OBB80B (right) from track level

Figure 2-5: OBB80A

Overbridges OBB81 and OBB81C are pedestrian footbridges within the station and depot. OBB81 is Drogheda MacBride Station footbridge, a steel structure providing

access to the platforms, see Figure 2-6. OBB81C is a staff access footbridge between the station and the depot, see Figure 2-7.

UBB81A is recorded as a culvert for a river or stream which, according to the IÉ structures list, was not found on site.

Figure 2-6: OBB81 Drogheda MacBride Station footbridge

Figure 2-7: OBB81C

Figure 2-8: OBB81C

UBB81B is an access subway for the depot, visible in Figure 2-9.

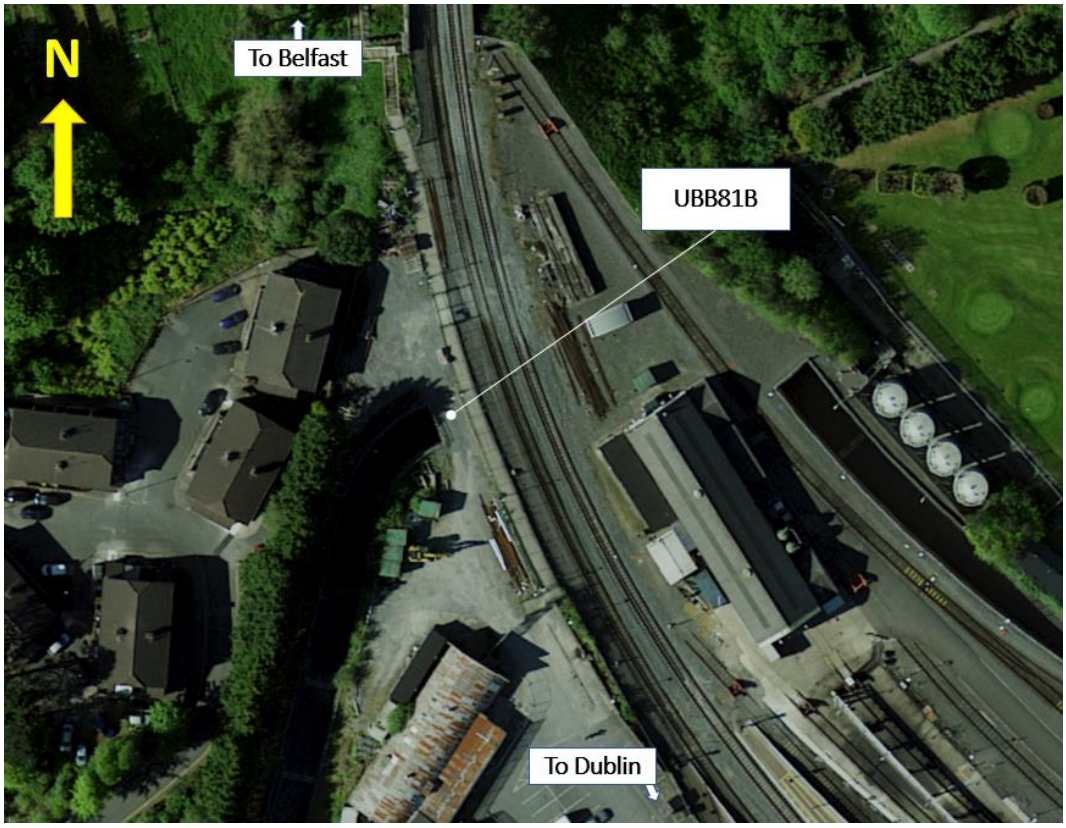


Figure 2-9: Aerial view on UBB81B depot access subway (source: OSI aerial mapping)

Underbridge UBB82 is the Boyne Viaduct, an 18-span structure carrying the railway over three roads (Cord Road, Drogheda Road and Marsh Road) and the River Boyne. The river span is a steel lattice girder structure whilst the others are stone. See Figure 2-10 and Figure 2-11.

Figure 2-10: UBB82 Boyne Viaduct (Protected Structure LCC RPS DB-176)

Figure 2-11: UBB82 Boyne Viaduct (Protected Structure LCC RPS DB-176)

UBK1 is a steel girder underbridge carrying the railway over the R132 Dublin Road, see Figure 2-12 and Figure 2-13.

Figure 2-12: Aerial view of UBK1 (Source: OSI Aerial Mapping)

Figure 2-13: UBK1 (Source: Irish Rail)

2.3 Permanent Ways and Tracks

Drogheda MacBride Station has three platforms: two through platforms on the Up and Down Main towards Belfast and a third terminating platform on the north side. All platforms are on a tight horizontal curve with radius between 220m and 350m. The mainline grade through the station is flat with an approximate RL of 30m.

On the Up-side of the station are facing and trailing crossovers on the mainline. Between the station and the crossovers is Navan Junction which diverges trains from the Down Main to two separate tracks south west towards Navan and serves the Irish Cement works (Platin) and Tara Mines. Both Navan tracks fall towards Navan Junction at an approximate 1% track gradient. There is an existing trap on the Navan lines prior to Navan Junction, protecting unauthorised moves from the branch onto the main line.

To the north of the existing station is the Boyne Viaduct which accommodates a single bi-directional track. The gradient from the Boyne Viaduct is 1% falling in the Up direction towards Drogheda MacBride Station.

Drogheda Depot is on the north side of the station and on the inside of the tight curve. The depot has two entries from the Down Main; one that allows a train to travel straight into the depot facilities and a second through the terminating Platform 3 with a reversing move into the Train Wash.

The depot consists of two CET/refuelling roads and wheel lathe road to the south west of the maintenance building. Between these roads and the maintenance building is a 110m headshunt allowing trains to manoeuvre between them. On the south side of the building is a single 220m long stabling road. On the east side of the building are various crossovers and three headshunts of length 40m, 100m, 180m. The latter 180m headshunt allows trains to travel from the maintenance building to the Train Wash before another reversing move to get back onto the mainline. The depot is at the same level as the station at 30m RL.

2.4 Other Railway Facilities

2.4.1 Signalling

Drogheda MacBride Station and its access are signalled with three aspect signals. Shunt signals with alphanumeric route indicators are also present for the shunting movements and to access the Drogheda Depot and the Navan Branch from the Northern Line.

This section is not currently electrified; the track protection system is based on track circuits. The existing train protection system is CAWS with 50 Hz code (carrier 2 non-electrified area). As this section is not electrified, there are not impedance bonds.

The interlocking system which controls Drogheda MacBride Station and part of the Navan Branch is the Drogheda DA01 SSI. This interlocking is housed in the Drogheda SSI Room and it was commissioned in the mid-1990s. Drogheda DA01

SSI interfaces with the adjacent interlockings Dundalk DD01 SSI, Drogheda Relay Interlocking, and Fingal BBDA SSI.

There is a signalling interface between the mainline signalling (which includes the Drogheda MacBride Station signalling) and the Drogheda depot, where the access is done through the Drogheda MacBride Station. This interface is not supervised by any interlocking system because of the absence of any signalling system from part of the Drogheda depot, which is manually operated. Thus, trains entering or exiting from/to the Depot from/to Drogheda MacBride Station must be supervised by the signalman.

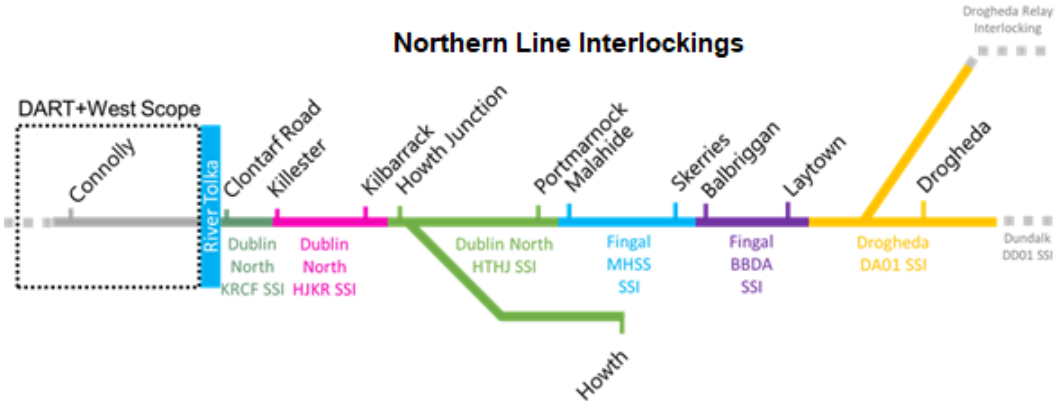


Figure 2-14: Interlocking control areas

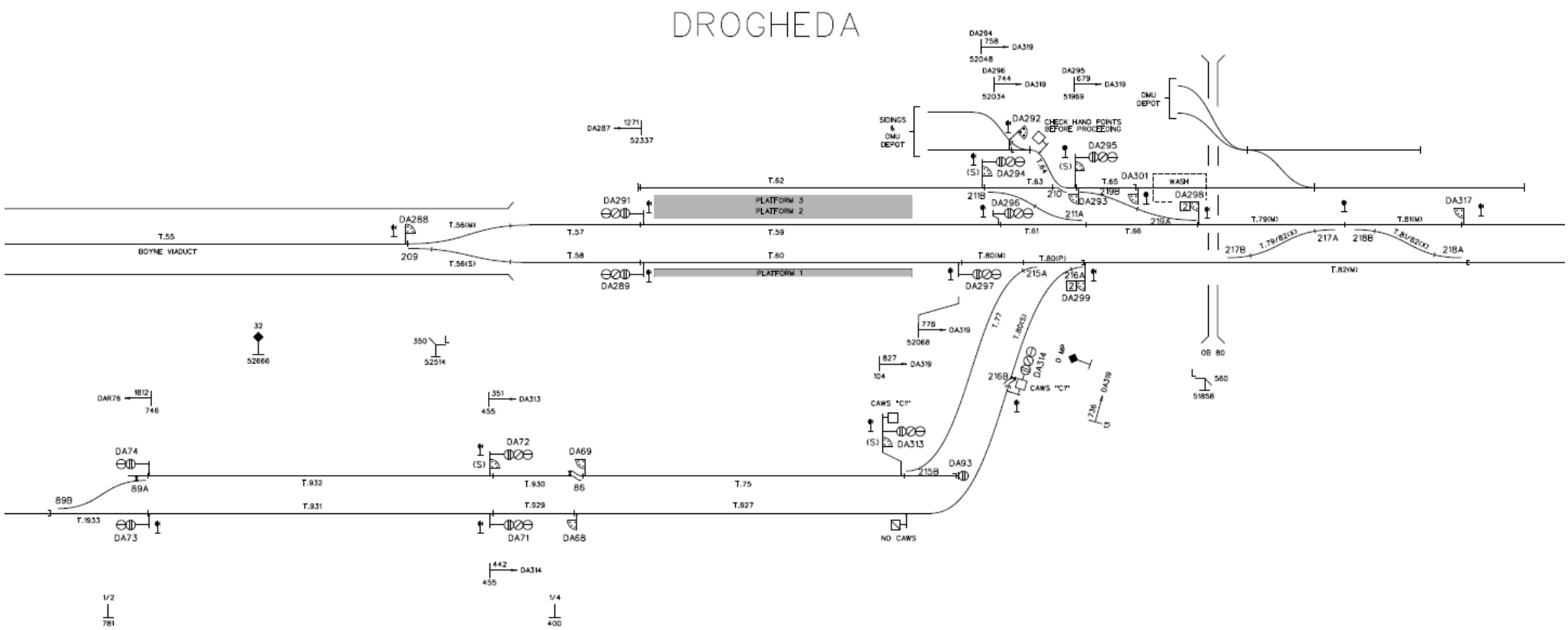


Figure 2-15: Signal Plan for Drogheda area

2.4.2 Telecoms

The Telecoms Operational network is a legacy Synchronous Digital Hierarchy (SDH) which is in the process of being updated by Irish Rail (IÉ) with the replacement of nodes with MPLS-TP technology. However there remain potential problems due to the low number of available fibres which will be solved by the provision of new fibre optic cables over the length of the line and the migration of the MPLS-TP network to these.

On the Supporting GigE network side, part of the Operational Systems, the 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 Drogheda MacBride Station.

The current Telecoms equipment room layout at Drogheda can be seen in the picture below. The current layout leaves little room for future expansion. Based on the expected future telecoms network equipment space requirements and the availability of space based on the preferred option will dictate the location of additional or replacement TER facilities.

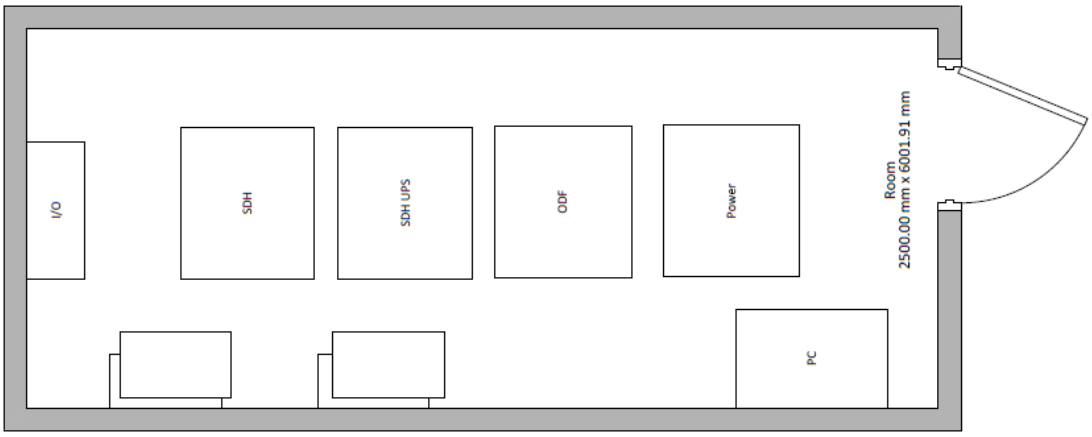


Figure 2-16: Drogheda Telecoms Equipment Room

2.4.3 OHLE

There is no existing OHLE at Drogheda MacBride Station or depot.

2.5 Ground Conditions

Drogheda MacBride Station is bounded to the north by the River Boyne and Marsh Road, to the south by the Dublin Road. The depot sits within a cutting with topography typically within the range of 30mOD to 32mOD at track level rising to 32-34mOD to the north and 33-37m OD to the south; the bund adjacent to the depot building has levels up to 37mOD. Considerable variations in topography are noted to the north of the site as ground levels reduce from 30mOD to 3mOD towards River Boyne.

A review of historic mapping and aerial photography shows that the site was originally agricultural land up to 1842. Historic mapping from 1888-1913 shows the presence of the railway station, railway lines and related infrastructure. To the south off the main station building the mapping indicates the presence of railway lines, platforms and good sheds; this area is now a carpark. As such, a potential for Made Ground and buried foundations associated with these areas exists. Additionally, a number of historic pits or quarries were identified within the vicinity of the site.

Significant developments comprising Drogheda MacBride Station as well as numerous residential, commercial, and industrial buildings occurred to the south of the site and a wastewater treatment plant was built to the north east in the twentieth and twenty-first century.

The EPA waterbodies map (EPA, 2021) does not indicate any historic or existing rivers crossing or near the site. However, River Boyne and Stagrennan stream were noted to the north and south east of the site respectively. Historic mapping from 1837 indicates that the R150 Marsh Road marks the historic extent of the floodplain of the River Boyne prior to land reclamation.

The GSI Quaternary sediment mapping indicates the widespread presence of Made Ground associated with urbanised and developed areas and Irish Sea Till derived from Lower Palaeozoic sandstones and shales (and potentially underlying the Made Ground). Recent sediments such as lacustrine deposits (to the south) and alluvial deposits (to the north and east) associated with past and existing water bodies are noted.

GSI bedrock mapping shows that the site is underlain by dark Limestone & calcareous shale of the Carboniferous Mornington bedrock formation. To the north of the site alongside the River Boyne, a small area of Quartz monzonite of the Drogheda Granite formation is noted

Limited ground investigation is available within the site and its immediate surrounds. That which is available is summarised below.

McBride Station Maintenance Depot (IGSL Report 6387, 2000):

This GI was completed for the current maintenance depot building and comprised eight cable percussion boreholes, ten trial pits, two masonry coreholes and laboratory testing. Based on the available factual report the following assessment of the expected ground conditions were made:

(i) The stratigraphy consists of widespread made ground which comprises ballast/hardcore fill and to depths up to 2.3m BGL however depths up to 9.3m BGL are noted at to the north of the site where a silty clay fill with inclusions of brick, pottery, glass and organics was noted. Beneath this a firm to stiff (very stiff with depth) very sandy, very gravelly Clay with occasional cobbles is noted.

(ii) No rotary drilling was completed to confirm bedrock levels.

(iii) Limited groundwater monitoring information was recorded. Levels from two boreholes of 2.38 and 2.55mbgl are noted but no information on frequency or date or recoding is available.

(iv) Two rotary coreholes were drilled into a disused arch and recorded a masonry thickness of 0.8m and 1.25m. No further information, specific records or logs are available.

Proposed Carpark Marsh Road (Glover Report 09-0232, 2009):

This GI was completed for the Marsh road carpark beneath the Boyne viaduct. It consists of four window samples to depths up to 3.9m BGL. Made ground up to 1.7m was noted with soft Clays and medium dense Gravels beneath.

Proposed Railway Crossing at Newtown (IGSL report 8794, 2003):

This GI was completed approximately 200m to the east of McGrath's Bridge for a potential new railway crossing. It included three cable percussion boreholes, four rotary core boreholes, ten trial pits two packer tests and some laboratory testing. Based on the available factual report the following assessment of the expected ground conditions were made:

(i) The stratigraphy consists of topsoil and either made ground (comprising of fragments of wood, wires, brick and domestic refuge not exceeding 1.0m or fill of rail ballast) are noted at shallow depths. Beneath these firm to very stiff Clays with occasional cobbles and boulders are noted; dense Gravel layers are also present.

(ii) Rotary core drillholes indicate that bedrock at depths in the range 3.5-5.3m BGL and to consist of moderately strong to very strong limestone. Highly weathered rock, up to 4.1m thick, was noted in one borehole and was recovered as gravel and cobble materials.

(iii) Limited groundwater monitoring data is available however the records indicate shallow and possible artesian groundwater conditions in the area.

Other:

Two small historic ground investigations for residential works and approximately 100m to the west of Drogheda MacBride Station indicate:

(i) The stratigraphy consists of made ground with tarmacadam and hardcore over a layer of dense gravelly Sands up to 2.75m BGL. Obstructions were encountered at depth in the range 0.40-4.40m across the site. Bedrock was not proven in these investigations.

(ii) Groundwater monitoring indicates groundwater level at 4.10m BGL and 2.80m BGL at two specific boreholes. No groundwater was encountered at another two locations.

While there is no available geo-environmental information from the above ground investigations, there is a potential for contamination based on site history and usage.

2.6 Environmental

Drogheda MacBride Station is located to the east of Drogheda town, in County Louth. The station is south of the River Boyne with agricultural fields and a pitch and putt club to the east, residential development to the west and south, and a mix of residential and industrial/commercial development to the north, between the station and the River Boyne.

The R132 Dublin Road runs northwest to southeast to the west of the station, with the R150 Marsh Road located to the north, between the station and the River Boyne.

The River Boyne in this location is a designated European site, the River Boyne and River Blackwater Special Area of Conservation (SAC) and further downstream, there is the Boyne Estuary Special Protection Area (SPA) and Boyne Coast and Estuary proposed Natural Heritage Area (pNHA).

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

2.6.1 Traffic and Transportation

Drogheda MacBride Station is accessible by a regional road (R132 Dublin Road). The road is approximately 7m wide and footpaths are provided on both sides adding another c. 3m to the total width. The nearest road links of regional importance are the R152 Donore Road through Drogheda town centre and the R132 towards the south. Both link to interchanges with the M1.

2.6.2 Landscape and Visual Impact

The station is located to the south east of Drogheda town centre, south of the River Boyne. The station area is within the Drogheda Transport Development Area in the Drogheda Borough Council Development Plan, 2011 – 2017. This area is zoned as a Transportation Development Hub in the Draft Louth Development Plan, 2021 – 2027. To the east, west and south of these zoned lands are residential areas, with a commercial/retail area and regeneration area to the north. Further to the north, the River Boyne runs west to east towards the coast.

Newtown Lodge is located at the end of McGrath's Lane on the north side of the railway east of the station. This property is a standalone house located directly adjacent to the railway and in proximity to a number of options. McGrath's Lane crosses the railway corridor via a stone bridge. Railway Terrace, a terrace of 6 houses off McGrath's Lane, backs on to the south side of the railway station. The west side of the station is defined by the Dublin Road, with its stone retaining wall along the road and stone wall at the top of the embankment. McBride Pitch & Putt Course and agricultural fields lie to the north of the station.

The station area is relatively well screened within its immediate setting, though established residential development lies to the south and west. The station area and railway corridor are openly viewed from the elevated vantage of the Rail Bridge OBB80/80A/80B on McGrath's Lane, immediately east of the station area.

Figure 2-17: Landscape and visual referenced features

2.6.3 Archaeology and cultural heritage

The Irish name, Droichead Átha, which means "the bridge of the ford", was the name given to the lowest bridging point of the River Boyne. The original fording site is located 2km west of Drogheda, but the town was established further downstream to provide a transport route inland and between north and south, with a harbour to accommodate seaborne trade.

The site of Drogheda Railway Station lies outside (700m) and to the southeast of the twelfth century Anglo Norman town of Drogheda (RMP LH024-041) in Lagavooren townland.

The 1st edition six-inch Ordnance Survey map (1837-1842) shows the area now occupied by Drogheda Railway Station and works as an open field, located to the south of grounds associated with 'St James' Estate. These grounds are planted with trees, possibly forming an orchard. 'Lansdowne' and 'Longwood' two dwellings are annotated to the northwest of the station and this area is now partly occupied by the locomotive shed.

The twenty-five-inch edition Ordnance Survey (1888-1913) shows the 'Station' and the associated railway infrastructure including goods, engine and carriage sheds, platforms and the Drogheda/Boyne Viaduct to the north of the works.

The arrival of the railway in the nineteenth century had a significant impact in Louth, due its pivotal location between Dublin and Belfast.

2.6.4 Architectural Heritage

The Dublin and Drogheda Railway, which was formed in 1835, and granted parliamentary permission in 1836, reached Drogheda in 1844. The original station was to the south of the existing (at Buckey's Sidings) and was in operation until the completion of the first Boyne Viaduct in 1855. Prior to this, passengers travelling north had to disembark, and cross the Boyne by carriage to Newfoundwell Platform on the north side of the estuary. The existing Boyne Viaduct (UBB82) is included in the Record of Protected Structures (LCC RPS DB-176).

Drogheda MacBride Station is a Protected Structure (LCC RPS DB-055). The listing notes this railway station retains a great deal of its original fabric and is a well composed architectural set piece.

Five additional structures in the station complex are also included in the Record of Protected Structures. These are:

- Engine Shed LCC RPS DB-395,
- Water Tower LCC RPS DB-397,
- Parcel Office LCC RPS DB-396,
- Boiler House LCC RPS DB-398 and
- toilet block LCC RPS DB-399.

All of these structures are also included in the NIAH where they are rated of Regional Importance for reasons of architectural, technical and social interest. The NIAH notes the high-quality workmanship in stone and brick detailing, developments in railway architecture as evidenced in the buildings and the sensitivity of modern interventions.

Historic map analysis suggests that the station layout has been altered on a number of occasions, resulting in a complex site of multi-layered morphology.

Notably the 1870 Drogheda Map series show two Good's sheds (the larger of which is now demolished) to the south of and in front of the station building. A turntable held a prominent position in front of the engine shed, with more turn tables noted at the entrance to the goods shed and inside. A number of signal posts and boxes are shown and there was a watch house on the east side of the station. There was a footbridge on the east side of the station building, and a long carriage house to the north of the down platform. There was also a platform on the Navan Line. Stone bridges are marked crossing the Dublin Road and Railway Terrace.

A number of buildings and sites of interest are also noted around the station including the Union Workhouse and Fever Hospital to the west, Gardens marked St. James's and Weirhope to the north and Railway Terrace to the South.

2.6.5 Noise and Vibration

Drogheda MacBride Station is surrounded by residential houses to the north, south, and west, and has a pitch and putt (recreational facility) to the east/north-east. There

are also some commercial properties on the north and south banks of the River Boyne to the north of the station.

The most sensitive receptors are the residential properties, some of which are directly adjacent to the rail corridor.

2.6.6 Air Quality and Climate

The existing environment considers the proximity of sensitive receptors to the construction works. Drogheda MacBride Station is surrounded by residential houses to the north, south, and west, and has a pitch and putt course (recreational facility) to the east/north-east. The River Boyne is also considered a sensitive receptor due to its ecological sensitivity.

2.6.7 Agricultural and Non-Agricultural

Agricultural Land

The lands to the South, East and West of the railway station are urban / built up. To the north of the existing station there is a pitch and putt course (which is non-agricultural) and a grassland field (agricultural). There are three tillage fields adjoining the railway line, just East of the grassland field. The access to these four fields is via McGraths Lane which is on the northern boundary of the station and railway line.

Non-Agricultural land/population assessment

Drogheda MacBride Station is on the edge of the town and is accessible from the R132 Dublin Road. There are small areas of green space and terraced or semi-detached housing nearby on St. Mary's Villas and Railway Terrace. Six properties and their gardens located on a cul-de-sac off Railway Terrace look out onto the Navan Line and to the east of one prospective location for a new platform. A large single property is located on the far side of the railway depot off McGrath's Lane. A pitch and putt club is located immediately to the north of the station.

2.6.8 Geology and Soils

The Corine Land Cover 2018 categorises the land use as artificial discontinuous urban fabric areas in the south and north west, heterogeneous agricultural with complex cultivation patterns in the north and agricultural area with permanent crops as well as non-irrigated arable land in the north east. Moreover, two IPPC facilities (one adjacent to Boyne viaduct and is currently closed and the other, approximately 300m to the south of Drogheda MacBride Station) were identified.

The geological mapping for the area indicates that the soils and geology of the area comprise made ground in urbanised areas overlying recent deposits of alluvium associated with the River Boyne and its tributaries in turn overlying glacially deposited sediments including Irish Sea Till and Glaciofluvial terrace sediment. The underlying bedrock is predominantly Carboniferous Limestone and Calcareous Shale with an intrusion of Granite indicated to the North East of Drogheda MacBride Station. Additionally, the APM Pits and Quarries map indicates the

presence of three historic quarries located within a distance of 100-500m from the railway line at the site.

The expected ground conditions at the site are summarised in Section 2.5 and comprise widespread made ground which comprises ballast/hardcore fill and a silty clay fill with inclusions of brick, pottery, glass and organics to depths of up to 9.3m BGL. The latter is underlain by a firm to stiff (very stiff with depth) very sandy, very gravelly clay with occasional cobbles. Previous site investigations indicate (see Section 2.5) that bedrock was not proven.

2.6.9 Water Resources

Surface water bodies

The study area in relation to works at Drogheda MacBride Station is within the Stagrennan_010 river sub basin which is in the Boyne_SC_130 sub-catchment. The main channel of the Stagrennan_010 river waterbody is located 1km east of the study area and flows in a north-easterly direction, discharging into the Boyne Estuary. Its ecological status for the 2013-2018 cycle is unassigned and the WFD risk is under review.

The Boyne Estuary (IE_EA_010_0100) is a transitional waterbody located approximately 500m north of Drogheda MacBride Station entrance. It discharges to the Boyne Estuary Plume Zone coastal waterbody (IE_EA_010_0000) and the Northwestern Irish Sea HA08 coastal waterbody (IE_EA_020_0000). Under the Water Framework Directive (WFD, 2000/60/EC) the "Ecological Status" of the Boyne Estuary transitional water body is classified as Moderate for the 2013-2018 monitoring cycle and At Risk, indicating that the waterbody may not maintain or achieve that status on the next WFD cycle. The minimum objectives for a water body under the WFD are to achieve at least Good status (or Good potential for artificial/ highly modified water bodies), and no deterioration of existing status. The ecological status for the Boyne Estuary Plume Zone coastal waterbody is classified as Moderate for the 2013-2018 monitoring cycle and is currently under review.

