Appendix A3.4
Depot Site Selection Supplementary Report

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EXECUTIVE SUMMARY

A selection process was carried out in respect of the proposed site for the DART+ Programme depot which is necessary for maintenance and stabling of the rolling stock needed to deliver the proposed service. This is reported on in the following documents.

- DART+ West: OSR Volume 2 Technical Report, IDOM, published for consultation in July 2021.
- Centre of Excellence DART Expansion Maintenance Depot – Location Assessment rev 01, Iarnród Éireann, dated 11/07/2019.
- EMU Depot, Western Line Feasibility Study, Iarnród Éireann, dated 02/2010.

A detailed flood risk assessment was carried out for the depot preferred site. The study identified a greater extent associated with the risk of flooding than had been anticipated as part of the earlier studies and a consequent need for compensatory storage to be provided at the proposed depot site. In addition, environmental surveys have been carried out in respect of the preferred site.

This document presents a review of the site selection process to account for the new information on flood risk and the local environment to confirm the choice of preferred site. In addition to addressing the issue of flood risk, and supplementary environmental information, the opportunity has been taken to review the multi criteria analysis consistent with the Department of Transport: Common Appraisal Framework (CAF) across the whole of DART+ West. The preferred site for the DART+ Programme Depot is illustrated below.

Figure E-1 Location Feasibility Study –Preferred Site

This report takes the opportunity to standardise the MCA for the preferred site. The CAF multi-criteria analysis (mca) methodology was used for selection of the preferred site. It provides a mechanism whereby options can be assessed on a comparative basis across a spectrum of criteria including economy, integration, environment, accessibility and social inclusion, safety and physical activity. Flood risk is examined under environment for each option.

Publicly available records of historical and predicted flooding, published by the OPW, local authorities and as part of the CFRAMS study, were used to identify the risk of flooding at each site. Although the risk of fluvial flooding was identified at some sites, it was not identified at the preferred site which consequently performed better than some other sites in this regard.

Published flood risk mapping associated with the site and current during preparation of this report is presented in Figure E-2 below. The mapping shows at risk areas for up to a 1 in 1000 year event (0.1% annual probability of exceedance). It indicates that the proposed site is not at risk of fluvial flooding. The mapping indicates the presence of fluvial flood risk along the section of railway east of the preferred depot site. This section of railway has been a site of ongoing flooding of the railway in extreme events. Irrespective of the DART+ programme, it will be necessary to realign the section of the railway at Jackson's Bridge, at some stage, to address the flooding issues.

Flood risk assessment is typically carried out in stages dependent on the level of certainty required for a given stage of development planning. F or DART+ West it is necessary to carry out a stage 3 detailed flood risk assessment to clarify the extent of lands necessary for delivery of the project and, to assess any impact of the scheme on affected parties and the environment. The stage 3 assessment provides a quantitative appraisal of potential flood risk, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

Detailed three-dimensional flood modelling was carried out. It was carried out on the basis of return periods up to 1 in 1000 year. The long return period is reflective of the critical nature of the proposed infrastructure. It quantified the extent of flood risk upstream of the proposed realignment works. This extent was determined to include part of the preferred site for the depot.