The River Boyne and River Blackwater SAC, Boyne Coast and Estuary SAC and pNHA and Boyne Estuary SPA are located within 1km of the N2 study area.

Groundwater

There are no karst features located within the study area. The site is underlain by Dinantian Upper Impure Limestones (DUIL), which is part of the Mornington Formation which is described as dark limestone and calcareous shale. The aquifer is classified as a Locally Important Aquifer which is Generally Moderately Productive (Lm). The groundwater vulnerability at the site is classified as low.

The study area lies within the Drogheda groundwater body (IE_EA_G_025). The Drogheda 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 a number of water supply springs and wells within 250m from the site including one public supply dug well (2927SEW013) and an industrial use borehole

(2927SEW064). An active Outer Source Protection Zone associated with the Kiltrough Public Water Supply is located approximately 700m south of the study area.

Flooding

Historical flooding has been assessed by examining reports and maps from the OPW's National Flood Hazard mapping. There are no records of flood events within the site area.

Risk of coastal and fluvial flooding at River Boyne estuary has been assessed and mapped by the OPW as part of the Eastern CFRAM study. According to the OPW predictive flood maps (floodinfo.ie), the study area is located adjacent to areas at risk of tidal and fluvial flooding, but the area itself is not at risk of flooding. The predicted flood level during the 0.5% tidal Annual Exceedance Probability (AEP) event near the site is 3.55mOD, with the 1% AEP fluvial event flood level at 3.17mOD. The existing railway line is located at 28mOD and therefore the risk of flooding from river or the sea is unlikely.

2.6.10 Biodiversity

The works location is at the existing Drogheda train station, which is set in the urban centre of Drogheda, south of the River Boyne, and adjacent to residential holdings and the Dublin Road (R132). The Boyne Viaduct crosses the Boyne River, north of the site, with the Boyne Estuary from c. 800m east of the Viaduct. The area between the works area and the River Boyne is taken up by a pitch and putt club, residential holdings, pockets of woodland, scrub, and bare ground/artificial surfaces.

The River Boyne (and River Blackwater) is designated as a Special Area of Conservation (SAC). It is also designated as a Special Protection Area (SPA) and proposed Natural Heritage area (pNHA) c. 3.7km west of the works area. The Boyne Coast and Estuary is designated as a SAC and pNHA, c. 2km north east of the works, and also as a SPA c. 1km north east of the works area.

Figure 2-18: River Boyne and River Blackwater SAC and Boyne Coast and Estuary SAC

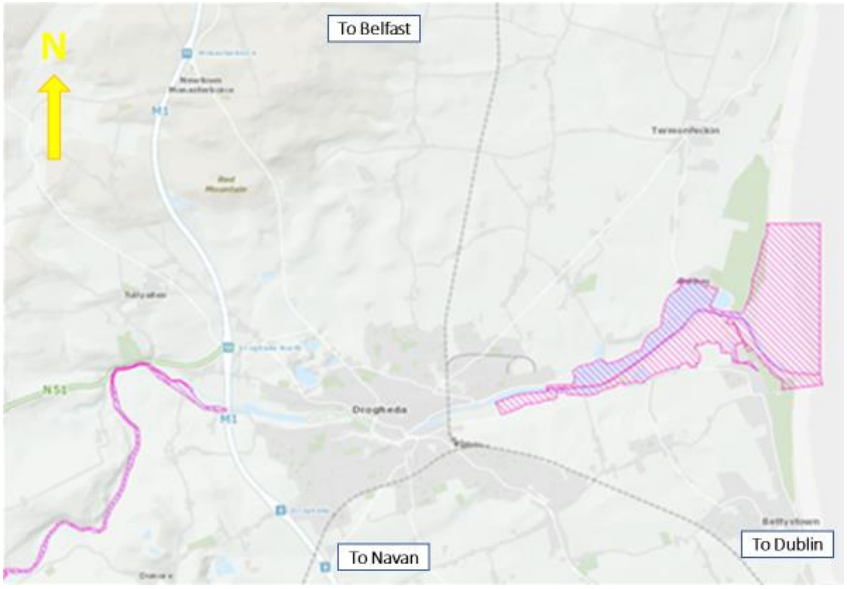


Figure 2-19: River Boyne and River Blackwater SPA and Boyne Estuary SPA

Figure 2-20: The Boyne Coast and Estuary pNHA

2.7 Utilities

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

- Gas Networks Ireland (GNI);
- Irish Water (Water supply);
- Irish Water (Wastewater Sewers)
- Louth County Council (Storm Water Sewers)
- ESB Networks
- Eir;
- BT Ireland;
- Irish Rail lineside cables running parallel along the railway.

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 there are also some services running under Drogheda MacBride Station and maintenance depot complex. All utility 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 lineside data cable/fibre optic running parallel to the railway. Within the Drogheda MacBride Station complex there are MV electrical cables, a low pressure gas main and a storm water pipe crossing under the railway.

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, Drogheda MacBride Station must, as a minimum, be able to handle the following quantum and pattern of train services in each direction:

- 5 TPH DART terminating/departing services;
- 2 TPH DMU through services;
- 1 TPH Enterprise through services;
- 1 TPH DART ECS move to/from platform 3 or 4 and depot;
- 1 TPH DMU ECS move to/from platform 2 and depot

An option will be deemed to be successfully handling the above quantum of service if it does not exceed a capacity utilization ratio (CU%) of 75%, matching standards set out by UIC Code 406 for mixed traffic railways. If an option exceeds a CU% of 75% by 1 to 2 percentage points, it may be deemed as being at risk of failing rather than failing, subject to professional judgement. Options exceeding a CU% of 75% by a more considerable margin will be judged as failing.

Note that the above ECS moves are not critical to the operation of TSS1C, but are included to allow ensure the choosing of a robust design capable of high levels of reliability and operational flexibility. For example, a chosen design should be capable of supporting non-standard operations, such as unplanned access to the depot to remove a failed unit, while still maintaining on time performance.

3.2 Systems Infrastructure and Integration

Overall signalling, electrification and telecoms (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 telecommunications (telecoms) may need some adaptation to the conditions that are specific to Drogheda MacBride Station and depot development.

Changes and additions to the signalling, telecoms and OHLE will be required to support operation over additional and special trackwork and provide for the operational turnback. Signalling will be adapted to enable the safe and efficient use of the new turnback facility so that trains can be easily routed into and out of the turnback with the least influence on the through services.

Similarly, 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.

Telecoms changes will be required to support the communication to passengers with enhanced information and considering the new operating patterns that can be provided by the new facility.

3.3 Design Standards

Table 3-1 contains some of the key applicable standards that will be used to develop the design. This is not intended as an exhaustive list of all required design standards.

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: Example Relevant 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	CCE-TMS-300	Track Construction Requirements and Tolerances
Irish Rail	CCE-TMS-312	Design Guidance Document for accessibility of Railway Stations
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

Source	Description	Comments
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	CCE-TRK-SPN-037	Fencing Specification
Irish Rail	I-PWY-1101	Requirements for Track and Structures Clearances
Irish Rail	I-PWY-1136	Requirements for Design, Installation and Maintenance of Lineside Drainage

4 Constraints

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

4.1 Technical

4.1.1 Permanent Way and Track

The following constraints have been identified in relation to permanent way and track:

- The curvature of the mainline in the existing platforms range between 220m and 350m. Any crossovers positioned between mainlines on this curvature would result in non-compliant turnout radii.
- Navan Junction on the Down Main is in close proximity to Platform 1 restricting space for additional infrastructure or realignments.
- The Boyne Viaduct carries a single bidirectional track that cannot be duplicated.
- The pier of the footbridge on the south west corner of the maintenance building restricts double ended stabling roads due to restricted clearances.
- Minimum proposed turnout used on the mainline is a P10 with a turnout radius of 320m.
- Minimum proposed turnout used in the depot is a P8 with a turnout radius of 204.8m
- The maintenance building and Wheel lathe building are to remain in the same location.
- Construction beyond rail corridor boundaries would necessitate property acquisition. All options have been designed to minimise any purchases of land where possible.
- Some options on the Navan line would require Dublin Road Underbridge to be widened to accommodate a new platform and wider track centres.
- All proposed Stabling Roads are >200m long to allow for a DART train, signalling requirements and buffer overrun.
- Clearance Points are based on Network Rail Standard which states 4.88m from the fouling point. The fouling point has been taken where track centres are 3.6m wide.
- Where trains are required to enter a headshunt, adequate track clearance has been designed to allow for a 700mm drivers walkway to safely walk from one end of the train to the other.
- In current conditions, a freight train on the Navan line stables on the southern track prior to Navan Junction. Any options which add a platform on the Navan line require an alternate location for stabling the freight train.

- The existing trainwash and/or separate plant room building can be moved to an alternate location to suit updated manoeuvres within the proposed depot.
- Additional tracks underneath the existing overbridges OBB80/80A/80B to the east of the maintenance building maybe required. Currently, this bridge does not have adequate vertical clearance for any OLE works.

4.1.2 Geotechnical

Based on the nature of the site usage as a railway station (which includes train refuelling areas), there is the risk of the presence of contaminated land. As such, materials excavated during the works may not be suitable for direct reuse on site and, subject to testing may require, disposal or recovery to a suitably licenced facility. Of particular note, the origins of the bund immediately south of the depot building are unknown as to whether it consists of original undisturbed natural material or reworked materials.

Due to limited information on the stratigraphy, depth to bedrock, groundwater regime and geo-environmental considerations from existing ground investigations, a site-specific ground investigation is a prerequisite at the location of the proposed works to investigate the current ground and groundwater conditions.

4.1.3 Structures

Any reconfiguration of the horizontal track alignment or increase in the number of tracks may require alternation to the structures in the area as described in Table 4-1. The introduction of OHLE on the route may also require the modification of some of the overbridges in this area to provide suitable clearance to overhead wires.

Table 4-1: Structure constraints along the site

Name	ID	Function	Constraint
Newtown / Public Rd	OBB80	Overbridge	Any alteration to the tracks at this location may require a modification to the bridge should additional width be required here. This bridge has insufficient clearance for the inclusion of overhead lines and may require modification.
Old Buckies Siding - Now DMU Depot	OBB80A	Overbridge	Any alteration to the tracks at this location may require a modification to the bridge should additional width be required here. This bridge has insufficient clearance for the inclusion of overhead lines and may require modification.

Name	ID	Function	Constraint
New bridge between Newtown & Buckies	OBB80B	Overbridge	Any alteration to the tracks at this location may require a modification to the bridge should additional width be required here. This bridge may need to be modified in line with vertical clearance requirements for OBB80 and OBB80A.
Drogheda MacBride Station Footbridge	OBB81	Overbridge	Alterations to the tracks at this location may require a modification to the bridge should additional width be required here. This bridge has limited clearance for the inclusion of overhead lines and may require modification.
	UBB81A	Culvert	Impact unknown
Access subway to DMU depot	UBB81B	Access subway	Minor alterations to the track alignment are unlikely to have a significant impact on the subway.
Staff Access Footbridge to Depot	OBB81C	Overbridge	Alterations to the tracks at this location may require a modification to the bridge should additional width be required here.
Boyne Viaduct	UBB82	Underbridge	Alteration to the track alignment at this location should be limited or avoided as alterations as widening of this structure is not desirable.
R132 Dublin Road	UBK1	Underbridge	Alterations to the tracks at this location may require a modification to the bridge should additional width be required here.

4.1.4 Utilities

Utility locations are a consideration when designing and implementing new railway infrastructure (whether at a 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 2.8, there are several utilities traversing and alongside the existing rail corridor, within the study area for the works around Drogheda

MacBride Station. Utilities are crossing the tracks at the northern end of the station and within the station, including an above ground medium voltage cable, an underground low-pressure gas main, and underground watermain. There are also medium and high voltage cables crossing the tracks on the southern side of the station. Most of the utility crossings on the Navan branch line are located at the Dublin Road (R132) railway bridge (Irish Water and telecommunications).

Underground utilities present are low, medium, and high voltage underground electrical cables, medium and low-pressure gas mains, telecommunications, watermains, wastewater sewers and surface water drainage networks. There are also lineside telecommunications running parallel to the railway in this area.

Options that involve constructing a new platform in the location of the existing service road 4, along with associated trackwork changes, will likely impact on the existing lineside services and telecommunications.

Options that involve changes to the Navan branch, including construction of a new platform, will likely impact on the existing lineside services and telecommunications.

Options that involve significant trackwork to the south and west of the depot building will potentially impact on existing services to the building such as the gas service connection pipeline, and the water and drainage networks.

All options are likley to involve modifications or construction of new Under Track Crossings for rail system cabling. These will be designed to Irish Rail Standards.

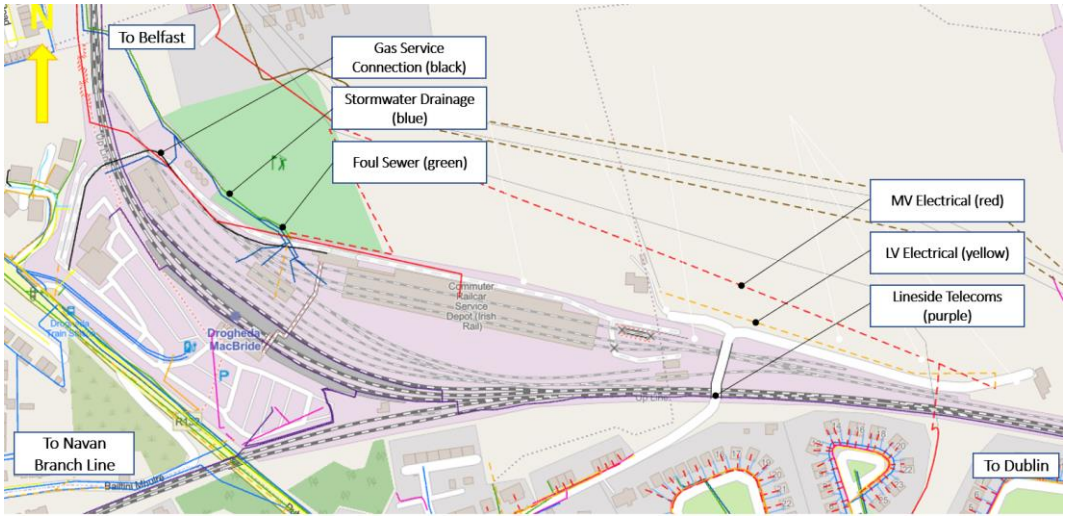


Figure 4-1: Existing Utilities at and around Drogheda MacBride Station

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.

The signalling is also constrained to only be able to operate unidirectionally in its current configuration.

The current Train Protection System CAWS is obsolete and is difficult to source.

The Signalling Equipment Room is also a constraint in terms its physical size as there is not sufficient space to add a significant amount of equipment.

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.

Telecoms is also limited by the amount of space available in the TER (Telecoms Equipment Rooms).

OHLE

The OHLE is constrained to the available capacity from the substation. Mast pole placements need to take utilities into account and be place in such a way to allow access to the utility infrastructure in the future. Special considerations will have to be given regarding mast pole placement on the Boyne Viaduct if required. OHLE is also constrained with the available headway underneath bridges and some bridges may be required to be modified to allow for OHLE.

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. In particular consideration should be given to Dublin Road N1 and Railway Terraces/McGraith's Lane where over- and underbridges may be impacted by the works.

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 will 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 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.

4.2.1 Traffic and Transportation

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.

4.2.2 Landscape and Visual

As outlined in Section 2.6, the lands of the existing station are zoned DTDA: Drogheda Transport Development Area: "*To protect and expand the existing Transport Hub around the train station and facilitate the development of Public Transport facilities including Residential, Retail and Office Development*."

There are protected views east and west along the River Boyne towards the Boyne Rail Viaduct. There are no protected landscape or visual aspects to the rail station area.

Newtown Lodge is located at the end of McGrath's Lane on the north side of the railway east of the station. McGrath's Lane crosses the railway corridor via a stone bridge. Railway Terrace, a terrace of 6 houses off McGrath's Lane, backs on to the south side of the railway station. The west side of the station is defined by Dublin Road, with its stone retaining wall along the road and stone wall at the top of the embankment. McBride Pitch & Putt Course and agricultural fields lie to the north of the station.

4.2.3 Archaeology and Cultural Heritage

The railway and its associated infrastructure at Drogheda is of an industrial heritage interest as well as being of architectural heritage significance. There is also the potential to reveal below ground archaeological features, finds and material within the environs of the existing station and works as a result of the proposal. As such work in this area will be archaeologically monitored to ensure that all features and finds are appropriately identified and recorded.

4.2.4 Architectural Heritage

There are six Protected Structures in Drogheda MacBride Station. They are: Drogheda MacBride Station (LCC RPS DB-055); Engine Shed LCC RPS DB-395,; Water Tower LCC RPS DB-397; Parcel Office LCC RPS DB-396; Boiler House LCC RPS DB-398; and a toilet block LCC RPS DB-399. All of these structures are also included in the NIAH. Their settings or curtilages include the whole station complex.

There is a protected structure of note to the north of the station, St. James's House (LCC RPS DB-148), within whose setting the station is situated, and one protected structure to the south west, Bayview House (LCC RPS DB-301). Similarly, UBB82 (Boyne Viaduct) is a protected structure (LCC RPS DB-176).

The station does not fall within an Architectural Conservation Area (ACA) and there are no historic gardens included in the NIAH Garden Survey, in the vicinity of it.

Historic Map analysis identifies a number of additional features which require further investigation to determine their architectural interest. These include a double arched cut stone bridge across Newtown Lane, and the Dublin Road Bridge. A terrace of six houses marked Railway Terrace is noted on the 1870 town map, with later workers houses added to the south of these by 1907. The former Union Workhouse and Fever Hospital to the west of the station is a significant complex of buildings likely to be of architectural, technical, social and historical interest. There were substantial gardens to the north of the station as Wierhope and St. James which may retain landscape features of interest.

4.2.5 Noise and Vibration

The residential properties to the south, west, and north of Drogheda MacBride Station are the most sensitive receptors in terms of noise and vibration from rail operations. These residential receptors are already exposed to noise and vibration from rail operations, and the electrification of the line will reduce noise from trains running past the nearby residents.

Nearby residents, recreational facilities, and commercial properties must be considered in the construction phase to ensure that their acoustic amenity is preserved.

4.2.6 Air quality and climate

The residential properties to the south, west, and north of Drogheda MacBride Station are the most sensitive receptors in terms of potential air quality impacts during the construction phase.

The development of a new station will increase the attractiveness of rail as a more sustainable mode of transport, having the effect of reducing carbon and harmful emissions associated with road traffic.

4.2.7 Agricultural and Non-Agricultural

Agricultural Land

The agricultural constraints consist of four agricultural fields (1 grassland and 3 tillage) on the northern boundary of the station and railway line. The sensitivity of the agricultural environment in this area is medium.

Non-Agricultural land/population assessment

As regards Accessibility and Social Inclusion, the principal constraints relating to the former would be the ease and speed of access to trains, and transfer between trains or platforms, i.e. that the distance to walk should not be too far and that it is easy for passengers to know where to go, by virtue of the station layout combined

with good signage. Avoidance of these constraints makes it easier for people to choose the DART service as means of accessing employment of social facilities.

For social inclusion, it is important to consider the needs of those with limited mobility, including older people, people with disabilities, people with intellectual difficulties and, potentially, also parents (and single parents) with children. Again, it is important for there to be ease and speed of access to trains, and transfer between trains or platforms. Distance is a constraint, but so is the need to avoid stairs to changes in grade access between platforms. Although lifts have been proposed in the station design, these must be easy to locate, but can nevertheless present users with delays or be subject to breakdowns.

4.2.8 Geology & Soils

Based on the historic and industrial use of the site as a railway station and depot (including refuelling areas), there are likely to be sources of contamination within the made ground throughout the study area.

Pockets of soft ground comprising recent sediments such as lacustrine and alluvial deposits associated with past and existing water bodies such as the River Boyne may be present in the surrounding site areas.

There are no geological heritage areas within the vicinity of Drogheda MacBride Station.

4.2.9 Water Resources

The constraints to the development in terms of water resources include the Stagrennan_010 river sub basin, the Boyne Estuary transitional waterbody and Boyne Estuary Plume Zone coastal waterbody, the underlying locally important aquifer, the public supply well and industrial borehole and the protected water dependant ecological sites where changes to the water flow and quality could have a negative impact.

4.2.10 Biodiversity

The key ecological constraints in this area are the River Boyne and Blackwater SAC, the Boyne Coast and Estuary SAC, the Boyne Estuary SPA, which are designated for riparian and marine habitats and protected species, and overwintering birds, and the overlapping pNHA designation. These designated areas are of international and national biodiversity importance. The River Boyne and Blackwater SPA is not likely to be impacted by the proposed works as it is located c 4.1km upstream of the development, is designated for kingfisher *Alcedo atthis*, and as works will not be within the River Boyne or altering kingfisher habitat within (banks), this SPA is not considered further.

The qualifying interests (reasons for designation) of the River Boyne and Blackwater SAC, the Boyne Coast and Estuary SAC, and the Boyne Estuary SPA, are listed in Table 4-2.

Other potential ecological constraints include:

- Potential for roosting bats in OBB80, OBB80A & OBB80B bridges, the Boyne Viaduct (UBB82) and the bridge structure on the Dublin Road (depending on the nature and structure of this bridge)
- 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

Table 4-2: Reasons for designation of the River Boyne and Blackwater SAC, Boyne Coast and Estuary SAC and Boyne Estuary SPA

River Boyne and Blackwater SAC	Boyne Coast and Estuary SAC	Boyne Estuary SPA
• 7230 Alkaline fens • 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) • 1099 River lamprey *Lampetra fluviatilis* • 1106 Atlantic salmon *Salmo salar* • 1355 Otter *Lutra lutra*	• 1130 Estuaries • 1140 Mudflats and sandflats not covered by seawater at low tide • 1210 Annual vegetation of drift lines • 1310 Salicornia and other annuals colonising mud and sand • 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) • 2110 Embryonic shifting dunes • 2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) • 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)	• A048 Shelduck Tadorna tadorna • A130 Oystercatcher (Haematopus ostralegus) • A140 Golden Plover (Pluvialis apricaria) • A141 Grey Plover (Pluvialis squatarola) • A142 Lapwing (Vanellus vanellus) • A143 Knot (Calidris canutus) • A144 Sanderling (Calidris alba) • A156 Black-tailed Godwit (Limosa limosa) • A162 Redshank (Tringa totanus) • A169 Turnstone (Arenaria interpres) • A195 Little Tern (Sterna albifrons) • A999 Wetland and Waterbirds

4.3 Planning

This section provides extracts from the relevant planning documentation.

Louth County Development Plan 2021-2027

The Louth County Development Plan 2021-2027 was adopted on 30th September 2021. The Plan came into effect on 11th November 2021.

The Louth County Development Plan 2021-2027 has superseded the Drogheda Borough Council Development Plan 2011-2017 and the North Drogheda and Environs Local Area Plan.

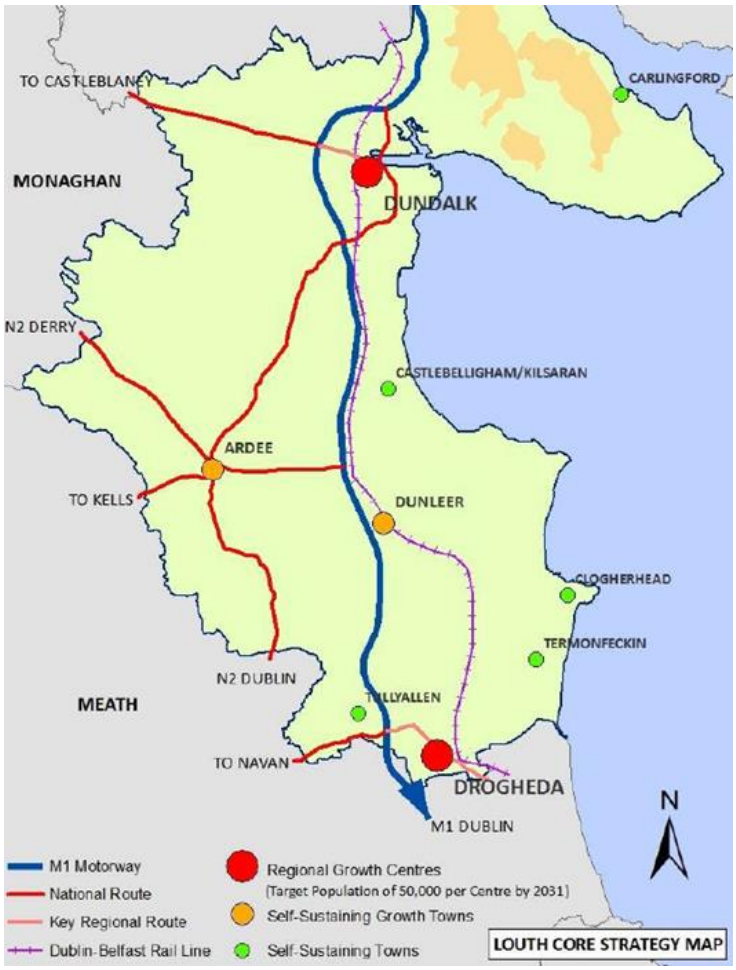


Figure 4-2: Louth Core Strategy Map Source: Louth County Development Plan 2021-2027

A key priority of the Plan is to promote the continued sustainable and compact growth of the town as a regional driver of city scale with a target population of 50,000 by 2031. This is supported by objectives to regenerate the town centre, promote compact growth in the town's hinterlands and enhance the role of Drogheda as a self-sustaining strategic employment centre on the Dublin-Belfast Economic Corridor.

The Plan states in relation to Drogheda:

"The goal of achieving compact growth will require improved accessibility, sustainable mobility and the requisite infrastructure to enable Drogheda to grow as a Regional Growth Centre (RGC). The town will benefit from the extension of the DART service and improvements will be required to McBride station relating to accessibility."

The Plan recognises that the "DART Expansion Programme" is an important growth enabler for Drogheda as it would improve the connectivity to Dublin due to the increased frequency of services, making the town more accessible and attractive for economic investment and employment generating development.

The following policies and objectives in the Plan are relevant:

"SS13: To support investment in public and sustainable transport infrastructure and services in Drogheda including the progression of the DART Expansion Programme which includes the electrification of the rail line and the extension of DART services to Drogheda

MOV 2: To facilitate the integration of land use with sustainable transportation infrastructure in accordance with the requirements of RPO 8.1 in the RSES by supporting the creation of a critical mass of population and employment related development that would maximise investment in public transport infrastructure and create compact, sustainable settlements.

MOV 12: To support the DART Expansion Programme including new infrastructure and the electrification of existing lines along the northern rail line to Drogheda."

The DART+ Coastal North project supports the overall vision for in the Plan, particularly in relation to the development of Drogheda as a Regional Growth Centre.

Zoning Objectives

The rail line goes though or is adjacent to the following zoning objectives:

A1 - Existing Residential

A2 - New Residential

J1- Transportation Development Hub

The DART + Coastal North project will not contravene any of these zoning objectives.

Protected Structures

There are a number of protected structures in or adjoining the Drogheda railway station as shown in Table 4-3.

Table 4-3: Protected Structures adjoining DART + Coastal Project

Ref.	Location	Structure	Description
DB-055	Dublin Road Railway Station	Railway Station	Station buildings incl. Engine shed, turntable c.1845, water tower and cast iron water tank.
DB-176	Boyne River	Bridge	Eighteen-span limestone and iron railway over river bridge, dated 1855. Fifteen round-headed stone arches, three north of river, twelve to south, three-span wrought-iron bolted girder trussed section crossing river 1932 with segmental-arched central section.
DB-395	Dublin Road Railway Station	Engine shed	Detached single-storey six-bay stone engine shed, built c. 1860. Located to north-west of station complex
DB-396	Dublin Road Railway Station	Railway Station Building	Detached three-bay single-storey brick railway ancillary building, built c. 1875.
DB-397	Dublin Road Railway Station	Railway Station Office	Detached three-bay two-storey brick water tower, built 1873. Red brick Flemish bond walling to podium. Water tank with rounded corners, embossed plaque inscribed "T. C. RENDON AND CO. ENGINEERS, DROGHEDA 1873"
DB-398	Dublin Road Railway Station	Railway Station Office	Detached single-storey timber parcel office, built c. 1900. Painted timber horizontally-sheeted clapboard cladding on timber frame walling set on masonry plinth. Located to east of main station building.
DB-399	Dublin Road Railway Station	Railway Station Building	Attached three-bay single-storey brick station building, built c. 1860. Yellow brick Flemish bond walling.

Any works associated with DART + Coastal Project that may affect protected structures will have to be carefully assessed.

Flood Risk

There is an area immediately to the north of Drogheda MacBride Station on the rail line which is classified as Flood Zone A in the OPW CFRAM Study. The DART+ Coastal Project will have to take this classification into account in terms of specific design measure.

5 Options

The following section runs through the optioneering process from the longlist of options to the selection of the Draft Emerging Preferred Option.

The option selection process is described in the Preliminary Option Selection Report.

5.1 Longlist of options

This section describes the options which have been considered for Drogheda. 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 1A	New platform at location of existing service road 4
Option 1B	New platform at location of existing service road 4 with new crossover from down main at the station approach
Option 1C	New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach
Option 1D	New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak
Option 1E	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach
Option 1F	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only
Option 2A	Single Navan Branch Platform maintaining ECS moves to Navan Platforms
Option 2B	Single Navan Branch Platform but with no ECS moves to Navan Platforms
Option 2C	Single Navan Branch Platform with southern headshunt to depot
Option 2D	Island Navan Branch Platform maintaining ECS moves to Navan Platforms
Option 2E	Island Navan Branch Platform with no ECS moves to Navan Platforms
Option 2F	Island Navan Branch Platform with southern headshunt to depot

Option	Description
Option 2G	Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms
Option 2H	Navan Branch Platform provided by removing dual track with southern headshunt to depot
Option 2I	New Platform(s) in Station car park with no ECS moves to Navan Platforms
Option 2J	New Platform(s) in Station car park with southern headshunt to depot
Option 3A	New Headshunt to North
Option 3B	New headshunt to North with connection from Platform 2

The key intervention areas defining option 1s, 2s and 3s are shown in the figures below.

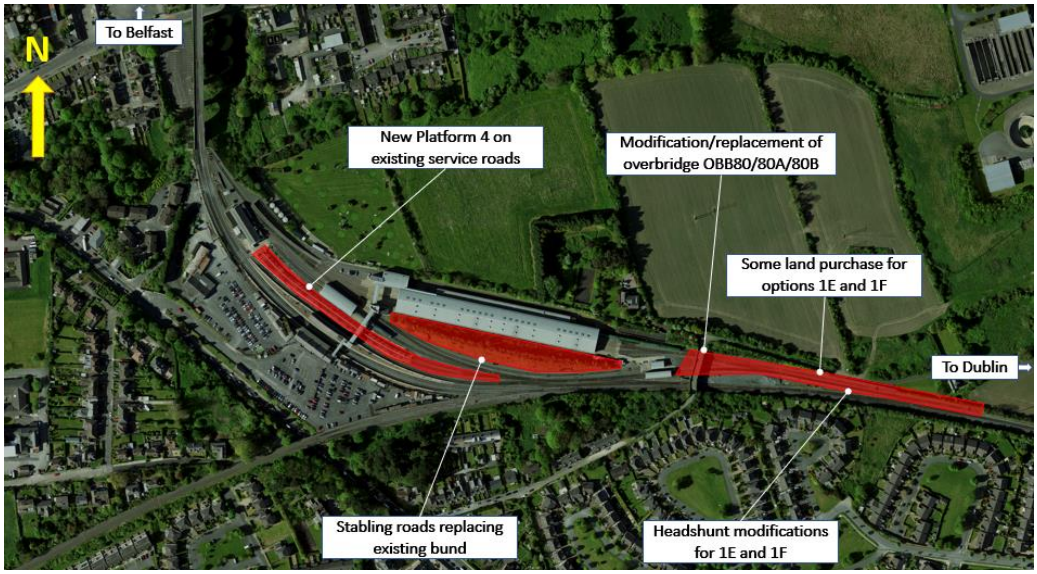


Figure 5-1: Option 1s intervention areas (Base map source: OSI aerial imagery)

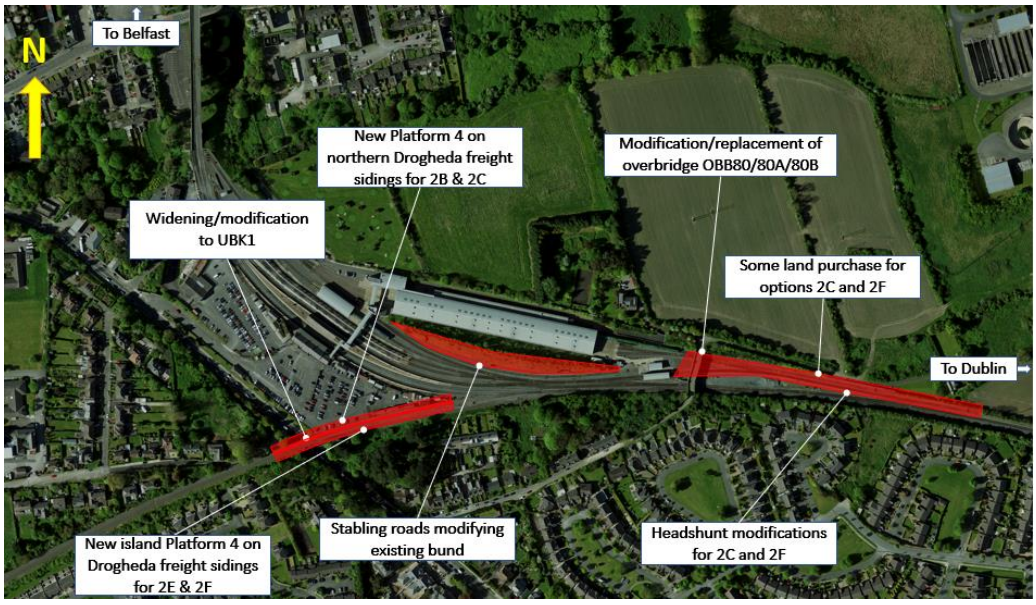


Figure 5-2: Option 2s intervention areas (Base map source: OSI aerial imagery)

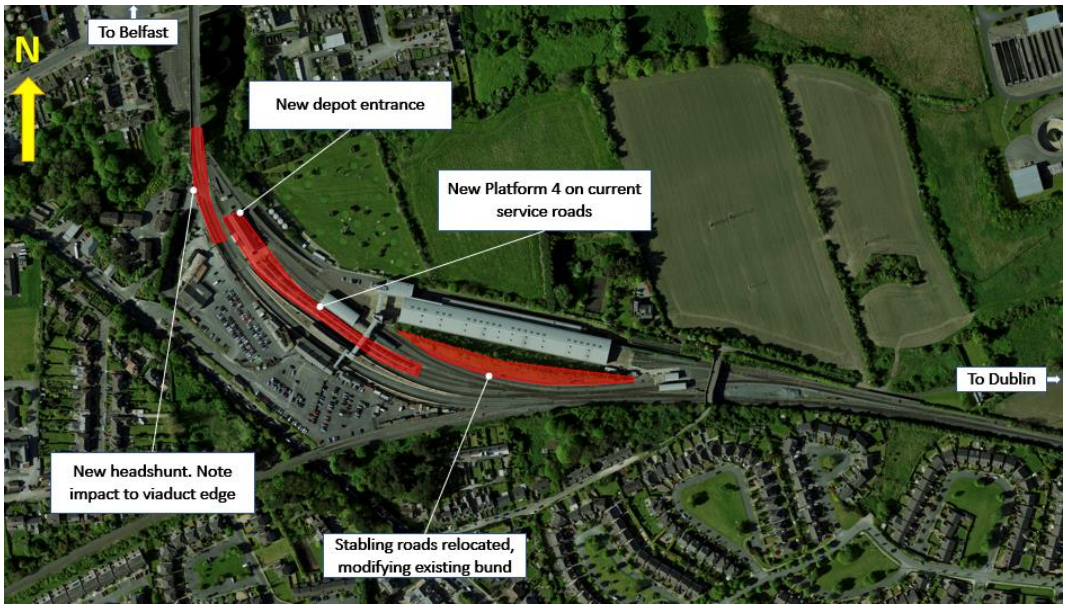


Figure 5-3: Option 3s intervention areas (Base map source: OSI aerial imagery)

5.1.1 Option 0 - 'Do Nothing'

'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.

5.1.2 Option 1A – New platform at location of existing service road 4

Track

This option provides a new platform at the location of the current service roads as indicated by the red hatched area in the figure below. The service roads would be relocated within the depot to the area that is currently a vegetated earth bund. This is consistent within all the "1" Options.

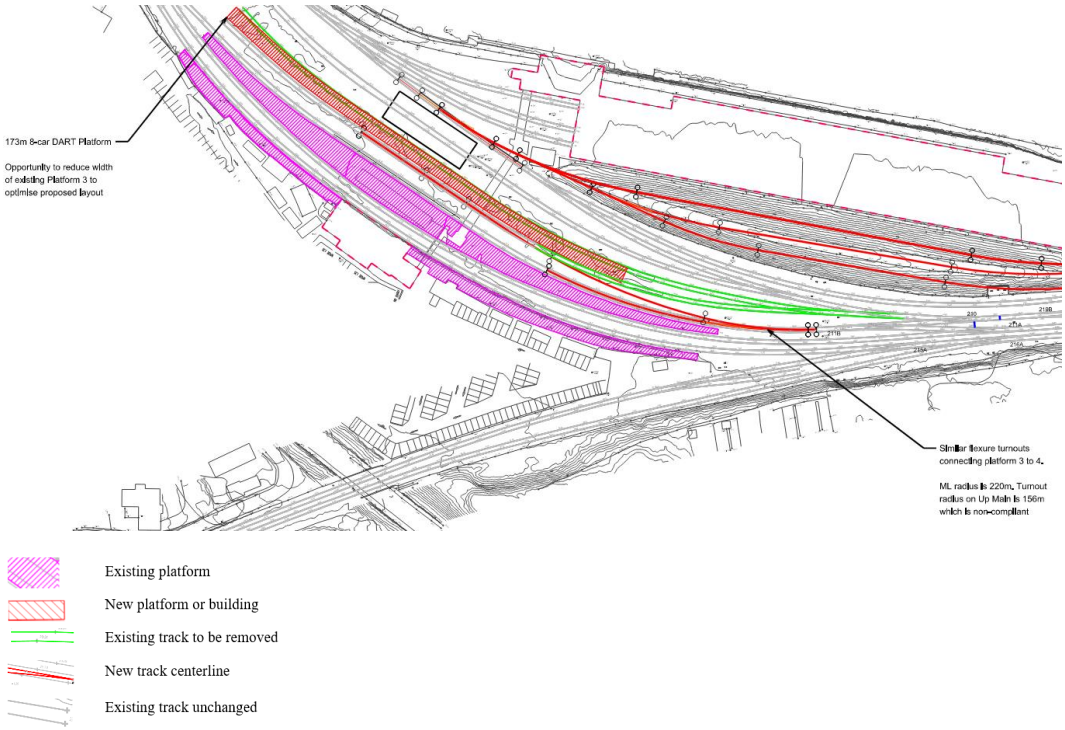


Figure 5-4: Option 1A track work

Platform/Station

The new platform would be constructed adjacent to the wheel lathe and would be curved at the southern end requiring a derogation to the current design standards for new platforms. A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2, a new bridge may be required to span all 4 platforms for the planned electrification works. This option has implications for a Protected Structure.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new platform (and/or platform 3) to work as a depot arrivals road. A restriction on the current access to the south would also likely to be needed such that this was an exit only road.

The new sidings within the yard would need to be considered in conjunction with electrification works to the existing McGrath's Lane bridge and would likely involve modifications/reconstruction of the bridge and moving/replacement of the train wash plant room.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements described earlier in Section 3.1, the operational performance of this option has been assessed and the results are as presented below.

Explanation of Operational Performance Analysis

Figure 5-5 shows how Option 1A will operate TSS1C in the peak period, with services grouped by path. For example, DMU and Enterprise services (shown in blue) use different rolling stock and have different stopping patterns; however, in the context of Drogheda station the two service types are functionally identical. DART services are only differentiated by direction, due the different paths taken by trains dictated by the turnaround move at Drogheda. DART services in the Up direction to Dublin are shown in orange, while those in the Down direction to Drogheda's platform are shown in yellow. Lastly, empty coaching stock (ECS) moves are differentiated by service type, but not by direction, as the path is the same whether the move is to or from the depot. DART ECS moves are shown as green dotted lines, traveling between the depot and DART serviced platforms (in this case platforms 3 or 4). DMU ECS moves are shown as magenta dotted lines, traveling between the depot and DMU served platforms (in this case platforms 1 or 2).

Operational analysis is undertaken at key high traffic points on the option layout, in this case the Up running line, the Down running line, the bi-directional lead connecting the Down running line to platforms 2, 3, and 4, and the single lead track connecting to platforms 3 and 4. Callout windows show the frequency of trains on each section–irrespective of direction–and show the amount of time the section will be occupied per hour. The percentage is derived from dividing the proportion of occupied time by an hour, giving a 'capacity utilization' value. UIC Code 406 recommends that capacity utilization be no greater than 75% on a mixed traffic railway sections like Drogheda station. Segments at or below 75% utilization are denoted by callout boxes coloured green. Segments that are found to be utilized more than 75% of an hour but within 1 to 2 percentage points are deemed to be at risk of failing, with callout windows coloured yellow. Segments utilized far in excess of 75% are judged to be failing, with callout windows coloured red. Deciding whether a segment should be deemed failing or at risk of failing is done through professional judgement by rail operations experts.

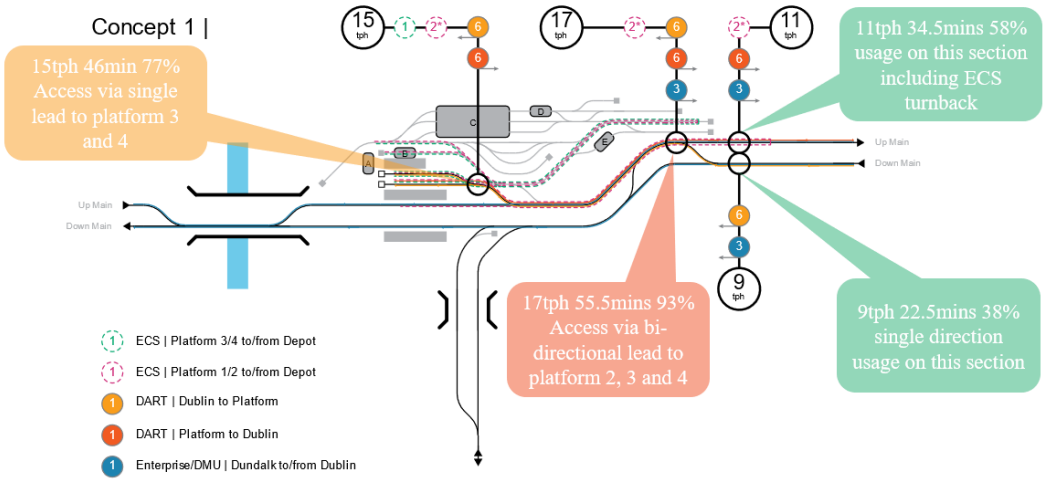


Figure 5-5: Operational performance of Option 1A

5.1.3 Option 1B - New platform at location of existing service road 4 with new crossover from down main at the station approach

Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently a vegetated earth bund. This is consistent within all the "1" Options.

Significant alteration of the depot and platform approach track configurations would be made and a new crossover from the Down Main to the platforms would be installed.

Figure 5-6: Option 1B track works

Platform/Station

The new platform would be constructed adjacent to the wheel lathe and would be curved at the southern end requiring a derogation to the current design standards for new platforms. A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has implications for a Protected Structure.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road

2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new platform (and/or platform 3) to work as a depot arrivals road. The current south facing access to the depot would be removed with all depot entry and exit movements being made via the new platform or platform 3

The new sidings within the yard would need to be considered in conjunction with electrification works to the existing McGrath's Lane bridge and would likely involve modifications/reconstruction of the bridge and moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

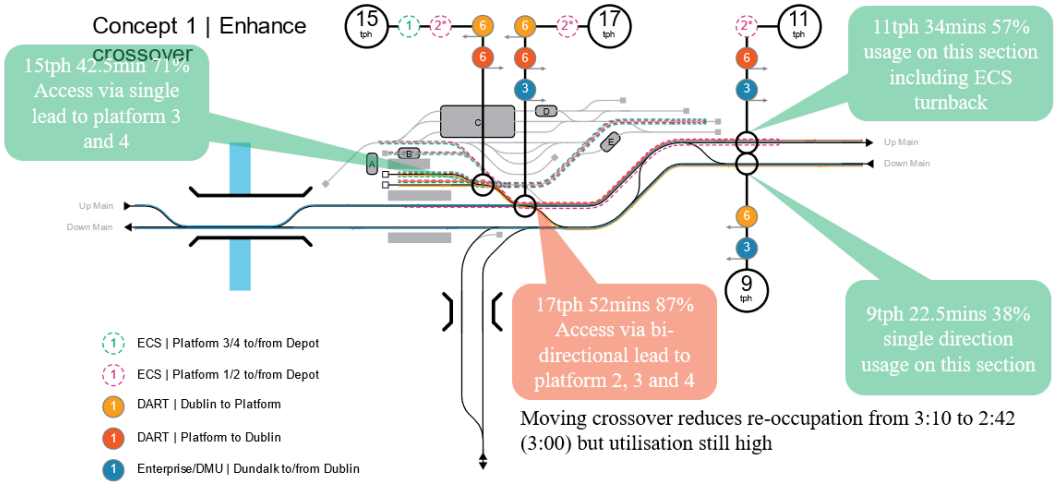


Figure 5-7: Operational performance of Option 1B

5.1.4 Option 1C – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach

Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently and bund and covered in vegetation. This is consistent within all the "1" Options.

Significant alteration of the depot and platform approach track configurations would be made and a new crossover from the Down Main to the platforms would be installed. A second connection to the Up main would be made allowing parallel moves to be made across the platform approach

Figure 5-8: Option 1C track works

Platform/Station

The new platform would be constructed adjacent to the wheel lathe and would be curved at the southern end requiring a derogation to the current design standards for new platforms. A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has implications for a Protected Structure.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new platform (and/or platform 3) to work as a depot arrivals road. The current south facing access to the depot would be removed with all depot entry and exit movements being made via the new platform or platform 3

The new sidings within the yard would need to be considered in conjunction with electrification works to the existing McGrath's Lane bridge and would likely involve modifications/reconstruction of the bridge and moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

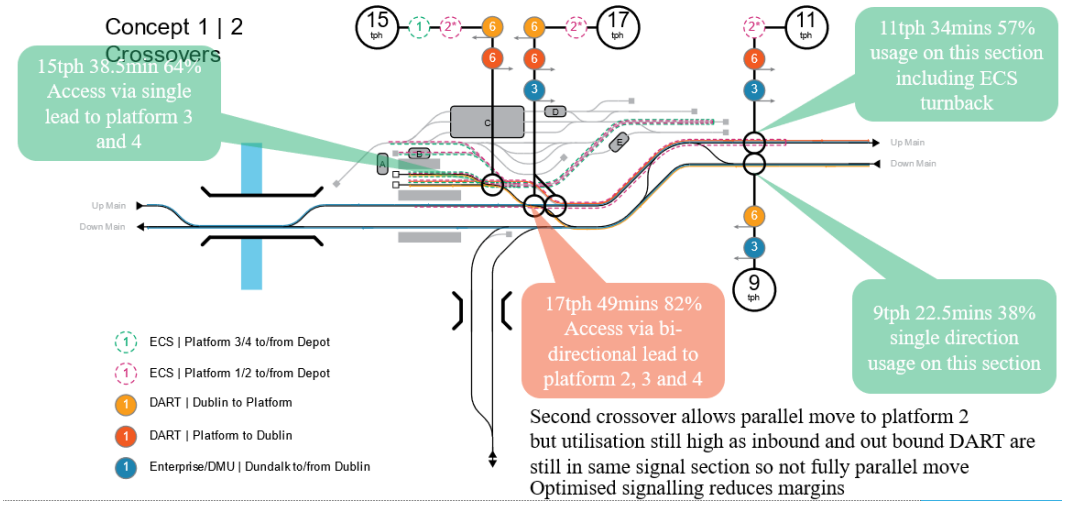


Figure 5-9: Operational performance of Option 1C

5.1.5 Option 1D – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak

This option has the same infrastructure as option 1C, along with similar implications for Protected Structures, however the number of Empty Carriage Stocks moves are reduced to improve the performance.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

For this option a modification has been made to the operational requirements which is through the removal of the ECS moves other than a single DART service per hour entering or exiting service via platform 3 or 4. An additional non-DART service entering the depot during peak hours to head north or south would cause the Up main to exceed the capacity rules set.

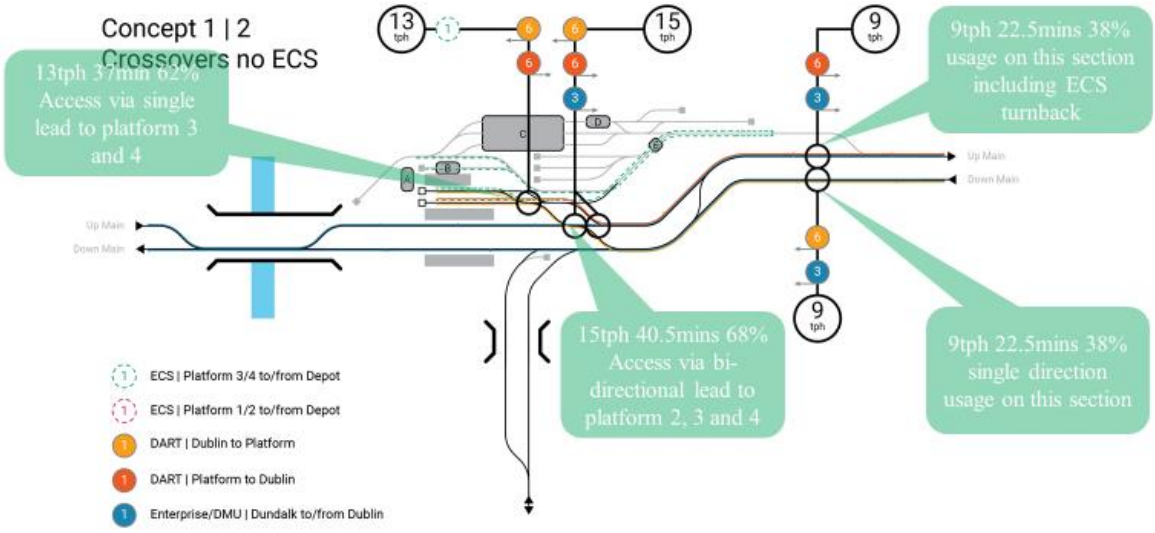


Figure 5-10: Operational performance of Option 1D

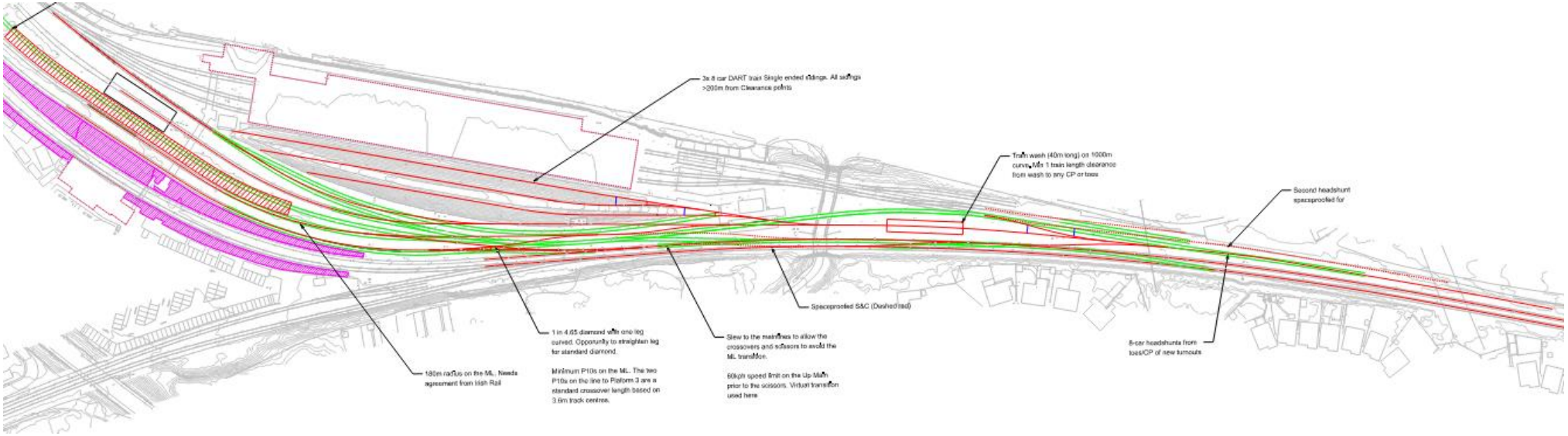
5.1.6 Option 1E – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach

Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently and bund and covered in vegetation. This is consistent within all the "1" Options.

Significant alteration of the depot and platform approach track configurations would be made and a new crossover from the Down Main to the platforms would be installed. A second connection to the Up main would be made allowing parallel moves to be made across the platform approach.

The existing headshunt at the southern end of the depot sidings would be realigned and extended to allow a new connection on to the Up Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.



Existing platform

New platform or building

Existing track to be removed

New track centerline

Existing track unchanged

Figure 5-11: Option 1E track works

Platform/Station

The new platform would be constructed adjacent to the wheel lathe and would be curved at the southern end requiring a derogation to the current design standards for new platforms. A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has implications for a Protected Structure.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new headshunt to operate as a depot arrivals road. Platform 3 or the new platform could also be made to function as a depot arrivals road. If the new headshunt was the sole arrivals road the Up Main would have reduced capacity in the peak to take trains out of service.

The current south facing depot access would be removed with all depot entry and exit movements being made via the new platform/platform 3 or the from the station to the new headshunt. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains off peak.

The new sidings within the yard would need to be considered in conjunction with electrification works to the existing McGrath's Lane bridge and would likely involve modifications/reconstruction of the bridge and moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

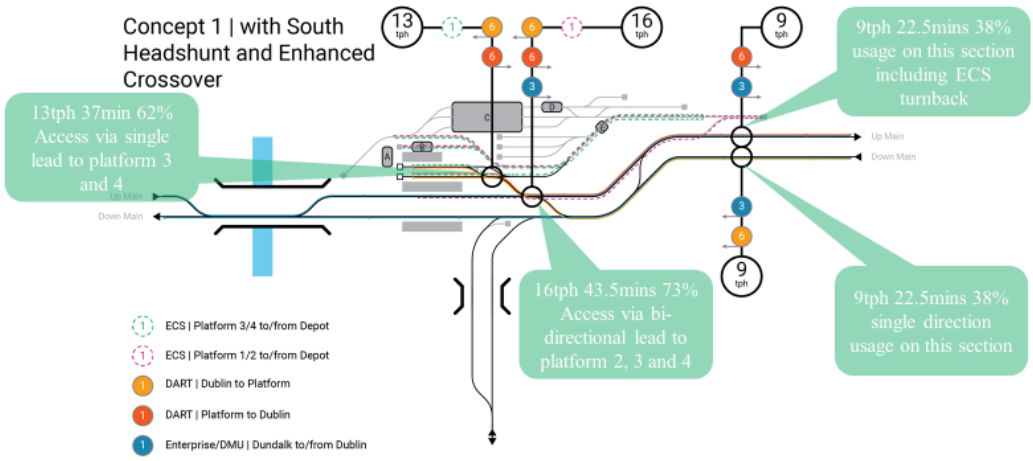


Figure 5-12: Operational performance of Option 1E

5.1.7 Option 1F – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only

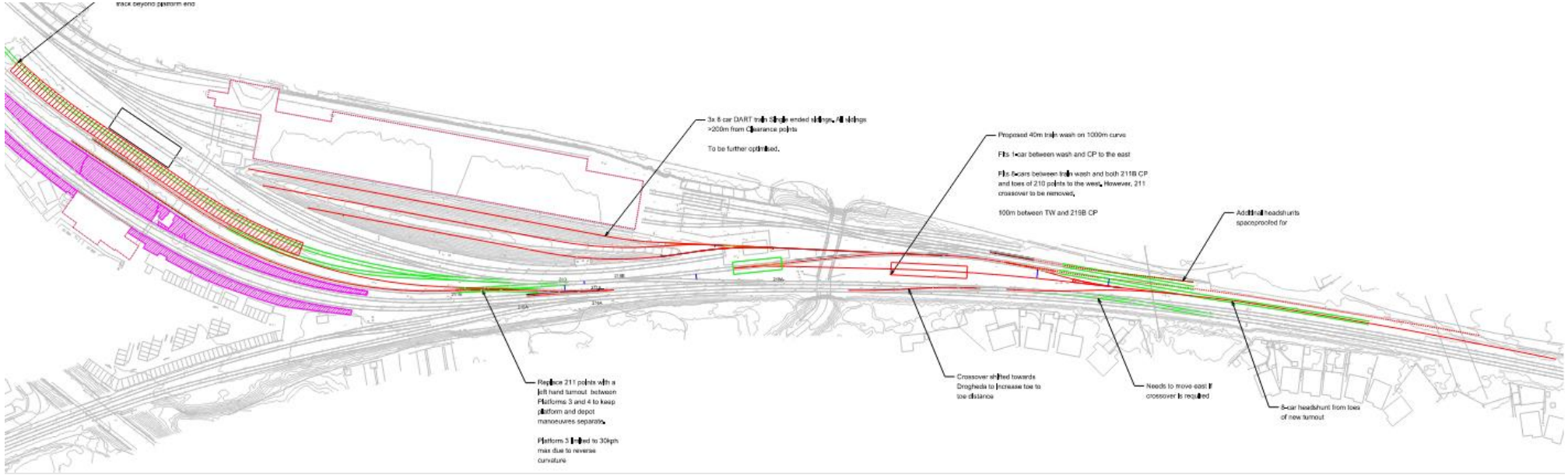
Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently and bund and covered in vegetation. This is consistent within all the "1" Options.

Minor alteration of the depot and platform approach track configurations would be made and a new crossover from the Down Main to the platforms would be installed.

The existing depot headshunt would be realigned and extended to allow a new connection on to the Up Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.

This option is similar to Option 1A with the addition of an extended headshunt and connection to the Up Main.



Existing platform

New platform or building

Existing track to be removed

New track centerline

Existing track unchanged

Figure 5-13: Option 1F track works

Platform/Station

The new platform would be constructed adjacent to the wheel lathe and would be curved at the southern end requiring a derogation to the current design standards for new platforms. A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has implications for a Protected Structure.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new headshunt to operate as a depot arrivals road.

The current south facing access from the depot would be retained as an exit only road. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains off peak.

The new sidings within the yard would need to be considered in conjunction with electrification works to the existing McGrath's Lane bridge and would likely involve modifications/reconstruction of the bridge and moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

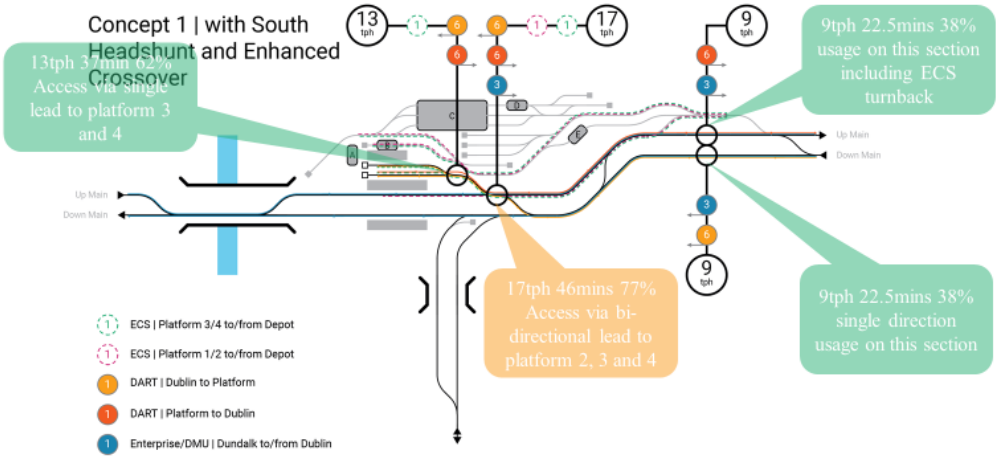
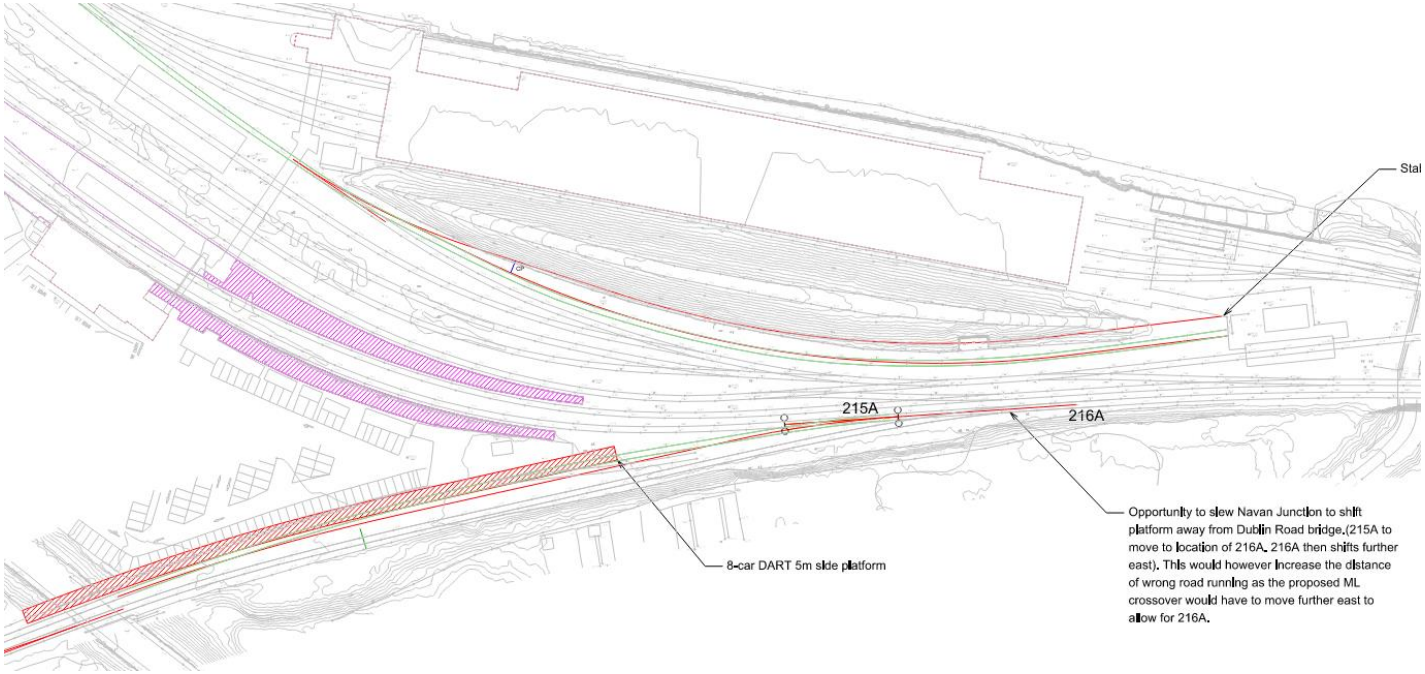


Figure 5-14: Operational performance of Option 1F

5.1.8 Option 2A – Single Navan Branch Platform maintaining ECS moves to Navan Platforms

Track

This option provides a new Platform on the Up Navan Branch through a slew of the line and modification to the mainline P&C. Other track modifications are required to cater for the increase in stabling requirements.



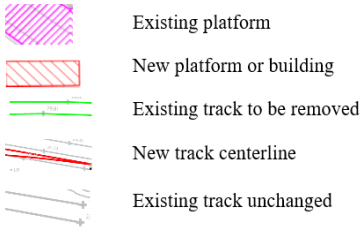


Figure 5-15: Option 2A layout

Platform/Station

A new single platform would be constructed on the Up Navan Branch. This would require the widening and installation of the platform over Dublin Road Underbridge.

The platform would be interconnected with the existing platform 1 which would require modification to allow for the pedestrian movements to the new platform (or an alternative access route adjacent would need to be provided). This option would require the removal of the existing SET buildings to a new location. This option will also result in the loss of some station car parking. This option is not expected to have an impact on Protected Structures.

Stabling

The additional stabling requirement of two FLU roads would be provided by two of the following:

1. Within the BEMU stabling location introduced on the Navan branch
2. Provision of a stabling facility west of the platform on the Up Navan. (note it is not possible to stable in the platform as there is insufficient space for a trap point to be installed). The use of this option with option 1 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
3. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the platform 3 to work as a depot arrivals road. A restriction on the current access to the south would also likely to be needed such that this was an exit only road.

Freight

The provision of the new platform will allow current freight levels on the Navan branch to continue but this will require the timing of freight trains, the use of the platform and any stabling to be considered and aligned within the operational planning rules.

The relocation of the mineral train stabling location is considered to have already to have occurred to facilitate the BEMU stabling position. If this has not occurred a new location will be required.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

For this option, no modification has been made to the operational requirements. Two single ECS move in/out of the depot either to the north, south or the new Navan Platforms has been allowed for in the peak. Having two services entering or exiting the depot during peak hours causes the Up main to exceed the capacity rules set in Section 3.1.

Note that this option assumes that DART ECS moves can access to all platforms

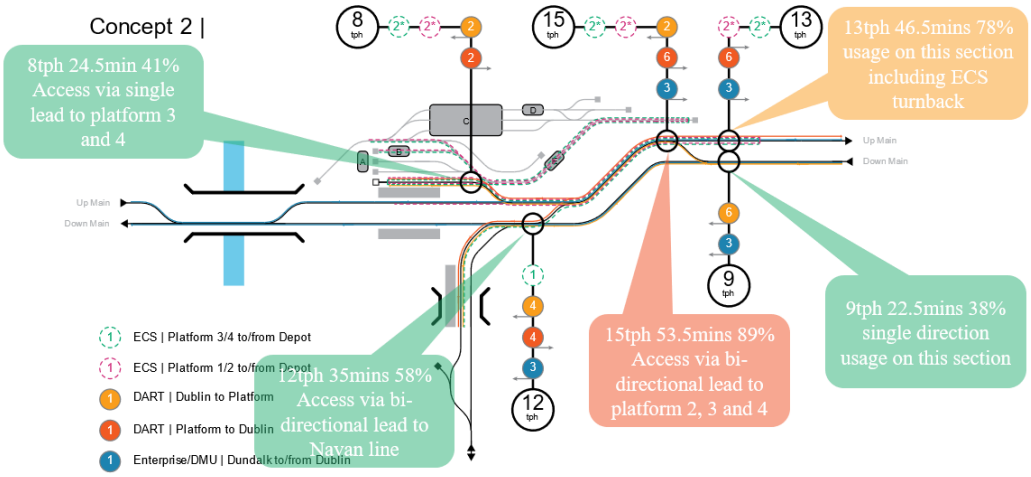


Figure 5-16: Operational performance of Option 2A

5.1.9 Option 2B - Single Navan Branch Platform but with no ECS moves to Navan Platforms

This option has the same infrastructure as option 2A however the number of Empty Carriage Stocks moves are reduced to improve the performance.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

For this option a modification has been made to the operational requirements which is through the removal of an ECS move. A single DMU ECS move in/out of the depot either to platforms 1 or 2 has been allowed for in the peak. An additional DART ECS move entering or exiting the depot during peak hours from any platform apart from Platform 3 would cause the Up main to exceed the capacity rules set out in Section 3.1.

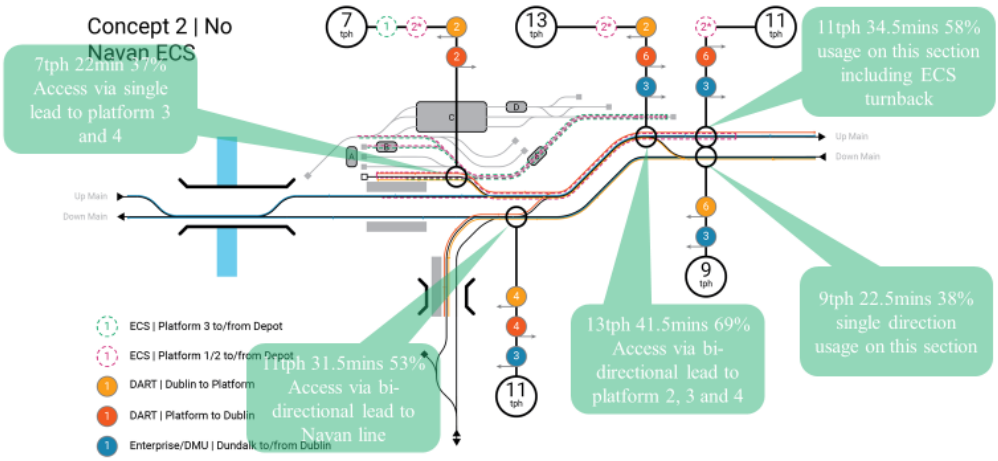


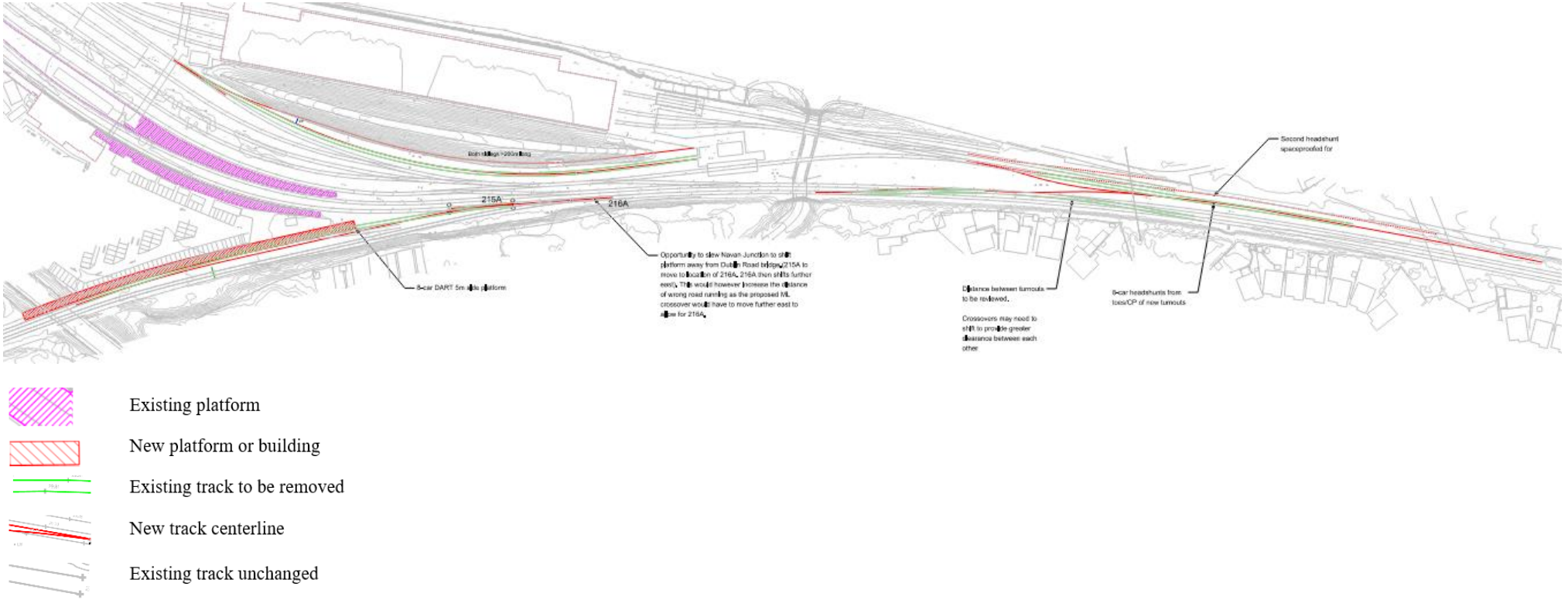
Figure 5-17: Operational performance of Option 2B

5.1.10 Option 2C - Single Navan Branch Platform with southern headshunt to depot

Track

This option includes the same trackwork infrastructure requirements as Options 2A and 2B, with the addition of amendments to the southern headshunt of the depot. It provides a new Platform on the Up Navan Branch through a slew of the line and modification to the mainline P&C. Other track modifications are required to cater for the increase in stabling requirements.

The existing depot headshunt would be realigned and extended to allow a new connection on to the Up Main which would also include a relocation of the crossover to the Down Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.



Existing platform

New platform or building

Existing track to be removed

New track centerline

Existing track unchanged

Figure 5-18: Option 2C layout

Platform/Station

A new single platform would be constructed on the Up Navan Branch. This would require the widening and installation of the platform over Dublin Road Underbridge.

The platform would be interconnected with the existing platform 1 which would require modification to allow for the pedestrian movements to the new platform (or an alternative access route adjacent would need to be provided). This option would require the removal of the existing SET buildings to a new location. This option will also result in the loss of some station car parking. This option is not expected to have an impact on Protected Structures.

Stabling

The additional stabling requirement of two FLU roads would be provided by two of the following:

1. Within the BEMU stabling location introduced on the Navan branch
2. Provision of a stabling facility west of the platform on the Up Navan. (note it is not possible to stable in the platform as there is insufficient space for a trap point to be installed). The use of this option with option 1 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
3. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road. Alternatively the new headshunt would become the sole arrivals road and the connection to platform 3 could be removed or made an exit only road.

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3, Navan Branch or from the station to the new headshunt. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains during off peak.

Freight

The provision of the new platform will allow current freight levels on the Navan branch to continue but this will require the timing of freight trains, the use of the platform and any stabling to be considered and aligned within the operational planning rules.

The relocation of the mineral train stabling location is considered to have already to have occurred to facilitate the BEMU stabling position. If this has not occurred a new location will be required.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

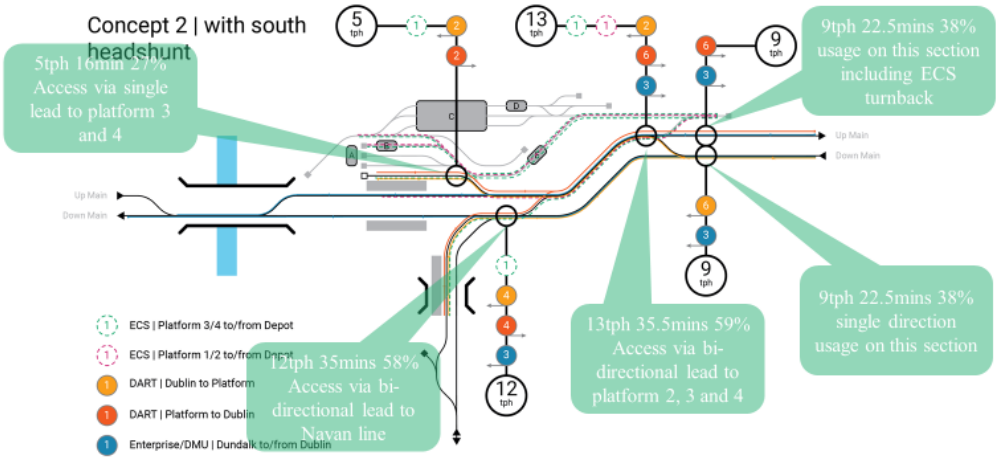


Figure 5-19: Operational performance of Option 2C

5.1.11 Option 2D - Island Navan Branch Platform maintaining ECS moves to Navan Platforms

Track

This option provides a new island platform serving the Up and Down Navan Branch through a slew of the line and modification to the mainline P&C. Widening of the underbridge at Dublin Road is required to accommodate the track slew as are civil engineering works to the cutting. Modifications are required to cater for the increase in stabling requirements.

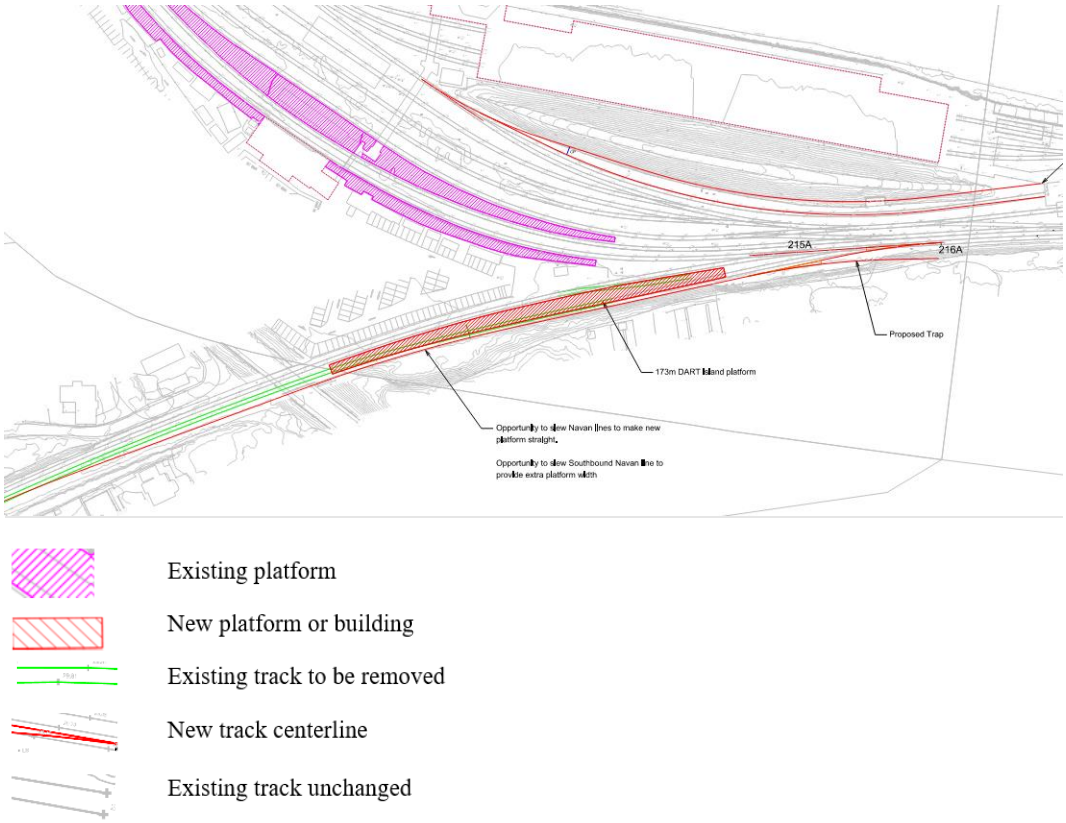


Figure 5-20: Option 2D layout

Platform/Station

A new island platform would be constructed between the Up and Down Navan Branch lines.

A new footbridge with lifts would be provided which will be interconnected with the existing platform 1 which would require modification to allow for the pedestrian movements to the new platform (or an alternative access route adjacent would need to be provided). This option would require the removal of the existing SET buildings to a new location. This option is not expected to have an impact on Protected Structures.

Alternatively, a new station entrance could be built which serves as the focal point for DART services.

Stabling

The additional stabling requirement of two FLU roads would be provided by two of the following:

1. Provision of stabling on the new Navan down platform. (note it is not possible to stable in the new Navan Up platform as there is insufficient space for a trap point to be installed).
2. Provision of a stabling facility west of the platform on the Up/Dn Navan. The use of this option with option 1 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
3. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road.

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3

Freight

The provision of the new platforms will allow current freight levels on the Navan branch to continue but this will require the timing of freight trains, the use of the platform and any stabling to be considered and aligned within the operational planning rules.

The relocation of the mineral train stabling location is considered to have already to have occurred to facilitate the BEMU stabling position. If this has not occurred a new location will be required.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

For this option no modification has been made to the operational requirements. Two single ECS move in/out of the depot either to platforms 1, 2 or or the new Navan Platforms has been allowed for in the peak. Having two services entering or exiting the depot during peak hours causes the Up main to exceed the capacity rules set in Section 3.1.

It is assumed that in providing two new platform faces that all DART services would operate from the new island platform to provide a consistent customer arrival/departure point. It is noted that some benefit to capacity can be gained if

services used platform 3 prior to arriving or departing the depot at the expense of customer experience.

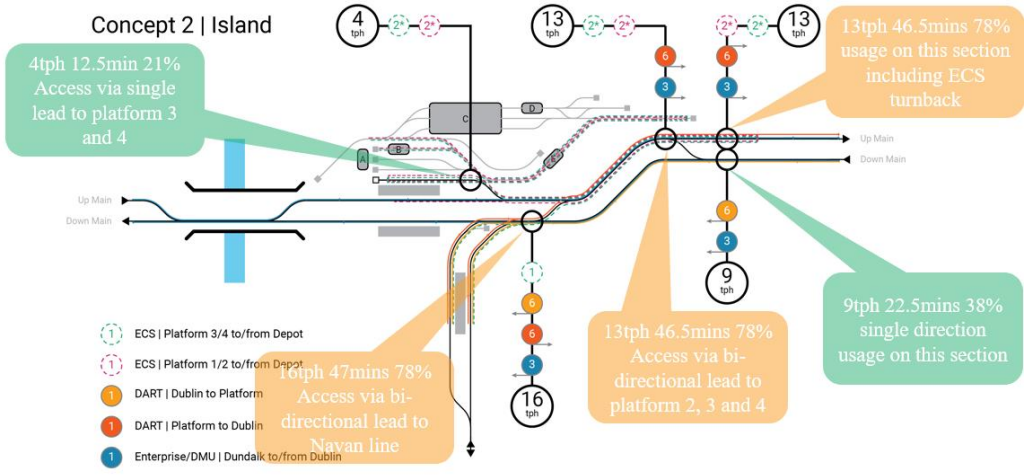


Figure 5-21: Operational performance of Option 2D

5.1.12 Option 2E – Island Navan Branch Platform with no ECS moves to Navan Platforms

This option has the same infrastructure as option 2D however the number of Empty Carriage Stocks moves are reduced to improve the performance.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

It is assumed that in providing two new platform faces that all DART services would operate from the new island platform to provide a consistent customer arrival/departure point. It is noted that some benefit to capacity can be gained if services used platform 3 prior to arriving or departing the depot at the expense to customer experience.

For this option a modification has been made to the operational requirements which is through the removal of an ECS move. A single DMU ECS move in/out of the depot either to platforms 1 or 2 has been allowed for in the peak. An additional DART ECS move entering or exiting the depot during peak hours from any platform apart from Platform 3 would cause the Up main to exceed the capacity rules set out in Section 3.1.

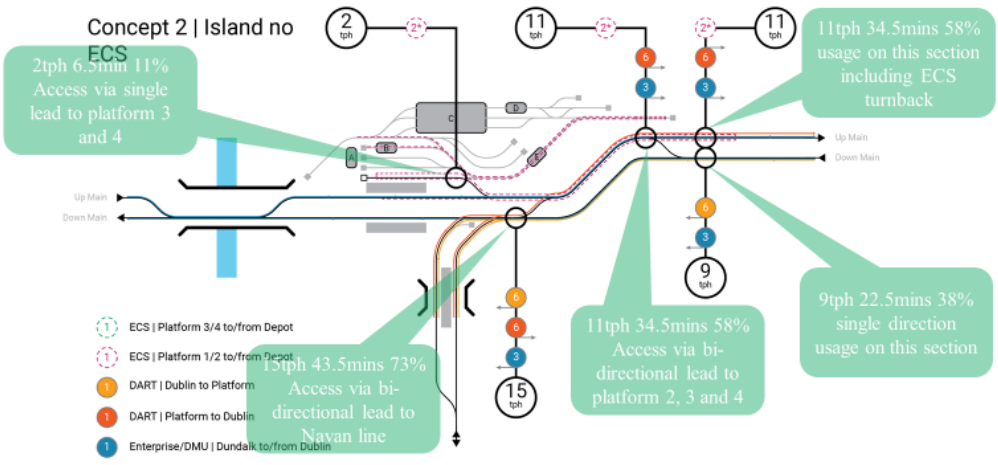


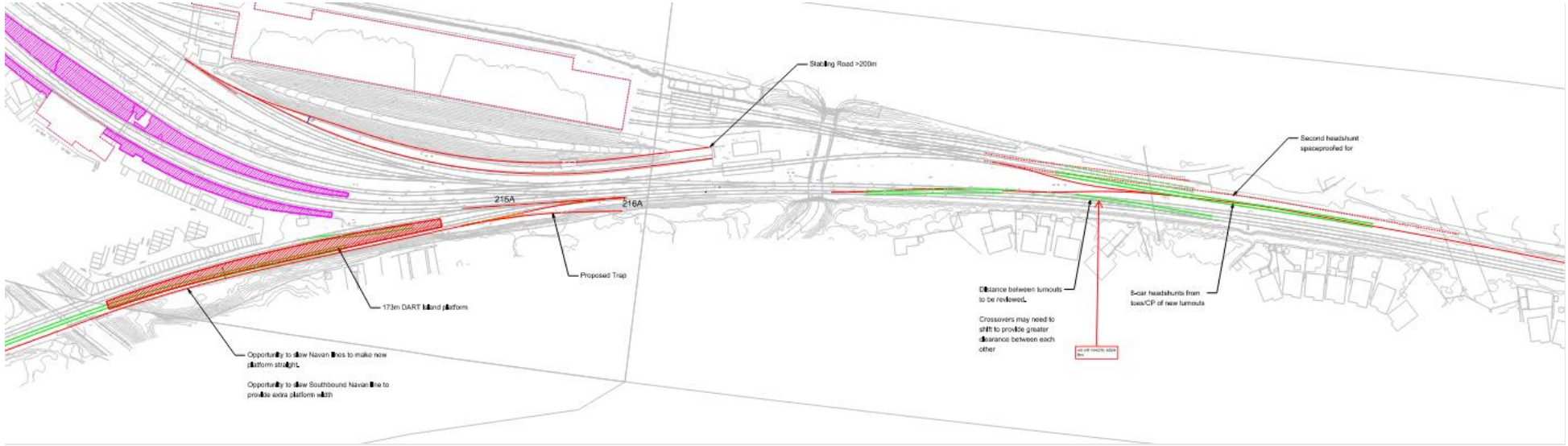
Figure 5-22: Operational performance of Option 2E

5.1.13 Option 2F - Island Navan Branch Platform with southern headshunt to depot

Track

This option requires the same infrastructure works as Options 2D and 2E, with the addition of amendments to the southern headshunt of the depot. It provides a new island platform serving the Up and Down Navan Branch through a slew of the line and modification to the mainline P&C. Widening of the underbridge at Dublin Road is required to accommodate the track slew as are civil engineering works to the cutting. Modifications are required to cater for the increase in stabling requirements.

The existing depot headshunt would be realigned and extended to allow a new connection on to the Up Main which would also include a relocation of the crossover to the Down Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.



Existing platform

New platform or building

Existing track to be removed

New track centerline

Existing track unchanged

Figure 5-23: Option 2F layout

Platform/Station

A new island platform would be constructed between the Up and Down Navan Branch lines.

A new footbridge with lifts would be provided which will be interconnected with the existing platform 1 which would require modification to allow for the pedestrian movements to the new platform (or an alternative access route adjacent would need to be provided). This option would require the removal of the existing SET buildings to a new location. This option is not expected to have an impact on Protected Structures.

Alternatively, a new station entrance could be built which serves as the focal point for DART services.

Stabling

The additional stabling requirement of two FLU roads would be provided by two of the following:

1. Provision of stabling on the new Navan Down platform (note it is not possible to stable in the new Navan Up platform as there is insufficient space for a trap point to be installed).
2. Provision of a stabling facility west of the platform on the Up/Down Navan. The use of this option with Option 1 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
3. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road. Alternatively, the new headshunt would become the sole arrivals road at the connection to platform 3 could be removed or made an exit only road

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3, Navan Branch or the from the station to the new headshunt. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains off peak.

Freight

The provision of the new platforms will allow current freight levels on the Navan branch to continue but this will require the timing of freight trains, the use of the platform and any stabling to be considered and aligned within the operational planning rules.

The relocation of the mineral train stabling location is considered to have already to have occurred to facilitate the BEMU stabling position. If this has not occurred a new location will be required.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

It is assumed that in providing two new platform faces all DART services would operate from the new island platform to provide a consistent customer arrival/departure point. It is noted that some benefit to capacity can be gained if services used platform 3 prior to arriving or departing the depot at the expense to customer experience.

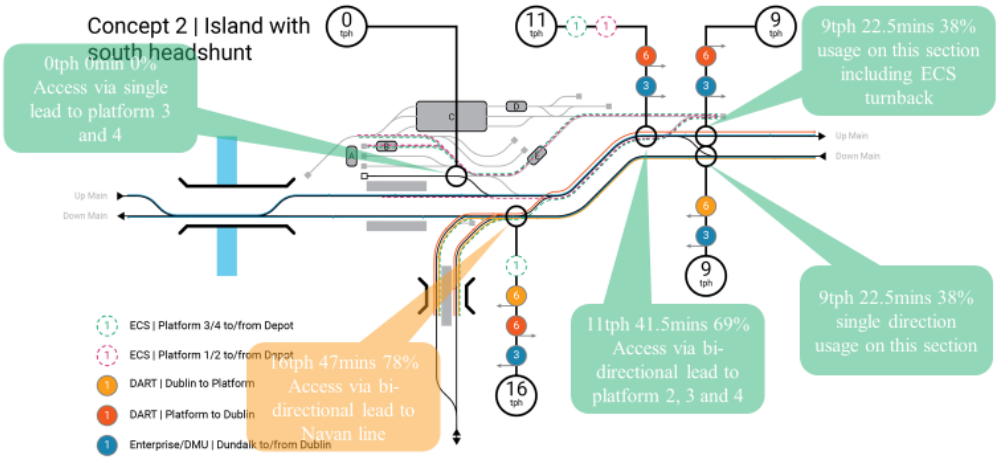


Figure 5-24: Operational performance of Option 2F

5.1.14 Option 2G - Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms

This option has the same infrastructure as option 2F however the number of Empty Carriage Stocks moves are reduced to improve the performance.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

For this option a modification has been made to the operational requirements which is through the removal of an ECS move. A single ECS move in/out of the depot either to the platform 1 or 2 has been allowed for in the peak. An additional service entering or exiting the depot during peak hours from any platform apart from Platform 3 would cause the Up main to exceed the capacity rules set out in Section 3.1.

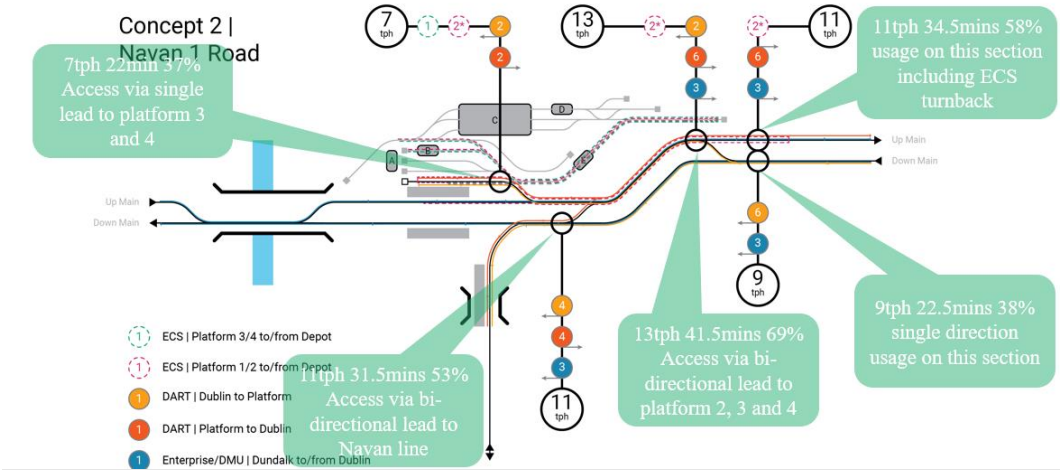


Figure 5-25: Operational performance of Option 2G

5.1.15 Option 2H - Navan Branch Platform provided by removing dual track with southern headshunt to depot

Track

This option provides a new Platform on a new single track Navan Branch but is otherwise similar to Option 2F. As shown in the following images, by removing the Navan branch Up line the construction of a platform can occur. A new turnout could be installed west of the single track to allow a short length of double track on the Navan branch. Other track modifications are required to cater for the increase in stabling requirements.

In addition to adding a new platform to meet the DART infrastructure requirements, Option 2F provides an additional access point from the Depot to the mainline, via a southern headshunt. The existing depot headshunt would be realigned and extended (as shown in Figure 5-27) to allow a new connection on to the Up Main which would also include a relocation of the crossover to the Down Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.

Figure 5-26: Option 2H layout part 1

Figure 5-27: Option 2H layout part 2

Platform/Station

A new single platform would be constructed on the current location of Up Navan Branch.

The platform would be interconnected with the existing platform 1 which would require modification to allow for the pedestrian movements to the new platform (or an alternative access route adjacent would need to be provided). This option would require localised removal of the existing SET buildings to a new location. This option is not expected to have an impact on Protected Structures.

Stabling

The additional stabling requirement of two FLU roads would be provided by two of the following:

1. Provision of a stabling facility west of the platform on the Up Navan.
2. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road. Alternatively, the new headshunt would become the sole arrivals road at the connection to platform 3 could be removed or made an exit only road.

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3, Navan Branch or the from the station to the new headshunt. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains off peak.

Freight

The provision of the new platform will significantly restrict the number of opportunities for freight trains to use the branch. This will require the timing of the use of the platform and stabling to be considered within the operational planning rules and would cause a considerable constraint on operations.

The relocation of the mineral train stabling location is considered to have already to have occurred to facilitate the BEMU stabling position. If this has not occurred a new location will be required.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

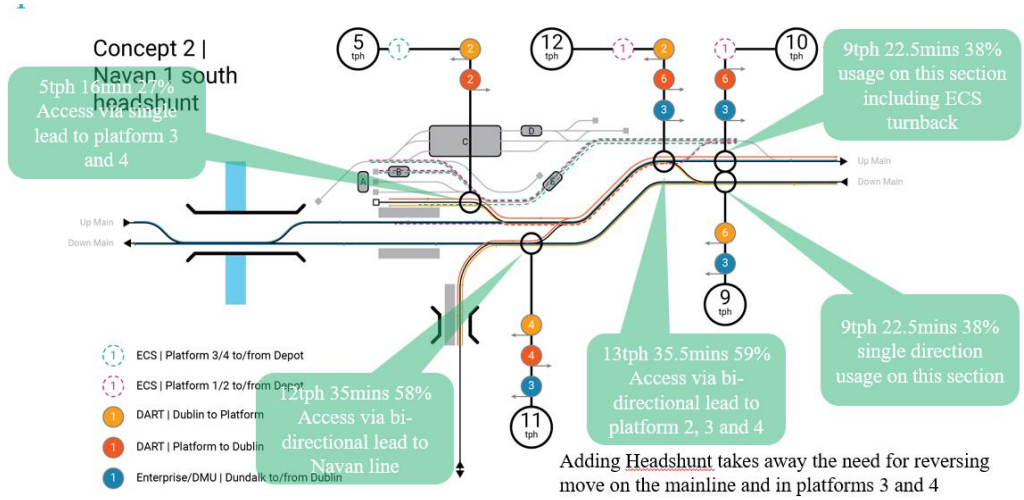


Figure 5-28: Operational performance of Option 2H

5.1.16 Option 2I - New Platform(s) in Station car park with no ECS moves to Navan Platforms

Track

This option provides a new island platform within the station car park. A new connection would be made to the Down Main. Other track modifications are required to cater for the increase in stabling requirements.

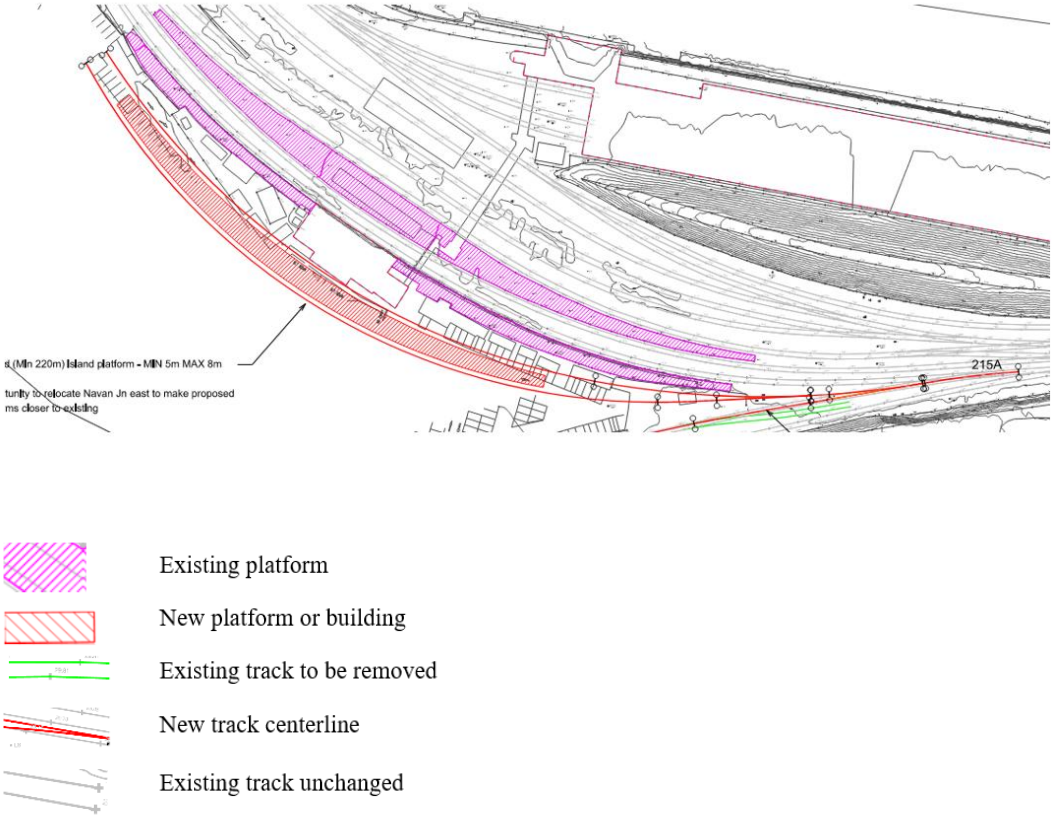


Figure 5-29: Option 2I layout

Platform/Station

A new island platform would be constructed within the current station car park. It would need to be constructed on a considerable curve to avoid sterilising the remaining land within the car park.

The platform would be interconnected with the existing platform 1, 2 & 3 via new footbridge.

This option would result in a considerable loss in station car parking which would need to be mitigated (potentially by introducing a decked car park) and would require the existing SET equipment buildings to be relocated.

The new platform arrangement would have a severe impact on the existing station building not just visually but also functionally. A new station building would likely need to be built within the car park.

Stabling

The additional stabling requirement of two FLU roads would be provided by one or two of the following:

1. Provision of stabling on the new platforms with the introduction of trap points
2. Within the BEMU stabling location introduced on the Navan branch
3. Provision of a stabling facility west of the platform on the Up/Down Navan. The use of this option with option 2 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
4. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road.

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

It is assumed that in providing two new platform faces all DART services would operate from the new island platform to provide a consistent customer arrival/departure point. It is noted that some benefit to capacity can be gained if services used platform 3 prior to arriving or departing the depot at the expense to customer experience.

For this option a modification has been made to the operational requirements which is through the removal of an ECS move. A single DMU ECS move in/out of the depot either to platforms 1 or 2 has been allowed for in the peak. An additional DART ECS move entering or exiting the depot during peak hours from any platform apart from Platform 3 would cause the Up main to exceed the capacity rules set out in Section 3.1.

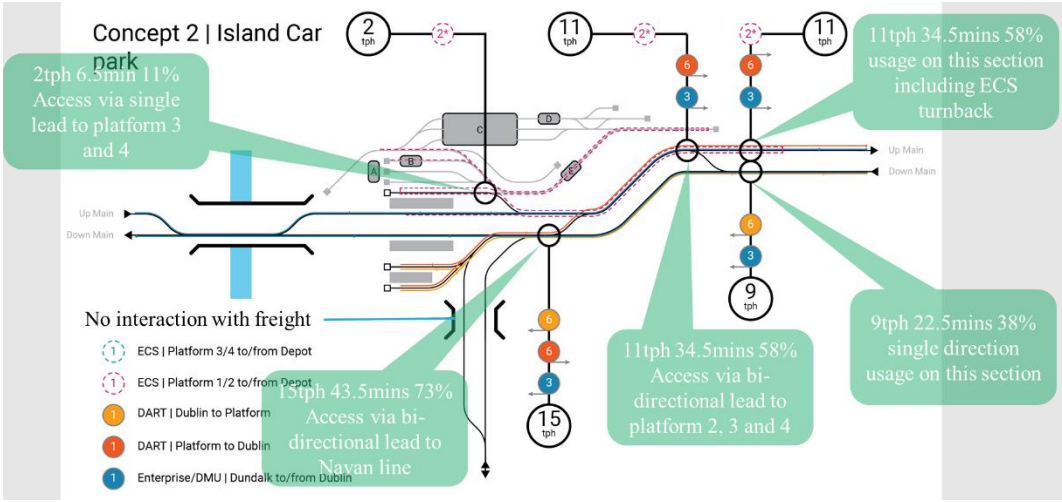


Figure 5-30: Operational performance of Option 2I

5.1.17 Option 2J - New Platform(s) in Station car park with southern headshunt to depot

Track

This option provides a new island platform within the station car park as per Option 2I. A new connection would be made to the Down Main. Other track modifications are required to cater for the increase in stabling requirements.

In addition to the infrastructure changes in Option 2I the existing depot headshunt would be realigned and extended to allow a new connection on to the Up Main which would also include a relocation of the crossover to the Down Main. An option could include the provision of a second headshunt if deemed necessary following further assessment.

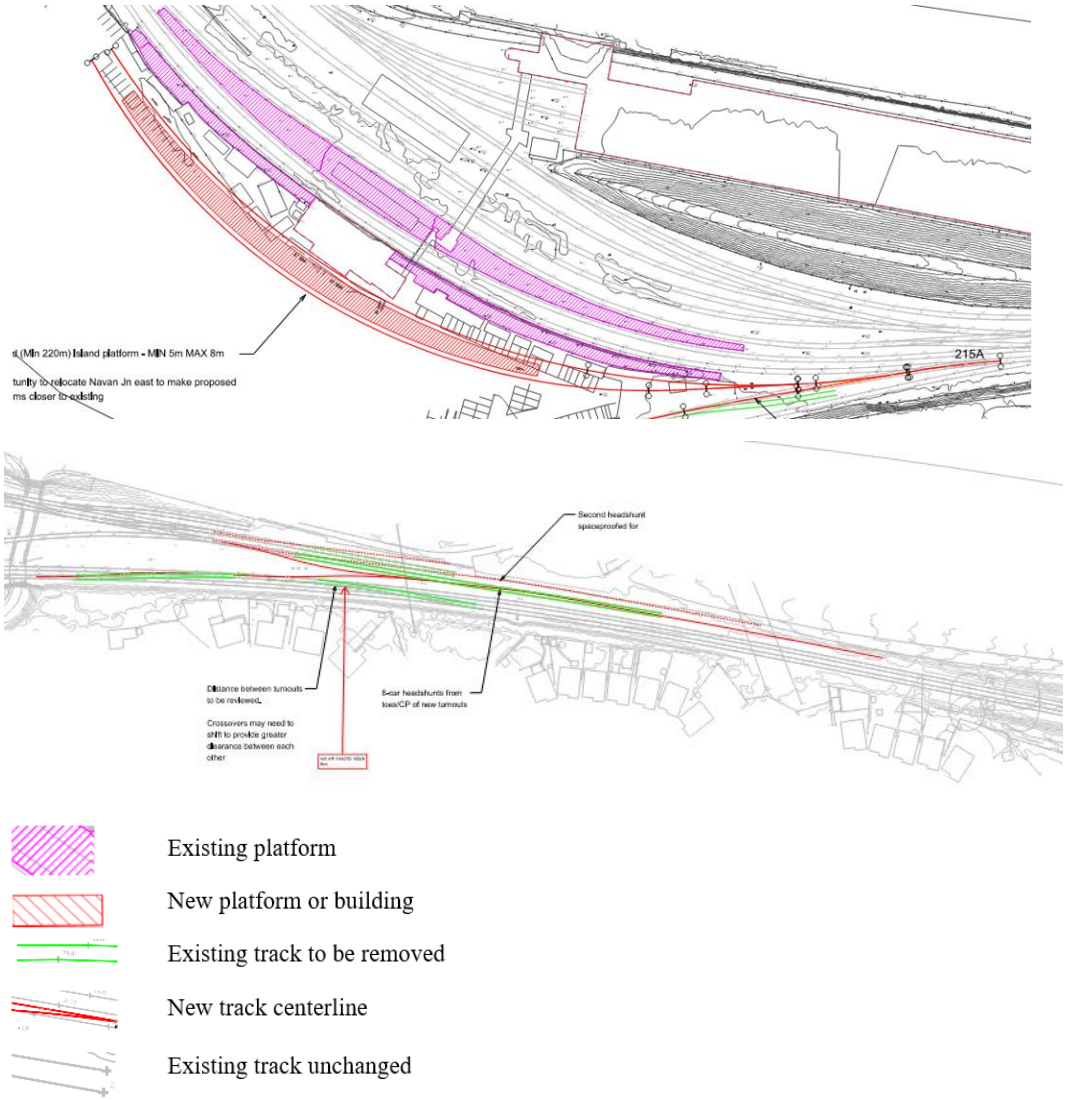


Figure 5-31: Option 2J layout

Platform/Station

A new island platform would be constructed within the current station car park. It would need to be constructed on a considerable curve to avoid sterilising the remaining land within the car park.

The platform would be interconnected with the existing platform 1, 2 & 3 via a new footbridge.

This option would result in a considerable loss of station car parking which would need to be mitigated (potentially by introducing a decked car park) and would require the existing SET equipment buildings to be relocated.

The new platform arrangement would have a severe impact on the existing station building (a Protected Structure) not just visually but also functionally. A new station building would likely need to be built within the car park.

Stabling

The additional stabling requirement of two FLU roads would be provided by one or two of the following:

1. Provision of stabling on the new platforms with the introduction of trap points
2. Within the BEMU stabling location introduced on the Navan branch
3. Provision of a stabling facility west of the platform on the Up/Down Navan. The use of this option with option 2 would need to consider mitigation to allow freight trains to continue to use the Navan branch if both stabling locations were occupied.
4. Provision of an additional FLU within the bund area of the depot (this could provide both stabling locations, with an additional road and further bund removal)

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires platform 3 to work as a depot arrivals road. Alternatively, the new headshunt would become the sole arrivals road at the connection to platform 3 could be removed or made an exit only road

The current south facing depot access would become an exit only connection with arrivals from the south being made via platform 3, new platforms or the from the station to the new headshunt. There is an option for a new southern connection to the mainline and crossover to the Down main but currently it is not believed to be operationally required as there is sufficient capacity to use the station platforms to reverse trains off peak.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

It is assumed that in providing two new platform faces all DART services would operate from the new platforms to provide a consistent customer arrival/departure point. It is noted that some benefit to capacity can be gained if services used platform 3 prior to arriving or departing the depot at the expense to customer experience.

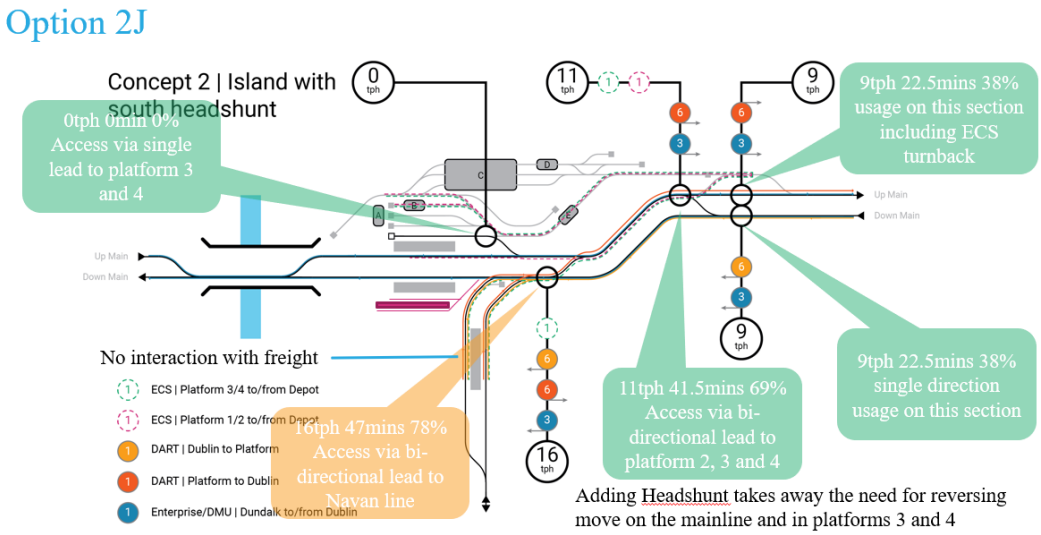


Figure 5-32: Operational performance of Option 2J

5.1.18 Option 3A - New Headshunt to North

Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently and bund and covered in vegetation.

A new northern headshunt would be constructed on the Boyne viaduct. This would require some structural modification to the south east corner of the viaduct. A full structural assessment of the impacted sections of viaduct would need to be undertaken to confirm they are suitable to have two tracks. This would include a review of the parapet walls with respect to derailment containment. To facilitate the new northern headshunt the existing length of mainline dual tracking would need to be reduced and the turnout relocated south.

A new arrivals road would connect the new headshunt into the depot adjacent to the existing wheel lathe.

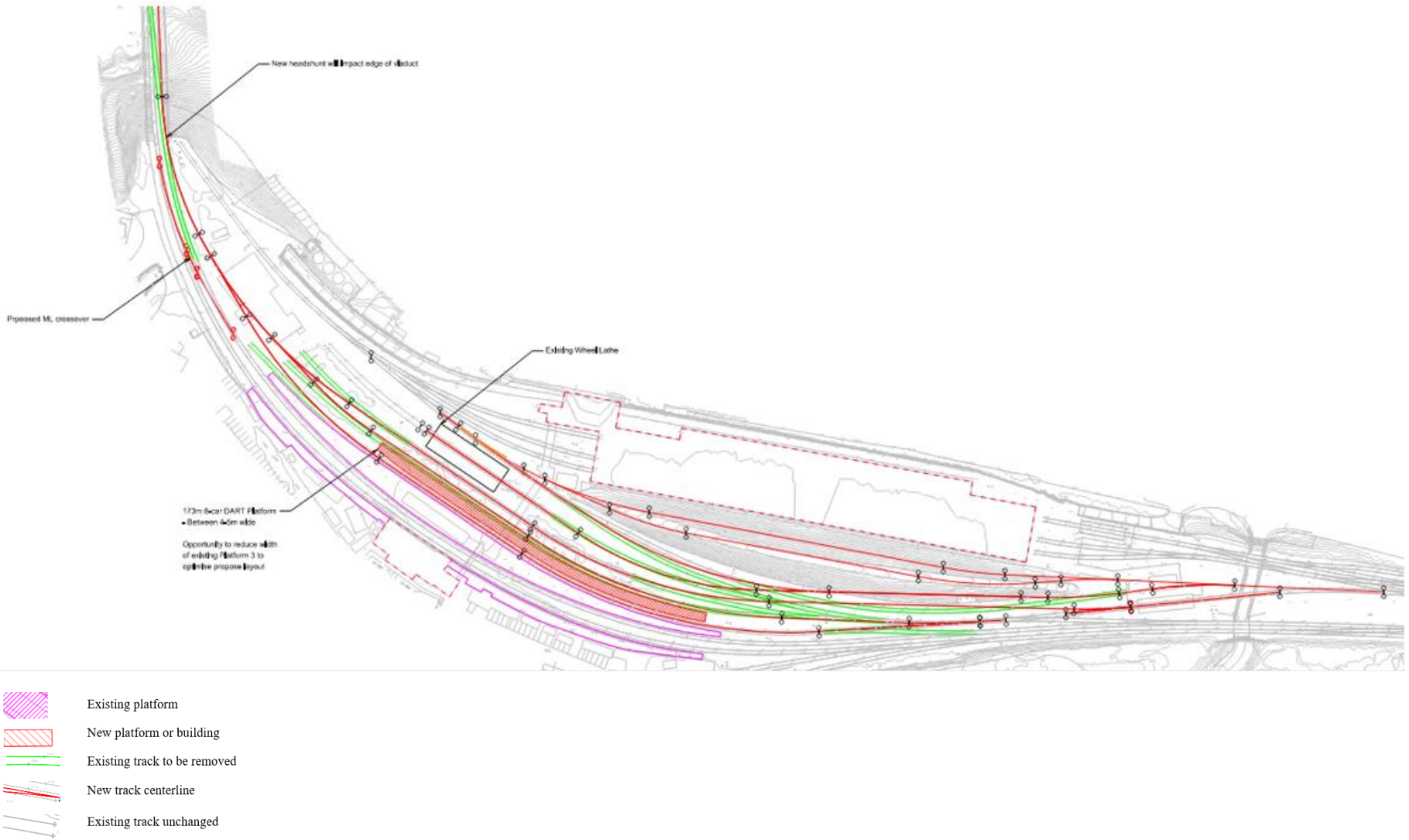


Figure 5-33: Option 3A layout

Platform/Station

The new platform would be constructed adjacent to the existing Platform 3 and would be curved at the southern end. There is an opportunity to make this new platform an island platform and remove the current platform 3 face

A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between Platforms 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has an impact on Protected Structures.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new headshunt to operate as a depot arrivals road.

An exit only road from the train wash would allow trains to access the platforms direct from the depot without using the headshunt.

The current south facing access from the depot would be replaced/repurposed as mainline infrastructure for the new platforms. All trains would therefore need to use the new platforms before arriving or exiting the depot

The new sidings and connection would need to be considered in conjunction with bridge works to the existing McGrath's Lane bridge and would involve moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

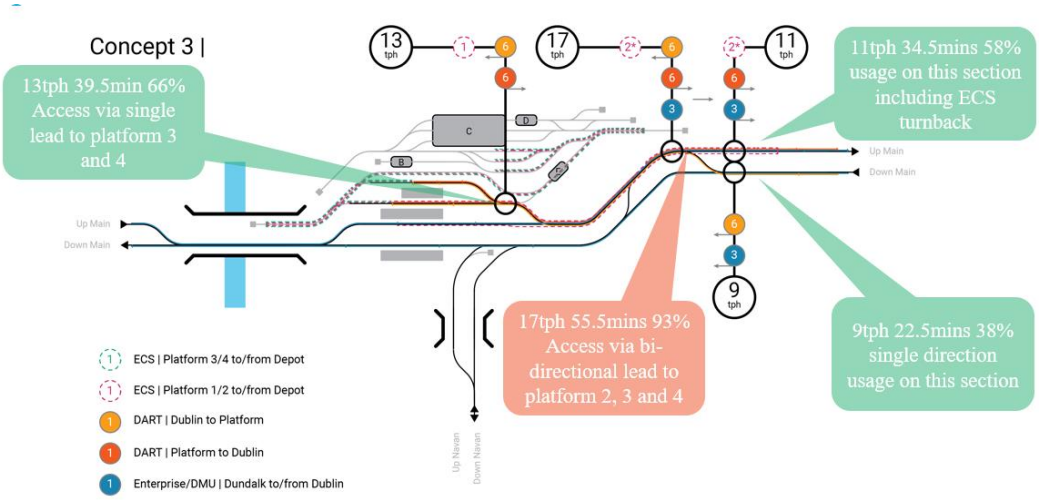


Figure 5-34: Operational performance of Option 3A

5.1.19 Option 3B - New headshunt to North with connection from Platform 2

Track

This option provides a new platform at the location of the current service roads. The service roads would be relocated within the depot to the area that is currently and bund and covered in vegetation.

A new northern headshunt would be constructed on the Boyne viaduct. This would require some structural modification to the south east corner of the viaduct. Furthermore a full structural assessment of the viaduct would need to be undertaken to confirm it was suitable to have two tracks. To facilitate the new northern headshunt the existing length of mainline dual tracking would need to be reduced and the turnout relocated south.

A new connection would be made from platform 2 to the new headshunt.

A new arrivals road would connect the new headshunt into the depot adjacent to the existing wheel lathe.

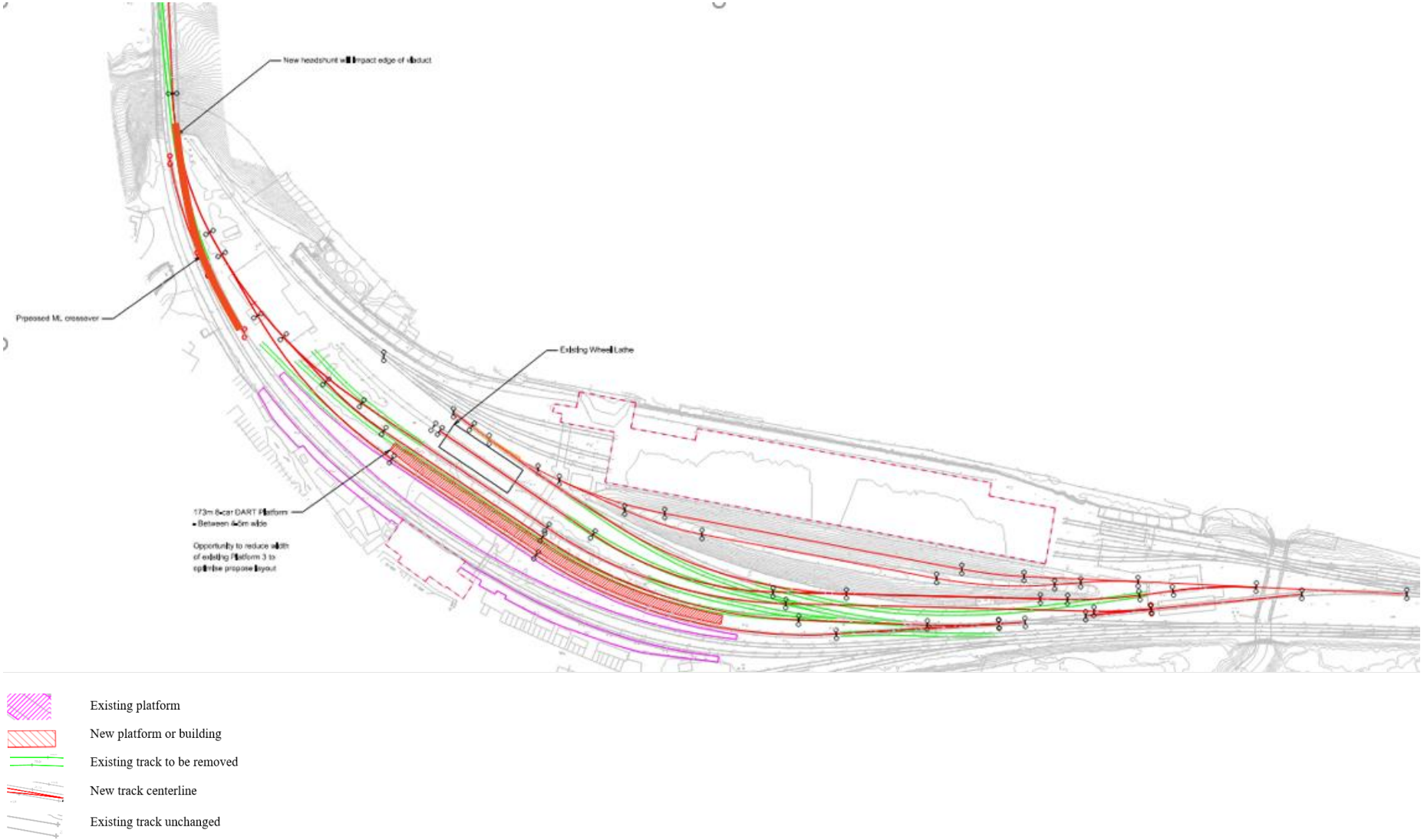


Figure 5-35: Option 3B layout

Platform/Station

The new platform would be constructed adjacent to the existing platform 3 and would be curved at the southern end. There is an opportunity to make this new platform an island platform and remove the current platform 3 face

A new footbridge with lift access would be provided to this platform (alternatively options to modify and use the existing staff only bridge to the depot could be investigated). Noting that the current bridge between platform 1 and 2 is not clear for electrification a new bridge could installed to span all 4 platforms. This option has an impact on Protected Structures.

Stabling

The additional stabling requirement of two FLU roads would be provided by:

1. Stabling a new FLU on the new platform road
2. Provision of an additional FLU within the bund area or on the BEMU stabling introduced on the Navan branch

Depot

In order to install a locally operated signalling system and split the mainline and depot signalling systems this option requires the new headshunt to operate as a depot arrivals road.

An exit only road from the train wash would allow trains to access the platforms direct from the depot without using the headshunt.

The current south facing access from the depot would be replaced/repurposed as mainline infrastructure for the new platforms. All trains would therefore need to use the new headshunt before arriving or exiting the depot.

The new sidings and connection would need to be considered in conjunction with bridge works to the existing McGrath's Lane bridge and would involve moving/replacement of the train wash.

Freight

There would be minimal impacts on freight services with this option.

Operational performance

Using the requirements and method described earlier in Section 5.1.2, the operational performance of this option has been assessed and the results are as presented below.

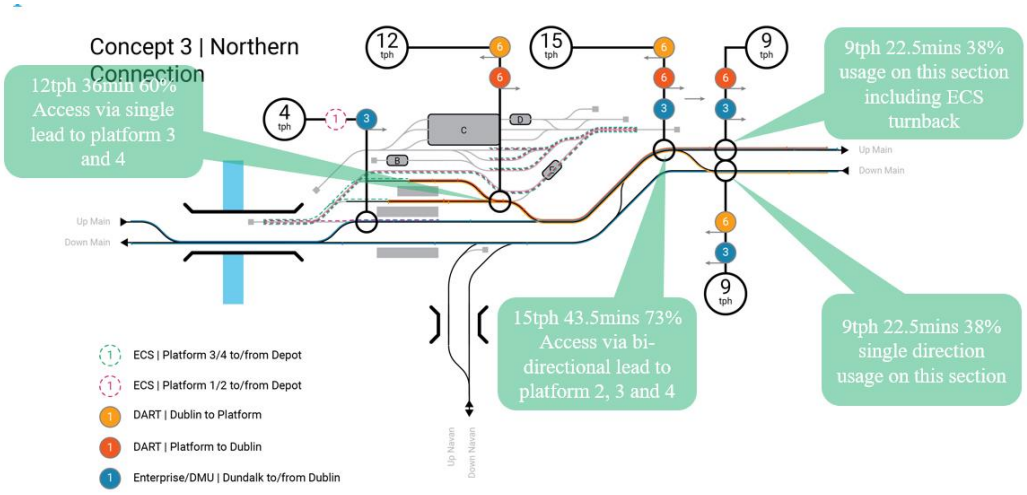


Figure 5-36: Operational performance of Option 3B

5.2 Sifting of Long list 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 to Table 5-5.

Table 5-2: Assessment of long list of options against project objectives and requirement (Options 0 to 1D)

Project objectives and requirements	Description	Do nothing option		Option 1A – New platform at location of existing service road 4		Option 1B - New platform at location of existing service road 4 with new crossover from down main at the station approach		Option 1C – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach		Option 1D – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak	
		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 Dublin City Centre.	**Fail**	• This option fails to meet the TSS and depot access requirements set.	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (93% of the up-main)	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (87% of the up-main)	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (82% of the up-main)	**Pass**	• There will be timetabling constraints on bringing units in and out of service • Only a single DART service per hour entering or exiting service via platform 3 or 4 has been allowed for. An additional non-DART service entering the depot during peak hours to head north or south would cause the Up main to exceed the capacity rules set.
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	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point with benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point with benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point with benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point with benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4

Project objectives and requirements	Description	Do nothing option		Option 1A – New platform at location of existing service road 4		Option 1B - New platform at location of existing service road 4 with new crossover from down main at the station approach		Option 1C – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach		Option 1D – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak	
		Pass/ fail	Rationale	Pass/ fail	Rationale	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**	• No changes	**Pass**	• This solution utilises land within the rail corridor and minimises new infrastructure	**Pass**	• This solution utilises land within the rail corridor	**Pass**	• This solution utilises land within the rail corridor	**Pass**	• This solution utilises land within the rail corridor
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	• No costs	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund • Cost of additional crossover and track re-configuration • Requires moving of train wash and overbridge OBB80/A/B replacement	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund • Cost of additional crossover and track re-configuration • Requires moving of train wash and overbridge OBB80/A/B replacement	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund • Cost of additional crossover and track re-configuration • Requires moving of train wash and overbridge OBB80/A/B replacement • The additional operation constraint this option brings could cause an increase in train operational costs

Project objectives and requirements	Description	Do nothing option		Option 1A – New platform at location of existing service road 4		Option 1B - New platform at location of existing service road 4 with new crossover from down main at the station approach		Option 1C – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach		Option 1D – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	• No changes	**Pass**	• Requires removal of which has an ecological benefit and acts as a visual screen of the depot building.	**Pass**	• Requires removal of which has an ecological benefit and acts as a visual screen of the depot building.	**Pass**	• Requires removal of which has an ecological benefit and acts as a visual screen of the depot building.	**Pass**	• Requires removal of which has an ecological benefit and acts as a visual screen of the depot building.
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	**Pass**	• Work would be phased to minimise impact on the depot • Construction access through depot for works would cause disruption.	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the large-scale changes of the depot track access • Construction access through depot for works would cause disruption.	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the large-scale changes of the depot track access • Construction access through depot for works would cause disruption.	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the large-scale changes of the depot track access • Construction access through depot for works would cause disruption.
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.	**Pass**	• No changes therefore compliant	**Fail**	• Non-compliant geometry on approach to new platform		• Non-standard track geometry (further development required)		• Non-standard (further development required)		• Non-standard (further development required)
Project requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification	**Fail**	• Does not meet requirements	**Fail**	• Fails to meet TSS	**Fail**	• Fails to meet TSS	**Fail**	• Fails to meet TSS	**Pass**	• Compliant

Project objectives and requirements	Description	Do nothing option		Option 1A – New platform at location of existing service road 4		Option 1B - New platform at location of existing service road 4 with new crossover from down main at the station approach		Option 1C – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach		Option 1D – New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project requirement	Provision of new turnback infrastructure at Drogheda MacBride Station which will meet the Train Service Specification	**Fail**	• Does not meet requirements	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (93% of the up-main)	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bidirectional operation on up-main (87% of the up-main)	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bidirectional operation on up-main (82% of the up-main)	**Pass**	• There will be timetabling constraints on bringing units in and out of service • Only a single DART service per hour entering or exiting service via platform 3 or 4 has been allowed for. An additional non-DART service entering the depot during peak hours to head north or south would cause the Up main to exceed the capacity rules set.
Project requirement	To allow for continued movements of freight traffic to and from the Navan Branch.	**Pass**	• No change to allowed movements	**Pass**	• Provided in off-peak • Minimal Impacts	**Pass**	• Provided in off-peak • Minimal Impacts	**Pass**	• Provided in off-peak • Minimal Impacts	**Pass**	• Provided in off-peak • Minimal Impacts
Project requirement	Provide DART rolling stock stabling within the Drogheda area as per the DART+ stabling strategy.	**Fail**	• Does not meet requirement	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.

Table 5-3: Assessment of long list of options against project objectives and requirements (Options 1E to 2C)

Project objectives and requirements	Description	Option 1E – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach		Option 1F – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only		Option 2A – Single Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2B - Single Navan Branch Platform but with no ECS moves to Navan Platforms		Option 2C - Single Navan Branch Platform with southern headshunt to depot	
		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 Dublin City Centre.	**Pass**	• Bi-directional operation on up main (73%)	**Pass**	• Bi-directional operation on up main (77%): Whilst the target of 75% is the aspiration, noting that the train service is on the shoulder of the peak, the option is still considered viable.	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (89% of the up-main)	**Pass**	• There will be some timetabling constraints on bringing units in and out of service in peak • DART services can enter/exit service using platform 3 • Non DART services or DART services going to/from the depot using platform other than No3 are limited to a single path per hour in the peak without causing the Up main to exceed the capacity rules set.	Pass	• This option meets requirements with balanced utilisation
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Pass**	• Remote platform from other DART services. • Elongated/complex walking routes for passengers • Impact on accessibility (for people who are less able to walk longer distances)	**Pass**	• Remote platform from other DART services. • Elongated/complex walking routes for passengers • Impact on accessibility (for people who are less able to walk longer distances)	**Pass**	• Remote platform from other DART services. • Elongated/complex walking routes for passengers • Impact on accessibility (for people who are less able to walk longer distances)

Project objectives and requirements	Description	Option 1E – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach		Option 1F – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only		Option 2A – Single Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2B - Single Navan Branch Platform but with no ECS moves to Navan Platforms		Option 2C - Single Navan Branch Platform with southern headshunt to depot	
		Pass/ fail	Rationale	Pass/ fail	Rationale	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**	• Potential for increase in rail infrastructure to provide headshunt • Use of existing rail land.	**Pass**	• Potential for increase in rail infrastructure to provide headshunt • Use of existing rail land.	**Pass**	• Use of existing rail land. • Limited new infrastructure compared with other options	**Pass**	• Limited new infrastructure compared with other options	**Pass**	• Limited new infrastructure compared with other options • Potential for increase in rail infrastructure to provide headshunt
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund • Cost of additional crossover and track re-configuration • Requires moving of train wash and overbridge OOB80/A/B replacement • Cost of new southern headshunt	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of replacement servicing facilities, along with new lighting, systems etc • Cost of removing the bund • Cost of additional crossover • Requires moving of train wash and overbridge OOB80/A/B replacement • Cost of new southern headshunt	**Pass**	• Cost of widening the underbridge • Cost of new platform • Cost of providing additional stabling elsewhere • Modifications required for gate-line / passenger access • Potential need for increased staff levels due to remote nature of platform	**Pass**	• Cost of widening the underbridge • Cost of new platform • Cost of providing additional stabling elsewhere • Modifications required for gate-line / passenger access • Potential need for increased staff levels due to remote nature of platform	Pass	• Cost of additional headshunt works • Cost of widening the underbridge • Cost of new platform • Cost of providing additional stabling elsewhere • Modifications required for gate-line / passenger access • Potential need for increased staff levels due to remote nature of platform
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	• Requires removal of bund which has an ecological benefit and acts as a visual screen of the depot building	**Pass**	• Requires removal of bund which has an ecological benefit and acts as a visual screen of the depot building	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/ agreements required with road authority • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/ agreements required with road authority • Potential removal of part of bund which has an ecological benefit and acts as a visual	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/agreements required with road authority • Potential impacts of new headshunt on neighbouring green space and property • Potential removal of part of bund which has an ecological

Project objectives and requirements	Description	Option 1E – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach		Option 1F – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only		Option 2A – Single Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2B - Single Navan Branch Platform but with no ECS moves to Navan Platforms		Option 2C - Single Navan Branch Platform with southern headshunt to depot	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
									screen of the depot building		benefit and acts as a visual screen of the depot building
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**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the large-scale changes of the depot track access • Construction access through depot for works would cause disruption. • Land boundaries would need to be confirmed to conclude impacts for construction of southern headshunt.	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the changes of the depot track access • Construction access through depot for works would cause disruption. • Land boundaries would need to be confirmed to conclude impacts for construction of southern headshunt.	**Pass**	• Impact on freight services • Disruption to Dublin road	**Pass**	• Impact on freight services • Disruption to Dublin road	**Pass**	• Impact on freight services • Disruption to Dublin road • Potential disruption to the depot due to provision of new headshunt • Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the changes of the depot headshunt • Land boundaries would need to be confirmed to conclude impacts for construction of southern headshunt
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines	**Pass**	• Non-standard geometry (further development required)	**Pass**	• Standard geometry (further development required)	**Pass**	• Standard geometry	**Pass**	• Standard geometry	**Pass**	• Standard geometry
Project requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	**Pass**	• Compliant	**Pass**	• Compliant	**Fail**	• Fails to meet TSS	**Pass**	• Compliant	**Pass**	• Compliant

Project objectives and requirements	Description	Option 1E – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach		Option 1F – New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only		Option 2A – Single Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2B - Single Navan Branch Platform but with no ECS moves to Navan Platforms		Option 2C - Single Navan Branch Platform with southern headshunt to depot	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project requirement	Provision of new turnback infrastructure at Drogheda MacBride Station which will meet the Train Service Specification	**Pass**	• Bi-directional operation on up main (73%)	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. Single access point benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4	**Fail**	• This option fails to meet the TSS and depot access requirements set. • Heavy bi-directional operation on up-main (89% of the up-main)	**Pass**	• There will be some timetabling constraints on bringing units in and out of service in peak • DART services can enter/exit service using platform 3 • Non DART services or DART services going to/from the depot using platform other than No3 are limited to a single path per hour in the peak without causing the Up main to exceed the capacity rules set.	**Pass**	• This option meets requirements with balanced utilisation
Project requirement	To allow for continued movements of freight traffic to and from the Navan Branch.	**Pass**	• Provided in off-peak • Minimal Impacts	**Pass**	• Provided in off-peak • Minimal Impacts	**Pass**	• Allows for freight movements with operational restrictions • Stabling of freight needs to be relocated if not already relocated following BEMU siding introduction	**Pass**	• Allows for freight movements with operational restrictions • Stabling of freight needs to be relocated if not already relocated following BEMU siding introduction	**Pass**	• Allows for freight movements with operational restrictions • Stabling of freight needs to be relocated if not already relocated following BEMU siding introduction
Project requirement	Provide DART rolling stock stabling within the Drogheda area as per the DART+ stabling strategy.	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.	**Pass**	• 1 additional platform road provided and 1 additional stabling road provided.	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch

Table 5-4: Assessment of long list of options against project objectives and requirements (Options 2D to 2H)

Project objectives and requirements	Description	Option 2D – Island Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2E – Island Navan Branch Platform with no ECS moves to Navan Platforms		Option 2F - Island Navan Branch Platform with southern headshunt to depot		Option 2G – Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms		Option 2H - Navan Branch Platform provided by removing dual track with southern headshunt to depot	
		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 Dublin City Centre.	**Fail**	• This option fails to meet the TSS and depot access requirements set. • This option results in high utilisation (78%) across 3 sections of the station approach which is considered to present a significant constraint on operations	**Pass**	• There will be some timetabling constraints on bringing units in and out of service in peak	**Pass**	• Bi-directional operation on down main (77%): Whilst the target of 75% is the aspiration, noting that the train service is on the shoulder of the peak, the option is still considered viable.	**Pass**	• There will be timetabling constraints on bringing units in and out of service	**Pass**	• This option meets requirements with balanced utilisation
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.	**Pass**	• Ability to terminate all DART services on island platforms providing a single point for DART services • Potential for separate DART station and entrance improving passenger experience • Passenger route for connecting services to the north of Drogheda would be more convoluted	**Pass**	• Ability to terminate all DART services on island platforms providing a single point for DART services • Potential for separate DART station and entrance improving passenger experience • Passenger route for connecting services to the north of Drogheda would be more convoluted	**Pass**	• Ability to terminate all DART services on island platforms providing a single point for DART services • Potential for separate DART station and entrance improving passenger experience • Passenger route for connecting services to the north of Drogheda would be more convoluted	**Pass**	• Remote platform from other DART services. • Elongated/complex walking routes for passengers • Impact on accessibility (for people who are less able to walk longer distances)	**Pass**	• Remote platform from other DART services. • Elongated/complex walking routes for passengers • Impact on accessibility (for people who are less able to walk longer distances)
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**	• New infrastructure through construction of new platforms • Additional infrastructure with new footbridge	**Pass**	• New infrastructure through construction of new platforms • Additional infrastructure with new footbridge	**Pass**	• New infrastructure through construction of new platforms and headshunt • Additional infrastructure with new footbridge	**Pass**	• Minimal impacts compared to other options	**Pass**	• New infrastructure through construction of new platforms and headshunt •

Project objectives and requirements	Description	Option 2D – Island Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2E – Island Navan Branch Platform with no ECS moves to Navan Platforms		Option 2F - Island Navan Branch Platform with southern headshunt to depot		Option 2G – Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms		Option 2H - Navan Branch Platform provided by removing dual track with southern headshunt to depot	
		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**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of widening the Dublin Road underbridge • Associated earthworks costs with track slew • Cost of providing additional stabling elsewhere	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of widening the Dublin Road underbridge • Associated earthworks costs • Cost of providing additional stabling elsewhere	**Pass**	• Cost of new platform and associated footbridge and lifts, along with new lighting, systems etc • Cost of widening the Dublin Road underbridge • Associated earthworks costs • Cost of additional headshunt works • Cost of providing additional stabling elsewhere	**Pass**	• Cost of new platform • Modifications required for gate-line / passenger access • Cost of providing additional stabling elsewhere	**Pass**	• Cost of new platform • Modifications required for gate-line / passenger access • Cost of additional headshunt works • Cost of providing additional stabling elsewhere
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/ agreements required with road authority • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building • New footbridge / additional earthworks	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/ agreements required with road authority • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building • New footbridge / additional earthworks	**Pass**	• Platform close to residential properties • Platform close to green space • Land purchase/ agreements required with road authority • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building • New footbridge / additional earthworks	**Pass**	• Platform close to residential properties • Platform close to green space • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building •	**Pass**	• Platform close to residential properties • Platform close to green space • Potential removal of part of bund which has an ecological benefit and acts as a visual screen of the depot building •
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**	• Impact on freight services • Disruption to Dublin road	**Pass**	• Impact on freight services • Disruption to Dublin road	**Pass**	• Impact on freight services • Disruption to Dublin road • Potential disruption to the depot due to provision of new headshunt • Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the changes of the depot headshunt	**Pass**	• Impact on freight services • Platform located further away from residential properties/green space than other Navan options	**Pass**	• Impact on freight services • Platform located further away from residential properties/green space than other Navan options

Project objectives and requirements	Description	Option 2D – Island Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2E – Island Navan Branch Platform with no ECS moves to Navan Platforms		Option 2F - Island Navan Branch Platform with southern headshunt to depot		Option 2G – Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms		Option 2H - Navan Branch Platform provided by removing dual track with southern headshunt to depot	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
							• Land boundaries would need to be confirmed to conclude impacts for construction of southern headshunt				
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.	**Pass**	• Compliant	**Pass**	• Compliant	**Pass**	• Compliant	**Pass**	• Compliant	**Pass**	• Compliant
Project requirement	Designs shall comply with the Minimum Employer's Functional Requirements and meet the Train Service Specification.	**Fail**	• Fails to meet TSS	**Pass**	• Compliant	**Pass**	• Compliant	**Pass**	Compliant	**Pass**	Compliant
Project requirement	Provision of new turnback infrastructure at Drogheda MacBride Station which will meet the Train Service Specification	**Fail**	• This option fails to meet the TSS and depot access requirements set. • This option results in high utilisation (78%) across 3 sections of the station approach which is considered to present a significant constraint on operations	**Pass**	• There will be timetabling constraints on bringing units in and out of service	**Pass**	• Bi-directional operation on down main (77%): Whilst the target of 75% is the aspiration, noting that the train service is on the shoulder of the peak, the option is still considered viable.	**Pass**	• There will be timetabling constraints on bringing units in and out of service	**Pass**	• This option meets requirements with balanced utilisation

Project objectives and requirements	Description	Option 2D – Island Navan Branch Platform maintaining ECS moves to Navan Platforms		Option 2E – Island Navan Branch Platform with no ECS moves to Navan Platforms		Option 2F - Island Navan Branch Platform with southern headshunt to depot		Option 2G – Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms		Option 2H - Navan Branch Platform provided by removing dual track with southern headshunt to depot	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project requirement	To allow for continued movements of freight traffic to and from the Navan Branch.	**Pass**	• Timetabling constraint will need to be introduced in off-peak times to allow freight journeys	**Pass**	• Timetabling constraint will need to be introduced in off-peak times to allow freight journeys	**Pass**	• Timetabling constraint will need to be introduced in off-peak times to allow freight journeys	**Fail**	• Severe risk to DART performance with freight interaction • Increased restrictions to freight passing opportunities. Timetabling constraint will need to be introduced in off-peak times to allow freight journeys	**Fail**	• Severe risk to DART performance with freight interaction • Increased restrictions to freight passing opportunities. Timetabling constraint will need to be introduced in off-peak times to allow freight journeys
Project requirement	Provide DART rolling stock stabling within the Drogheda area as per the DART+ stabling strategy.	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• 2 Additional stabling location will either need to be provided in the depot or along Navan Branch	**Pass**	• 2 Additional stabling location will either need to be provided in the depot or along Navan Branch

Table 5-5: Assessment of long list of options against project objectives and requirements (Options 2I to 3B)

Project objectives and requirements	Description	Option 2I - New Platforms in Station car park with no ECS moves to Navan Platforms		Option 2J - New Platforms in Station car park with southern headshunt to depot		Option 3A - New Headshunt to North		Option 3B - New headshunt to North with connection from Platform 2	
		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 Dublin City Centre.	**Pass**	• There will be some timetabling constraints on bringing units in and out of service in peak	**Pass**	• Bi-directional operation on down main (78%): Whilst the target of 75% is the aspiration, noting that the train service is on the shoulder of the peak, the option is still considered viable.	**Fail**	• This option fails to meet the TSS and depot access requirements set. • This option results in heavy bi-directional operation on up-main (93% of the up-main)	**Pass**	• This option meets requirements with balanced utilisation
Project objective	To deliver solutions which improve the passenger experience where passenger infrastructure interventions are required to meet the Train Service Specification.	**Pass**	• Improved experience with ability to run DART services from adjacent platforms. • Potential for new customer facilities as part of front of station improvements • Potential loss of car parking	**Pass**	• Improved experience with ability to run DART services from adjacent platforms. • Potential for new customer facilities as part of front of station improvements • Potential loss of car parking	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. • Single access point benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4 •	**Pass**	• New platform close to existing platforms – ability to run DART services of platforms 3 & 4. • Single access point benefits for accessibility • Opportunity to combine a footbridge to span between platform 2 and 3/4 •
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**	• New infrastructure construction • Additional infrastructure with new footbridge	**Pass**	• New infrastructure construction • Additional infrastructure with new footbridge and headshunt	**Pass**	• Significant new infrastructure	**Pass**	• Significant new infrastructure
Project objective	To identify cost-effective solutions from a capital, operations, and maintenance perspective.	**Pass**	• Cost of additional platforms • Cost of replacement car parking • New station entrance building and arrangement • Cost of new footbridge	**Pass**	• Cost of additional platforms • Cost of replacement car parking • New station entrance building and arrangement • Cost of new footbridge Cost of additional headshunt works	**Pass**	• Costs of additional platform • Cost of Significant track works • Cost of works to the viaduct • Cost to replace workshop storage • Cost for new footbridge • Cost for new stabling	**Pass**	• Costs of additional platform • Cost of Significant track works • Cost of works to the viaduct • Cost to replace workshop storage • Cost for new footbridge • Cost for new stabling

Project objectives and requirements	Description	Option 2I - New Platforms in Station car park with no ECS moves to Navan Platforms		Option 2J - New Platforms in Station car park with southern headshunt to depot		Option 3A - New Headshunt to North		Option 3B - New headshunt to North with connection from Platform 2	
		Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale	Pass/ fail	Rationale
Project objective	To minimise adverse impacts on the natural and built environment associated with the construction, operation and maintenance of the project.	**Fail**	• Significant impact to a station building which is of architectural heritage value • Significant to current station functionality • Significant impact to car parking provision	**Fail**	• Significant impact to a station building which is of architectural heritage value • Significant to current station functionality • Significant impact to car parking provision	**Fail**	• Impact to heritage viaduct structure • Demolition of the workshop with heritage value • Requires removal of bund which has an ecological benefit and acts as a visual screen of the depot building	**Fail**	• Impact to heritage viaduct structure • Demolition of the workshop with heritage value • Requires removal of bund which has an ecological benefit and acts as a visual screen of the depot building
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**	• Significant disruption for passenger to existing station and services • Can be built largely away from rail infrastructure	**Pass**	• Significant disruption for passenger to existing station and services • Can be built largely away from rail infrastructure	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the changes of the depot track access • Construction access through depot for works would cause disruption.	**Pass**	• Although work would be phased to minimise impact on the depot this option would potentially have disruption due to the changes of the depot track access • Construction access through depot for works would cause disruption.
Project objective	To provide efficient and cost-effective integration of systems with the other DART+ projects	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage	**Pass**	• No integration issues noted at this stage
Project requirement	To design in accordance with IÉ Standards and relevant national and EU standards and guidelines.	**Pass**	• Introduction of new significantly curved platform would be deemed as a non-compliance and further discussion would be needed as to if a derogation would be acceptable	**Pass**	• Introduction of new significantly curved platform would be deemed as a non-compliance and further discussion would be needed as to if a derogation would be acceptable	**Pass**	• Compliant • Non-standard P&C would need to be introduced to re-provide the existing P&C on the mainline approach to the viaduct	**Fail**	• No compliant or suitable track geometry solution found

Project objectives and requirements	Description	Option 2I - New Platforms in Station car park with no ECS moves to Navan Platforms		Option 2J - New Platforms in Station car park with southern headshunt to depot		Option 3A - New Headshunt to North		Option 3B - New headshunt to North with connection from Platform 2	
		Pass/ fail	Rationale	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**	• Compliant	**Pass**	• Compliant	**Fail**	• Fails to meet TSS	**Fail**	• No compliant or suitable track geometry solution found
Project requirement	Provision of new turnback infrastructure at Drogheda MacBride Station which will meet the Train Service Specification	**Pass**	• There will be some timetabling constraints on bringing units in and out of service	**Pass**	• Bi-directional operation on down main (78%): Whilst the target of 75% is the aspiration, noting that the train service is on the shoulder of the peak, the option is still considered viable.	**Fail**	• This option fails to meet the TSS and depot access requirements set. • This option results in heavy bi-directional operation on up-main (93% of the up-main)	**Pass**	• This option meets requirements with balanced utilisation
Project requirement	To allow for continued movements of freight traffic to and from the Navan Branch.	**Pass**	• No impact	**Pass**	• No impact	**Pass**	• No impact	**Pass**	• No impact
Project requirement	Provide DART rolling stock stabling within the Drogheda area as per the DART+ stabling strategy.	**Pass**	• Platform provides new stabling infrastructure	**Pass**	• Platform provides new stabling infrastructure	**Pass**	• Platform and depot provide new stabling structure	**Pass**	• Platform and depot provide new stabling structure

5.3 Summary of Long List Sifting

The outcome of the longlist sifting is summarised in Table 5-6.

Table 5-6: Summary of Long List Sifting

Option	Description	Screening Result	Summary
Option 0 - "Do-Nothing"	Do-Nothing	**FAIL**	This option fails to meet the TSS, depot access or stabling requirements set.
Option 1A	New platform at location of existing service road 4	**FAIL**	This option fails to meet the TSS and depot access requirements set. In addition, there is non-compliant track geometry on approach to new platform.
Option 1B	New platform at location of existing service road 4 with new crossover from down main at the station approach	**FAIL**	This option fails to meet the TSS and depot access requirements set.
Option 1C	New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach	**FAIL**	This option fails to meet the TSS and depot access requirements set.
Option 1D	New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves to depot in peak	**PASS**	
Option 1E	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach	**PASS**	
Option 1F	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach.	**PASS**	

Option	Description	Screening Result	Summary
	Southern headshunt depot arrivals only		
Option 2A	Single Navan Branch Platform maintaining ECS moves to Navan Platforms	**FAIL**	This option fails to meet the TSS and depot access requirements set.
Option 2B	Single Navan Branch Platform but with no ECS moves to Navan Platforms	**PASS**	
Option 2C	Single Navan Branch Platform with southern headshunt to depot	**PASS**	
Option 2D	Island Navan Branch Platform maintaining ECS moves to Navan Platforms	**FAIL**	This option fails to meet the TSS and depot access requirements set.
Option 2E	Island Navan Branch Platform with no ECS moves to Navan Platforms	**PASS**	
Option 2F	Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms	**PASS**	
Option 2G	Navan Branch Platform provided by removing dual track with no ECS moves to Navan Platforms	**FAIL**	This option presents a severe risk to DART performance with the interaction with freight services.
Option 2H	Navan Branch Platform provided by removing dual track with southern headshunt to depot	**FAIL**	This option presents a severe risk to DART performance with the interaction with freight services.
Option 2I	New Platforms in Station car park with no ECS moves to Navan Platforms	**FAIL**	This option has significant impacts on heritage assets, compromises the current station functionality and car parking provision.
Option 2J	New Platforms in Station car park with southern headshunt to depot	**FAIL**	This option has significant impacts on heritage assets, compromises the current station functionality and car parking provision.

Option	Description	Screening Result	Summary
Option 3A	New Headshunt to North	**FAIL**	This option fails to meet the TSS and depot access requirements set. It also has significant impacts on heritage assets.
Option 3B	New headshunt to North with connection from Platform 2	**FAIL**	No compliant or suitable track geometry solution can be found. It also has significant impacts on heritage assets.

5.3.1 Project Requirement Changes

Following the development of the longlist assessment of the options, two project requirements were amended which required a re-assessment of the long list of option. These were:

1. The number of terminating DART services to cater for at Drogheda was revised down from 6TPH to 5TPH. It was therefore identified that options which had failed due to lack of one train path (whether it be a passenger service or an ECS move) would pass the assessment.
2. The requirement for a depot signalling system to be installed at Drogheda was removed. While this requirement had influenced the development of some of the options, options had already been developed which did not facilitate a depot signalling system at Drogheda. Therefore removal of this requirement did not change the result of the assessment.

These changes are reflected in the sifting table and summary above but not in the preceding longlist of options assessment or narrative.

5.4 Shortlisted Options

The following sections describe the shortlisted options in further detail. Drawings of the shortlisted options are provided in Appendix A.

5.4.1 Option 1D description

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

Track

Option 1D proposes a new Platform 4 between the existing Platform 3 and the wheel lathe building where the current CET/refuelling roads are located. The proposed platform is 173m long with 15m track beyond the end of Platform 4 for train overrun similar to Platform 3. The platform width, including a new lift shaft

is limited to 7m due to existing wheel lathe building. There is an opportunity to increase the width of the proposed platform by reducing the track centres between Platforms 3 and 4.

The CET/refuelling roads would be removed and new CET/refuelling roads established south of the maintenance building in place of the existing earth bund. A single new stabling road is proposed south of and adjacent to, the new CET/refuelling roads. These three roads are single ended only due to the limited clearance to the overbridge pier on the south west corner of the maintenance building. To make these sidings double ended with compliant length, would result in significant land take to the east.

Two other stabling roads are proposed. One within the new Platform 4, and one on the southern Navan track which has been identified as a BEMU stabling road. All stabling and CET/refuelling roads are >200m long between clearance points to allow for a DART train, signalling requirements and train overrun.

The existing train wash would be removed to accommodate the new trackwork. A new 40m uni-lateral directional (west to east) Train Wash is proposed on the eastern side of Railway Terrace. The Train Wash including 21m (single car length) either side is on straight track. The width shown is consistent with the existing Train Wash and provides 3m lateral clearance to the nearest running rail of the mainline. To the east of the Train Wash is an extension of the existing headshunt to allow FLU trains to shunt into the maintenance building. A new 'exit only' connection to the mainline is proposed on the eastern side of the headshunt. There is an opportunity to investigate a bypass road to the north to avoid the Train Wash and allow parallel movements.

A slew to the mainline on the approx. 1500m radius horizontal curve is required due to the proposed location of the mainline crossover being located on a horizontal transition. To achieve the necessary connections, a virtual transition is needed on the station side of the curve. This restricts the design speed to a maximum of 60kph. The distance between turnouts has been maximised where possible. Further refinement may enable these distances to be increased.

There are facing and trailing P10 crossovers proposed on the mainlines prior to Drogheda MacBride Station. There are three turnouts from the Up Main to get either in or out of the depot. From east to west:

- 'Exit only' connection on the eastern side of the extension of the headshunt
- Entry/Exit from Platform 4
- Entry connection that allows trains to either stop at Platforms 3 or 4 before a reverse move into the depot

A diamond crossing is required on entry from the Up Main into Platform 4. The second road allows trains to travel back from Platform 3 into the depot.

The proposed diamond is currently a non-standard 1 in 4.65 with one straight leg through the diamond and the other curved as a continuation of the 320m turnout radius from the P10. There is an opportunity to make this a standard 1 in 4.75 diamond with further investigation. Both turnouts adjacent to the diamond on the

Platform 3 Road are P10s and are positioned with a toe-to-toe clearance to support further refinements towards the inclusion of a standard diamond based on 3.6m track centres.

Between Platform 4 and the adjacent P10 turnout a 180m radius horizontal curve is proposed to support the turnout location close to the new platform. There is an opportunity with further engineering to either change the bearing of the turnout and/or reduce the clearance between Platforms 3 and 4 to achieve a compliant radius.

OHLE

OHLE foundation solutions are considered to consist of either rotary bored piles, shallow foundations or micro piles; refer to Section B of Annex 3.2 for specific details on each type. The preferred foundation solution will be based upon the findings of the site-specific ground investigation and other constraints such as available space.

Signalling

From a signalling perspective, all options 1D, 1E and 1F are similar. The options involve a significant new track layout, and the existing signalling equipment must be modified to meet the new scheme. Provision of new signals for signalling the new possible routes to enable the signalling to control the new point machines and the installation of the track detection system on the new tracks is required.

Civils/Structures

The overbridges carrying McGrath's Lane will be impacted in this option. The slewed mainline is likely to clash with the northern abutment of OBB80 and the new track between the uni-directional train wash and refueling/stabling roads and platforms clashes with the abutments of the existing OBB80 and OBB80B. Significant modifications or, most likely, replacement of OBB80 and OBB80B will be required. The adjacent OBB80A may also need replacing or modification depending on whether there are any interdependencies between the structures.

A new station footbridge will be required to provide access to new platform 4.

Earthworks will be required to remove the existing earth bund at the new re-fuelling and stabling roads.

Operations

All DART services are concentrated on the existing Platform 3 and new Platform 4. This does require heavy utilization of a single bi-directional lead to access Platforms 2, 3, and 4. DART ECS services can operate during the peak hour and can travel between service platforms and the depot without transiting the mainline. Other ECS moves would not be practicable during the peak hour.

Passenger Facilities

New passenger facilities would include standard platform furniture associated with a new platform for a terminal DART service. An assessment on expected passenger numbers would be undertaken to determine the exact nature and number of facilities on the new platform. A new footbridge with lifts would access the new platform. Emergency fire exits or refuges would likely need to be included for the new platform.

5.4.2 Option 1E description

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

Track

The track alignment in Option 1E differs from Option 1D to the east of the Train Wash only. An extra headshunt of length >200m is added between the existing eastern headshunt and the Up Main and provides sufficient clearance for a safe driver's walkway. The two existing headshunts are space proofed for only and have been slewed north which would require purchasing additional land. The connection

to the Up Main is on the western side of the headshunt rather than the east compared to Option 1D.

The central Entry/Exit from Platform 4 is not included in the scope; however, the trackwork is appropriately configured to allow the inclusion of the connection if required following further operational assessment in the future.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

The signalling commentary is as per Option 1D.

Civils/Structures

Impact on civils/structures is similar to Option 1D.

Operations

All DART services are concentrated on the existing Platform 3 and new Platform 4. This does require heavy utilization of a single bi-directional lead to access Platforms 2, 3, and 4. DART ECS services can operate during the peak hour and can travel between service platforms and the depot without transiting the mainline. Other ECS moves can also operate during the peak hour, utilizing a south headshunt to avoid turning back on the mainline.

Passenger Facilities

Passenger facilities would be similar to Option 1D

5.4.3 Option 1F description

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

Track

Similarly to Option 1D, Option 1F proposes a new Platform 4 between the existing Platform 3 and the wheel lathe building where the current CET/refuelling roads are located. However in Option 1F, entry into Platforms 3 and 4 is via 211B points which has been switched from a right-hand to a left-hand turnout to achieve compliant radius into both platforms. The existing 219 and 219A crossover, and second entry into the depot, have been removed to make space for both facing and trailing crossovers on the mainline. 210 points have also been removed and plain lined to avoid the need for the connection into 211B requiring a slip diamond, which is not desirable for new track. This results in trains from Platforms 3 and 4 having to travel on the Up Main before entering the depot at the new headshunt on the eastern side of the depot.

The CET/refuelling roads are proposed to be shifted to south of the maintenance building in place of the earth bund. A single stabling road is proposed south of the CET/refuelling roads. These three roads are single ended only due to the clearance to the overbridge pier on the south west corner of the maintenance building. To make these sidings double ended with compliant length, would result in significant land take to the east.

Two other stabling roads are proposed, one within Platform 4, and one on the southern Navan track. All stabling and CET/refuelling roads are >200m long between clearance points to allow for a DART train, signalling requirements and train overrun.

A new 40m unidirectional (west to east) Train Wash is proposed on the eastern side of Railway Terrace. The Train Wash including 21m (single car length) either side is on straight track. The width shown is consistent with the existing Train Wash and provides 3m lateral clearance to the nearest running rail to any adjacent track. There is a bypass road north of the Train Wash to allow multiple manoeuvres at once.

An extra headshunt of length >200m is added between the existing eastern headshunt and the Up Main and provides sufficient clearance for a safe driver's walkway. In order to retain the two existing headshunts they have been slewed north which pushes them off of IE land and would require purchasing additional land. The arrangment shows the necessary arrangement neeed to safeguard the inclusion of these headshunts. The connections from the depot to the Up Main are on both sides of the headshunt. The western side allows trains from Platforms 3 and 4 to run on mainlines for a short period before entering the headshunts. The eastern side of the headshunt provides an 'exit only' connection.

A slew to the mainline on the approx. 1500m curve is required due to the P10 facing and trailing mainline crossovers required between entry to the depot and the entry into Platforms 3 and 4. In order to achieve the necessary connections, a virtual transition is needed on the station side of the curve which restricts the design speed to a maximum of 60kph. The distance between turnouts have been maximised where possible. Further refinement may enable these distances to be increased.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

The signalling commentary is as per Option 1D.

Civils/Structures

Impact on civils/structures is similar to Option 1D.

Operations

All DART services are concentrated on the existing Platform 3 and new Platform 4. This requires heavy utilization of a single bi-directional lead to access Platforms 2, 3, and 4. This option can support both DART and other ECS moves but requires a trade-off between either reducing peak DART services to 5 from 6 TPH or reducing ECS moves to 1from 2 TPH. DART ECS moves must transit the mainline in order to access either the depot or service platforms. A southern headshunt allows ECS moves to access platform 2 without turning back on the mainline.

Passenger Facilities

Passenger facilities would be similar to Option 1D

5.4.4 Option 2B description

Refer to section 5.1.9 for an overview of the option. Further detail is provided below under the following disciplines: Track, OHLE, Signalling and Civils/Structures

Track

Option 2B slews the northern Navan track closer to the southern and removes the trap points allowing a 173m long 5m wide side platform with easy pedestrian connection to the existing Platform 1. The southwestern part of the proposed platform spans Dublin Road underbridge, therefore requiring significant structural modifications to the underbridge.

There is an opportunity to maintain and tamp through 215A points rather than proposing a new turnout pending a condition assessment. A second opportunity would be to move Navan Junction (215A and 216A points) further east to allow the proposed platform to move away from Dublin Road bridge.

Two additional stabling roads are required in this arrangement. One new stabling road is proposed where the earth bund is currently located adjacent to the depot building. The existing stabling road has been slewed to provide adequate lateral clearance. One stabling road is proposed on the southern Navan track, utilising the proposed BEMU stabling road. All stabling roads are >200m long between clearance points to allow for a DART train, signalling requirements and train overrun.

No track works to the existing connections into the depot have been proposed.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

This option 2B requires few signalling modifications with regard to the existing situation. If the turnouts 215A and 216A are displaced to the proposed location, signalling cables must be routed to the new position of the point machines. Track detection system elements must be also repositioned.

In comparison with options 1, signalling modifications are significantly lower. Regarding the number of signalling modifications required to execute the solution, after discussion Options 2B and 2E are presented as the best candidates from al shortlisted options concerning only signalling.

Civils/Structures

The new stabling road will require cutting into the toe of the earth bund. As this earthen bund currently has a steep angle of repose with heights up to 7m, its slope will require regrading to a suitable stable angle. The use of a retaining wall may be considered to limit earthworks volumes generated; however its height will be notable to maintain the required clear distance to the structures from the line.

Underbridge UBK1 will need to be significantly modified to be widened to the north or replaced.

Retaining walls and other civil works would also be required to accommodate the new platform along the Navan line.

Operations

DART services are split between the existing Platform 3 and a new platform on the Navan branch, with an additional track allowing other services to move around platformed DARTs. ECS access to Platform 2 is possible during the peak hour but requires a turnaround on the mainline. DART ECS moves would likely be restricted to operating from the existing Platform 3, as accessing the Navan platform would involve a second turnaround per hour on the mainline.

Passenger Facilities

New passenger facilities would include standard platform furniture associated with a new platform for a terminal DART service. An assessment on expected passenger numbers would be undertaken to determine the exact nature and number of facilities on the new platform.

At this stage it is envisaged that access to the platform would be achieved through widening of the existing platform 1 with passengers using the existing station entrance. Further assessment will be undertaken at preliminary design based on forecast passenger numbers. Fire access points will be provided into the station car park.

5.4.5 Option 2C description

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

Track

Option 2C is a development of Option 2B. The side platform on the Navan tracks and additional stabling road in the depot remain the same as the previous option.

An extra headshunt of length >200m is added between the existing eastern headshunt and the Up Main and provides sufficient clearance for a safe driver's walkway – similar to Option 1E. In order to retain the two existing headshunts they have been slewed north which pushes them off of IE land and would require purchasing additional land. The arrangment shows the necessary arrangement neeed to safeguard the inclusion of these headshunts. The connection to the Up Main is on the western side of the headshunt. Both mainline crossovers have been shifted further away from each other to allow for the depot connection in between. As a result, a slew to the mainline on the approx. 1500m radius horizontal curve is required. However, the mainline slews will be minimal compared to other options and won't require a design speed restriction.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

Option 2C requires minimal changes regarding the provision of the new platform on the Navan Branch. However, in comparison with option 2B, option 2C includes more turnouts modifications as a headshunt in the south side of Drogheda MacBride Station is considered. This requires relocation of some existing signalling elements, and the provision of new ones.

Civils/Structures

Impact on earthworks is similar to Option 2B.

Underbridge UBK1 will need to be significantly modified to be widened to the north or replaced.

Retaining walls and other civil works required to accommodate the new platform along the Navan line.

The slewed mainline is likely to result in a clash of the free envelop with the abutment of overbridge OBB80 requiring either structural modification or replacement of OBB80.

Operations

DART services are split between the existing Platform 3 and a new platform on the Navan branch, with an additional track allowing other services to move around platformed DARTs. ECS access to Platform 2 and the Navan branch platform is possible during the peak hour, with a south headshunt removing the need to turnaround on the mainline.

Passenger Facilities

Passenger facilities would be similar to Option 2B

5.4.6 Option 2E description

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

Track

Option 2E slews the southern Navan track away from the northern track to allow space for a 173m island platform. The width of the platform is between 4-7m due to curvature of both tracks. Points 216A have been shifted east to allow for adequate platform width. There is an opportunity to shift 216A points further east to allow for greater platform width. If this option is chosen, further investigation into whether the new position of 216A points avoids the Down Main transition would be required at the next stage of design.

The south western part of the proposed platform avoids Dublin Road underbridge avoiding significant structural modifications.

There is to an overbridge connecting the proposed island platform to the existing Platform 1.

An additional stabling road is required where the bund is currently located. The existing stabling road has been slewed to provide adequate clearances. The third and final stabling road would be on the southern Navan track at the proposed BEMU stabling location. All stabling roads are >200m long between clearance points to allow for a DART train, signalling requirements and train overrun.

A new trap is proposed on the southern Navan track between the proposed platform and 216A points to avoid stabled trains running onto the mainlines. The Navan tracks fall towards Navan Junction.

No works to the existing connections into the depot have been proposed.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

This option 2E require few signalling modifications with regard to the existing situation. Turnouts 215A and 216A are required to be displaced and the signalling cables must be routed to the new position of the point machines. Track detection system elements must be also repositioned.

Option 2E is similar to option 2B with the difference that 2E has an island platform between the Navan line tracks instead of the single platform in option 2B. The island platform requires slewing of the Navan track to the south which will impact signalling requiring relocation of the existing signals and train detection system elements.

In comparison with options 1, signalling modifications are significantly lower. Regarding the number of signalling modifications required to execute the solution, after discussion Options 2B and 2E are presented as the best candidates from all shortlisted options concerning only signalling.

Civils/Structures

Impact on earthworks is similar to Option 2B.

Operations

Option 2E provides a total of five platform faces, though only four are used in the analysis of conceptual operations. All DART services are concentrated on two platform faces on a new island platform on the Navan branch. This requires heavy utilization of a single bi-directional lead to access the Navan branch, and does not have an additional track to allow other services to pass platformed DARTs.

This option can support non-DART ECS moves to Platform 2 but requires trains to turnback on the mainline. DART ECS moves would be unable to operate during peak hours, as accessing the Navan platform would involve a second turnaround per hour on the mainline. However, a different concept of operations could utilize the otherwise unused existing Platform 3 to facilitate DART ECS moves.

Passenger Facilities

New passenger facilities would include standard platform furniture associated with a new platform for a terminal DART service. An assessment on expected passenger numbers would be undertaken to determine the exact nature and number of facilities on the new platform.

At this stage it is envisaged that access to the platform would be achieved through a new station entrance to the north of the new platforms. Further assessment will be undertaken at preliminary design based on forecast passenger numbers. Fire access refuges will likely need to be provided at the platform ends.

5.4.7 Option 2F description

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

Track

Option 2F is a development of Option 2E. The island platform between the Navan tracks, the proposed trap on the southern Navan and the additional stabling road in the depot remain the same as the previous option.

An extra headshunt of length >200m is added between the existing eastern headshunt and the Up Main and provides sufficient clearance for a safe driver's walkway. The two existing headshunts are space proofed for only and have been slewed north which would require purchasing additional land.

The connection to the Up Main is on the western side of the headshunt. Both mainline crossovers have been shifted further away from each other to allow for the depot connection in between. As a result, a slew to the mainline on the approx. 1500m curve is required. In order to achieve the necessary connections and the shift of 216A points, a virtual transition is needed on the station side of the Down Main curve which restricts the design speed to a maximum of 60kph. The distance between turnouts have been maximised where possible. Further work is to be undertaken at the next stage of design to increase these distances where possible.

OHLE

OHLE foundation solutions are similar to Option 1D.

Signalling

Option 2F proposes an island platform on the Navan Branch and a headshunt track with it associated turnouts modification at the south side of the Drogheda MacBride Station.

Option 2F requires the most signalling modifications of all of the "2" options. This is due to the island platform signalling elements on the Navan down track to be relocated, and the changes and new signalling equipment associated to the new headshunt track and turnouts.

Civils/Structures

Impact on earthworks is similar to Option 2B.

Operations

Option 2F provides a total of five platform faces, though only four are used in the analysis of conceptual operations. All DART services are concentrated on two platform faces on a new island platform on the Navan branch. This requires heavy utilization of a single bi-directional lead to access the Navan branch, and does not have an additional track to allow other services to pass platformed DARTs. ECS access to Platform 2 and the Navan branch platforms is possible during the peak hour, with a south headshunt removing the need to turnaround on the mainline. A different concept of operations could utilize the otherwise unused existing Platform 3 to facilitate DART ECS moves, reducing pressure on the Navan branch platforms.

Passenger Facilities

Passenger facilities would be similar to Option 2E

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 5-9.

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.

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

Table 5-7: MCA Summary table

Criteria	Sub-Criteria	Option 1D	Option 1E	Option 1F	Option 2B	Option 2C	Option 2E	Option 2F
Economy	CAPEX							
	OPEX							
	Train Operations Functionality/Economic Benefit							
	Depot 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 (includes waste)							
	Agricultural and non-agricultural							
	Air Quality & Climate Change							
Accessibility & Social Inclusion	Accessibility							
	Social Inclusion							
Integration	Adaptability in the future							
	Transport Integration							
	Land Use Integration							
	Government policy integration							
	Geographical integration							
Physical Activity	Walking/cycling opportunities							

Table 5-8: Overall criteria MCA summary table

Criteria Summary	Option 1D	Option 1E	Option 1F	Option 2B	Option 2C	Option 2E	Option 2F
Economy							
Safety							
Environment							
Accessibility & Social Inclusion							
Integration							
Physical Activity							

Table 5-9: 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 five sub-criteria which are considered below. It should be noted that, in terms of overall economy summary, CAPEX is viewed to have a more significant differential between options than operational functionality benefit – particularly when considering that the functionality benefits of Options 2C and 2F are surplus to the requirements of this scheme.

CAPEX

Option 2B has significant comparative advantages over other options for the following reasons:

- Less trackwork than all variations of Option 1. There are not track works required to the existing connections to the depot and although there may be an increase in offline works there is likely to be less disruption to train services compared to option 1s.
- A longer length of OHLE installation is required in Navan branch regarding option 1D, but less installation is required in the area of the south headshunt so it is considered this option has lower impact and OHLE cost than options 1D/1E/1F.
- In comparison with options 2C and 2F, signalling modifications are focused on the Navan Branch without actuations performed at the southern headshunt. Therefore, less signalling changes are required. SET buildings must be reallocated increasing costs in comparison with options 1.
- Retaining wall required along new stabling road and to accommodate Navan line platform and significant widening to UBK1 underbridge.

- There is no requirement for a new footbridge or lifts in comparison to Option 2D and 2E however a new entrance to station may be required.

Options 1D, 1E and 1E are significant comparative disadvantages over the other options for the following reasons:

- Several phases of trackwork resulting in reduced construction facilities & bridge work so complex and higher risk from construction perspective.
- Significant track works including non-standard diamond transition.
- Significant new OHLE to be installed.
- Overbridges OBB80 and OBB80B need to be replaced. The adjacent OBB80A may also need replacing or adjusting. New station footbridge required.
- New provisions of axle counters, point machines and signals are required - more signalling modifications is option 1 series that option 2 series.
- Modification of existing platforms required to accommodate new footbridge to 3No. Platforms and 3No. lifts.

Options 2C and 2E have comparative advantages over options 1 and 2F but not as significant as option 2B. The reasons for this are as follows:

- Constructability is similar to 2B but with a new platform that will be more challenging to build due to its island nature and need for a new access bridge to it.
- No track works to the existing connections into the depot. Standard track components used. Slewed track on Navan line.
- OHLE very similar to 2B.
- new island platform in Navan Branch leading to track modifications which require less re-signalling than options 2C/2F as no actuations are performed regarding the south headshunt.
- In comparison with option 2B which also does not actuate at the headshunt track, this option requires slightly more changes as down Navan track has to be displaced to accommodate the island platform.
- Civils works as option 2B but with less widening works to underbridge UBK1.

Option 2F have comparative disadvantages over the other option 2s however not as significant as option 1s. The reasons for this are as follows:

- This option combines 2E and 2C and is consequently the most challenging of Option 2 variants to construct. However the level of construction risk and temporary impact to train services is still deemed lower than Option 1 variants.
- Track similar to 2E.

- OHLE similar to 2C.
- New island platform in Navan Branch leading to track modifications which require more resignalling than options 2B/2C. The signalling costs are also increased than options 2B and 2E because of the addition of the new southern headshunt and their associated crossover modifications
- Civil works as 2C but with less widening to underbridge UBK1.

OPEX

Option 1F has some comparative operation costs advantages over the other options due to the new platform being close to existing platforms, therefore reducing staffing costs. Options 1D and E also have this scenario however these options have complex P&C with diamond crossing and the constrained area with difficult access will make these options harder to maintain.

Option 2s (B,C,E and F) have some comparative disadvantages to other options due to the new platform being further away from the station, hence increasing maintenance/staffing costs and in the case of 2E and 2F a new lift requiring maintenance.

Train operations functionality/economic benefits

Options 1D and 1F are at a significant comparative disadvantage to the other options from a rail operations standpoint. Option 1D requires either a reduction in DART frequency or limiting ECS moves. Furthermore, this option removes the in-depot access for DARTs to the existing Platform 3/new Platform 4, requiring all DART ECS moves to transit the mainline. This could allow for the import of any delays between the depot and mainline.

Option 1D can facilitate DART ECS moves, but not ECS moves to the existing Platform 2. Even with this reduced frequency, Option 1D still has a critical reliance on a single bi-directional lead to Platforms 2, 3, and 4, which could decrease timetable reliability. Furthermore, the lack of a southern headshunt means any ECS moves accessing the existing Platform 2 must turnback on the mainline, decreasing timetable reliability by possibly blocking mainline services.

Options 2B and 2E are at some comparative disadvantage to other options, as their design strengths—splitting DART services and an additional platform face respectively—are offset by their shared weakness—a lack of headshunt necessitating turning back on the mainline for any ECS moves. The analysis assumes that DART ECS moves would be limited to the existing Platform 3 for Option 2B. The analysis also assumes DART ECS moves would not be possible for Option 2E during the peak hour, to simplify DART operations by containing DART services to the two platform faces on the Navan branch. However, it could be possible to utilize the existing Platform 3 in Option 2E for DART ECS moves as well, improving operational performance at the expense of customer experience and increased operational complexity.

Options 1E, and 2C have some comparative advantage over other options. Option 1E ameliorates the weakness of Option 1D by providing a southern headshunt,

facilitating ECS moves to all platforms without requiring turning back on the mainline. DART ECS moves can enter existing the Platform 3/new Platform 4 directly, reducing opportunities for importing delays between the depot and mainline. One outstanding risk is that this design still relies on a somewhat heavy utilization of a single bi-directional lead to Platforms 2, 3, and 4, which could decrease timetable reliability.

Option 2C has comparatively lower utilization of bi-directional leads by splitting services to either side of Drogheda, improving operational performance at the expense of customer experience and increased operational complexity. The addition of the headshunt allows for DARTs to access the Navan line from the depot, as they will no longer need to turnback on the mainline, and also removes the need for ECS access to Platforms 1 and 2 to turn around on the mainline. This improves flexibility and timetable performance

Option 2F has the best operational performance, with significant comparative advantage over the other options. The five total platform faces allow for the most operational flexibility and timetable resilience. A southern headshunt allows for ECS access to the existing Platform 2, and DART ECS access to the Navan platforms if necessary, without requiring turnbacks on the mainline. This improves flexibility and timetable performance.

Using Platform 3 exclusively for ECS moves to/from service could improve efficiency with less comparative impact on customer experience and operational complexity, with all other DART services operating through the Navan platforms. Option 2F is flexible enough to allow for all DART services—including ECS moves—to use the Navan platforms, but this could decrease timetable reliability due to heavy utilization of a single bi-directional lead to the Navan platforms.

Depot operations functionality/economic benefits

All options maintain the existing depot functions and provide the additional stabling road required.

Options 1D, 1E, 1F, 2C and 2F provide a dedicated arrivals road which allows for improved depot operations by allowing a good changeover between mainline and depot signalling systems providing improved depot efficiencies and safety.

Option 1E, 2B and 2E provide direct access from the train wash to servicing roads which is the most frequent depot move. Options 1D and 1E provide direct access from the train wash road to stabling roads which is the second most frequent depot move. Options 1D, 1F, 2B, 2C, 2E and 2F provide the stabling within the depot boundary, not requiring a mainline operation and reducing the operation times for this activity. Overall, Options 1D and 1E are the most positive towards operational changes.

Options 1D, 1E and 1F provide the operational opportunity for a train wash bypass road and for the stabling roads to be converted for other uses such as a servicing road. Options 1E, 1F, 2C and 2F provide the operational opportunity for an additional FLU shunting road. Only Option 1E provides operational opportunity for an additional mainline connection. Out of all these operational opportunities, Option 1E is the most versatile for the needs of IÉ operations.

Options 1D, 1E, 1F, 2C and 2F provide alternative access/egress to the depot if there is an issue with the primary mainline connection. If there is an issue with the dedicated Arrivals Road, Options 1D, 1E, 2C and 2F provide alternative access solutions. Both of these issues have potential to disrupt depot operations.

If there was an issue with the train wash, it would not affect access to the servicing and stabling roads (most frequent operation) for Options 1F, 2C and 2F allow, it does not affect access to the Wheel Lathe or Northern Headshunt for Options 1D, 1F, 2C and 2F and does not prevent access to the maintenance building for Options 1D, 1E, 1F, 2C and 2F. Options 2C and 2F are the most resilient for depot operations with Options 1D and 1F also very resilient for operations.

Traffic functionality and associated economic activities and opportunities

Option 1s have some comparative disadvantages over the option 2s. There will be disruption to Platform 3 and the depot, with limited opportunities to easily phase works. There will also be disruption to railway terraces. There will be some impacts to the mainline in the option 1s, however this can be carried out in blocks/weekends.

The option 2s would have limited construction disruption to passenger rail services however during construction freight services and operations on Dublin Road would be impacted. Also during operation longer walking distances would be introduced from the new platform and some car parking spaces lost. Despite the above the option 2s have some comparative advantages over option 1s, due to lack of disruption.

When operational, the scheme will have no visible impacts on the prevailing traffic conditions in the surrounding road networks.

Construction activities on all options considered, are expected to generate a relatively low number of additional vehicular journeys, and therefore will, at most, have a minor temporary impact on the traffic conditions of the local road network.

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

All options are comparable to each other for employer's safety. At this stage no differentiators between the options in relation to employer safety have been identified.

Public safety

Options 1 (D, E and F) are seen to have some disadvantages to other options as the new platform is constrained to one side by the depot and does not offer easy escape routes. Options 2 E and F also some disadvantages over other options as the new

island platform increasing the number of platform interfaces. Also with these options, the platform escape is more constrained.

Options 2B and C have some advantages over the options discussed above as the new platform has clear escape routes to the rear into the car park.

5.5.5 Environment

Section 2.6 sets out a description of the existing environment, under key environmental criteria, while Section 4.1.6 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. Whilst there are some differences between the options on environmental sub-criteria, such as the options trading off between heritage impact and impacts from proximity to neighbouring residents, overall the options are considered comparable. This is reflected in the summary within Table 5-8.

Landscape and Visual

Option 1D has the least landscape and visual impact and has comparative advantages over all options. Otherwise, all options have some aspect of significant landscape or visual impact.

Option 2B has comparative disadvantages relative to Option 1D, but has less significant impacts that other options. The significant impacts of this option are limited to Dublin Road Rail Bridge.

Other Options 1E, 1F, 2C, 2E also have significant impacts on Dublin Road Rail Bridge, Properties 1 to 6 Railway Terrace and Newtown Lodge (2C and 2F). These options still have significant comparative disadvantages over other options.

Option 2F is the least preferable with significant impacts on Dublin Road Rail Bridge, Properties 1 to 6 Railway Terrace and Newtown Lodge. The option has significant comparative disadvantages over other options.

Biodiversity

All of the proposed options have potential to indirectly impact on the River Boyne and Blackwater SAC and the Boyne Coast and Estuary SAC, SPA and pNHA. There will be no direct impacts to any designated sites as all of the proposed works areas are outside of designated site boundaries. Potential indirect impacts include construction related impacts (e.g. potential for surface and ground water quality impacts or disturbance to birds) and new lighting which could impact on birds. The potential for ground water impacts is greater in Options 1E, 1F and 2C, 2E and 2F and least in Options 1D and 2B, and the potential for surface water impacts is comparable in all options.

A retaining wall is proposed in Options 1E, 1F, 2C, 2E and 2F. This could potentially affect the groundwater regime, and indirectly impact sensitive groundwater fed habitats within the nearby designated sites (River Boyne and Blackwater SAC, Boyne Coast and Estuary SAC). A change in the groundwater

regime and impacts on Annex I groundwater fed habitats may also affect the bird species that feed on these habitats, also subsequently indirectly impact the Boyne Estuary SPA.

Options 1D, 1E, 1F, 2C and 2F all include the reconstruction of OBB80, OBB80A, and OBB80B bridges. These bridges all have potential bat roost features and are currently undergoing bat roost surveys to determine if bats are roosting within.

Hibernation surveys carried out during the winter months are also necessary to determine if bats are using the structures as hibernation sites. Any works required on these bridges have the potential to impact roosting bats by disturbance and/or displacement. If bats are found to be roosting, NPWS will need to be consulted, and a bat derogation licence sought.

Options 2B, 2C, 2E, and 2F all require the widening of the bridge located on the Dublin Road. It is currently not known if the bridge has potential for roosting bats or not. If works were to occur here this bridge will need to be assessed for bat roosting potential, and if potential bat roost features are identified, bat roost presence/absence surveys will be required. If bats are found to be roosting, NPWS will need to be consulted, and a bat derogation licence sought. The addition of lighting within this location may also impact commuting and/or foraging bats. The potential impact on bats is therefore the same across all options.

There are a number of other potential ecological constraints, but 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 (scrub, hedgerows or treelines) and which may provide foraging, nesting, and commuting corridors for fauna species (e.g. birds, bats, small mammals).

All options involve some level of works on the existing tracks. Railway lines can often support interesting flora species and habitats due to the calcareous nature of the ballast and their often relatively undisturbed nature. If any such habitat is present the level of impact is likely to be similar across all options and might not 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 within the adjacent River Boyne and Boyne Estuary SAC and SPA being particularly sensitive receptors. 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 might not be a significant differentiator between options.

Noise and Vibration

Options 2B, 2C, 2E, and 2F will be slightly more difficult to manage from a construction noise and vibration point of view than Options 1D, 1E, and 1F, as options 2 will require construction of the new platform closer to existing noise sensitive receivers than options 1.

The level of operational noise for all scenarios with headshunt extension will be similar, given that all scenarios will include points and crossings, and trains stopping at Drogheda MacBride Station.

The level of operational noise for all scenarios is expected to be less than the existing noise level, as electric engines are quieter than diesel engines.

Water Resources

In consideration of impacts on water resources the comparative difference between the seven options relates mainly to the proposed retaining walls and structures such as the platforms and bridges which have the potential to impact groundwater flow regime and groundwater and surface water quality. Based on topography the groundwater flow across the site is likely to be towards the Boyne Estuary. The relative distance between the structures in the different options is insignificant in relation to their comparative impact on any of the identified receptors.

Options 1D and 2B have limited construction of retaining walls and outside of current railway land and therefore present some comparative advantage over the other options.

Archaeology

Options 2B, 2C, 2E and 2F are considered to have advantages to other options from an archaeological and cultural heritage perspective. Archaeological monitoring will be required for any excavation works undertaken and the setting of the existing overbridge at the Dublin Road will be altered by the proposed designs.

Options 1D, 1E,1F have a comparative disadvantages over other options as historic structures will be affected and the setting of the historic station will be altered.

Architectural Heritage

From an architectural heritage perspective, Options 1D, 1E and 1F have comparative disadvantages due to the anticipated impact of:

- the proposed new footbridge on the water tower (LCC RPS DB-397) and main station building (LCC RPS DB-055); The proposed new platform on the Engine Shed (LCC RPS DB-395);
- the proposed alteration of the Newtown Bridge which is of architectural impact; and
- the provision of new buildings associated with train washing which will impact on the setting of the bridge.

Option 1F has a slightly lessened impact on the Newtown Bridge due to the positioning of the proposed new structures.

Options 2C and 2F also impact the Newtown Bridge although to a lesser extent than the Option 1s.

From an architectural heritage perspective, Options 2B, and 2E avoid the impacts on Newtown Bridge.

Options 2B and 2C propose widening the Dublin Road Bridge on the North side which it is anticipated would impact the bridge and may impact the setting of Bayview House (LCC RPS DB-301).

The proposed footbridge may impact on Railway Terrace. The houses are not protected or included in the NIAH, but they do appear on the 1870 Drogheda Town Map.

Geology and Soils

In Options 1D, 1E and 1F, there is potential for the generation of surplus earthworks materials comprising of contaminated land for reuse or removal from site with the construction of the new platform, new footbridge (& lift access), headshunt extension, bridge reconstruction and new stabling, CET and refuelling roads. Additionally, the proposed works for Options 1E & 1F include the construction of a retaining wall due to changes in topography.

For Option 2B, 2C and 2F, the works will consist of the construction of new roads, a new platform and bridge widening. Moreover, there is potentially a construction related disadvantage to other works related to bridge widening over the Dublin Road.

However, the potential impact on geology and soils would need to be further assessed to determine if it is comparatively disadvantageous over the other options. Furthermore, for Options 2C and 2F, the proposed works include a new retaining structure, extension of headshunt and potential for a second headshunt which will potentially increase the earthworks requirements.

Agricultural

Option 1D, 1E, 1F, 2C and 2E have the potential to extend the fence-line away from the existing railway line and into agricultural property. For options 1D, 1E, 1F, 2C and 2F there is the possibility of additional land required for either reconstruction of the existing overbridge or additional headshunts. However, the majority of this construction will occur within the IE property and if additional land is acquired the amount will be small and the ‘at edge’ nature of impact will not be significant in this medium sensitivity agricultural environment.

Options 2B and 2E have no potential agricultural impacts. While options 2B and 2E have slight advantages over the other options, the significance of impact of all options is likely to be not significant, and therefore all options are comparable to other options.

Air Quality and Climate

Due to the location of sensitive receptors in the immediate vicinity of the construction works associated with the station upgrade, all options are deemed similar from an air quality perspective. There will be an improvement in air quality due to the provision of electric engines in place of the current diesel engines.

The overall impact on climate is positive for each option due to the provision of electric engines in place of the current diesel engines and the increased attractiveness of the use of rail over private car.

5.5.6 Accessibility and Social Inclusion

Regarding accessibility, the option 1s have a new platform adjacent to the existing platform which allow easy transfer of passengers and allows passengers easy navigation to their trains. Whereas options 2E and 2F allow the majority of the DART services to run off the new platforms off the Navan branch i.e. one single point for passenger.

Options 2B and 2C has some comparative disadvantages to the other options as the construction of a single platform on the Navan branch will result in DART serving platform 3 and the new platform. This will result in uncertainty in platform destinations for passengers. Furthermore this option introduces extended travel distances for passengers transferring services

For social inclusion the assessment is based on additional walking distance or crossings (allowing for provision of lifts) which must be negotiated by passengers relative to their destination. Option 1B, E and F have short journey times but passengers would have to use a bridge crossing to get to the DART platform. Option 2E and F have a longer journey time when compared to the options 1s however they create a single DART access point. Bridge crossings are also required for these 2 options

Options 2B and 2C have some comparative disadvantages to the other options because although access to the new platform requires no bridge crossing the DART services will also use platform 2/3 that does require a bridge crossing this will negate any accessibility benefit as passengers would see, plus the longer journey time to the platforms.

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

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

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 Drogheda MacBride Station are shown in the table below:

Table 5-10:Construction comments for shortlisted options

Opt	Option Description	Construction comments
1D	New platform at location of existing service road 4 with new crossover allowing parallel moves from down and up main at the station approach with no ECS moves in peak times	Several phases of trackwork would be required, with reduced station facilities meantime (including train wash, stabling, CET/ Fuelling and at least one fewer platform and). New bridge works would add complexity too.
1E	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach	Similar to 1D but with added scope and complexity and scope from headshunt to south. Construction risk subsequently higher than 1D.
1F	New platform at location of existing service road 4 with new depot headshunt to South and with new crossover from down main at the station approach. Southern headshunt depot arrivals only	Similar to 1E but with extended headshunt scope including longer retaining wall. Construction risk subsequently higher than 1E.
2B	Single Navan Branch Platform but with no ECS moves to Navan Platforms	This option has less trackwork than Option 1 (all variants) but increased offline works including additional concourse area, new platform and widened bridge over Dublin Road. There is likely to be less disruption to train services than Option 1 as a result.
2C	Single Navan Branch Platform with southern headshunt to depot	This option extends the construction aspects of Option 2B by adding the headshunt associated with Option 1E. Overall construction risk and impact is therefore higher than 2B but probably lower than Option 1 (all variants).
2E	Island Navan Branch Platform with no ECS moves to Navan Platforms	This option is similar to 2B but with a new platform that will be more challenging to build due to its island

Opt	Option Description	Construction comments
		nature and need for a new access bridge to it. Construction risk and impact considered between Options 2B and 2C.
2F	Island Navan Branch Platform with southern headshunt to depot	This option combines 2E and 2C and is consequently the most challenging of Option 2 variants to construct. However the level of construction risk and temporary impact to train services is still deemed lower than Option 1 variants.

Works at Drogheda Station should be planned with the neighbouring Drogheda Depot works in mind, to aid overall logistics, costs and risk.

The construction programme presently reflects most onerous aspects of the various design options to construct, namely all parts of Option 1F and the Navan Line aspects of Option 2F. The local critical path is shown as constructing a new retaining wall for the extended headshunt (should it be chosen) followed by laying and commissioning of the new service roads alongside the depot (2no. CET/Fuelling and 1no. Stabling) and lastly installation of a new footbridge in the station area with lifts.

The combined duration for such works would be approximately two years, with some works being undertaken in possessions (including potentially sheet piling at weekends for the headshunt retaining wall) and others during normal working hours. There would also be a negative impact to train and depot services, this varying over different phases and depending upon eventual designs and construction methodologies.

Where there is a need to demolish and reconstruct McGrath's Lane bridge this presents an access challenge for the two properties at each end of McGrath's Lane. There appears to be no other public road access to these two properties so ideally the new bridge will be built before the existing one is demolished, the new one being built maybe just to the east to avoid clashing with the new train wash plantroom to be built just to the west. An alternative would be to explore the option of gaining road access along the north side of the rail depot and via a gate at the east end of the depot directly onto McGrath's Lane. If this is not viable then vehicular access to the two properties would be probably blocked for a period of some weeks between demolishing the existing bridge and building the new one.

Option 2 designs result in Navan line works being undertaken relatively close to residential properties. Noise and light from construction activities may need to be mitigated especially if undertaken during night-time possessions.

6 Summary and conclusions

6.1.1 Non-preferred options

Option 1D, 1E and 1F are not preferred due to:

- The significant comparable difference in capital cost and disruption to build.
- In addition options 1D and 1F do not provide a level of operational performance and robustness that matches the level of capital cost required.

Option 2C and 2F are not preferred due to:

- The depot operational flexibility and performance benefits brought about by these two options cannot be demonstrated to be needed to meet the DART+ TSS 1C.
- Whilst the flexibility these options provide will improve reliability and provide greater timetabling opportunity they do so at significant extra capital and operational cost.

Option 2E is not preferred due to:

- The additional capital cost required for the platform bridge and station entrance works
- The additional platform capacity provided is not needed to meet the DART+ TSS 1C.
- Whilst this option allows a for an opportunity for a single departure and arrivals point for DART services it does so by putting operational pressure on the track infrastructure for the two platforms. Therefore there is risk therefore that the two platforms cannot be reliably serviced by trains to make full use of the two platforms.

6.1.2 Emerging preferred option

Option 2B has been identified as the emerging preferred option. It has advantages over a number of assessment criteria compared to the other options:

- It can be constructed at a relatively small capital cost.
- It can be shown that by splitting DART services between this platform and the existing Platform 3 a robust operational solution for services exists. By "alternating" services between the platforms the track infrastructure on the approach is most efficiently used.
- It can be built with relatively minimal disruption to existing passenger services
- This option does not interface significantly with the existing Protected Structures and other buildings of heritage value
- It is built generally on existing railway land limiting any potential bio-diversity loss

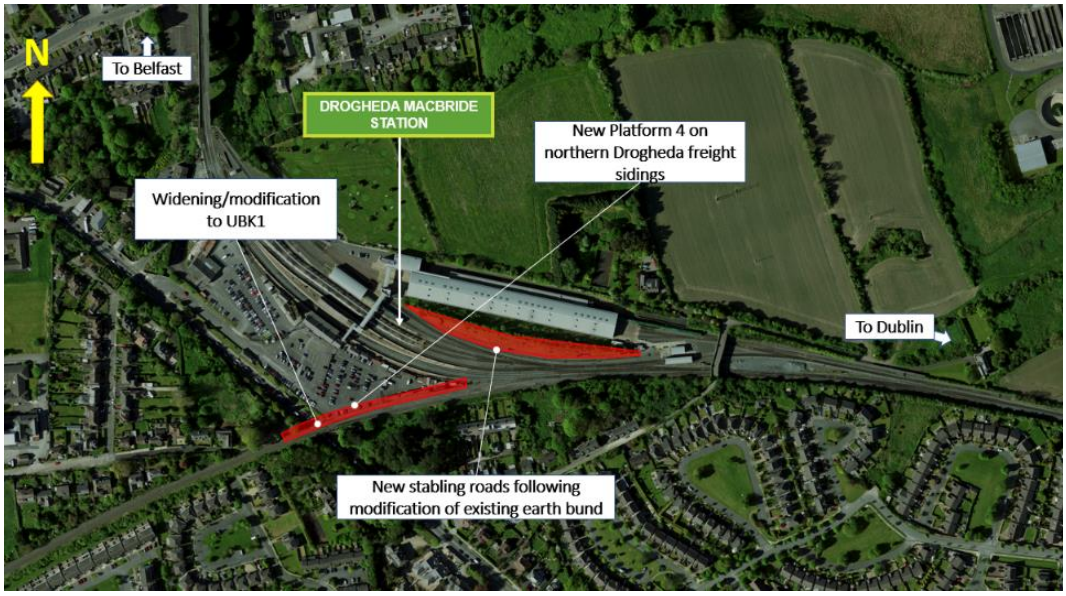


Figure 6-1: Emerging Preferred Option Schematic Aerial View

6.1.3 Key Risks/Next Steps

The following risks and next steps have been identified:

- Land purchase/over sail rights are required for widening over Dublin Road. These lands are understood to be owned by the local authority
- Provision for stabling and trapping of freight services on the branch need to be investigated at the next stage.
- Mitigation with regards to the introducing a platform close to residents on Railway Terrace will need to be investigated at the next stage.
- Required modifications and relocation of signalling equipment buildings in the vicinity of the new platform will need to be investigated at the next stage in conjunction with the wider re-signalling plan.
- The access route and provision of facilities from the existing station entrance will need to be investigated at the next stage to provide a good customer experience.
- Delivery of the site-specific ground investigation to inform the current ground and groundwater conditions. This scope has been included in the DART+ Coastal Northern Line Stage A GI.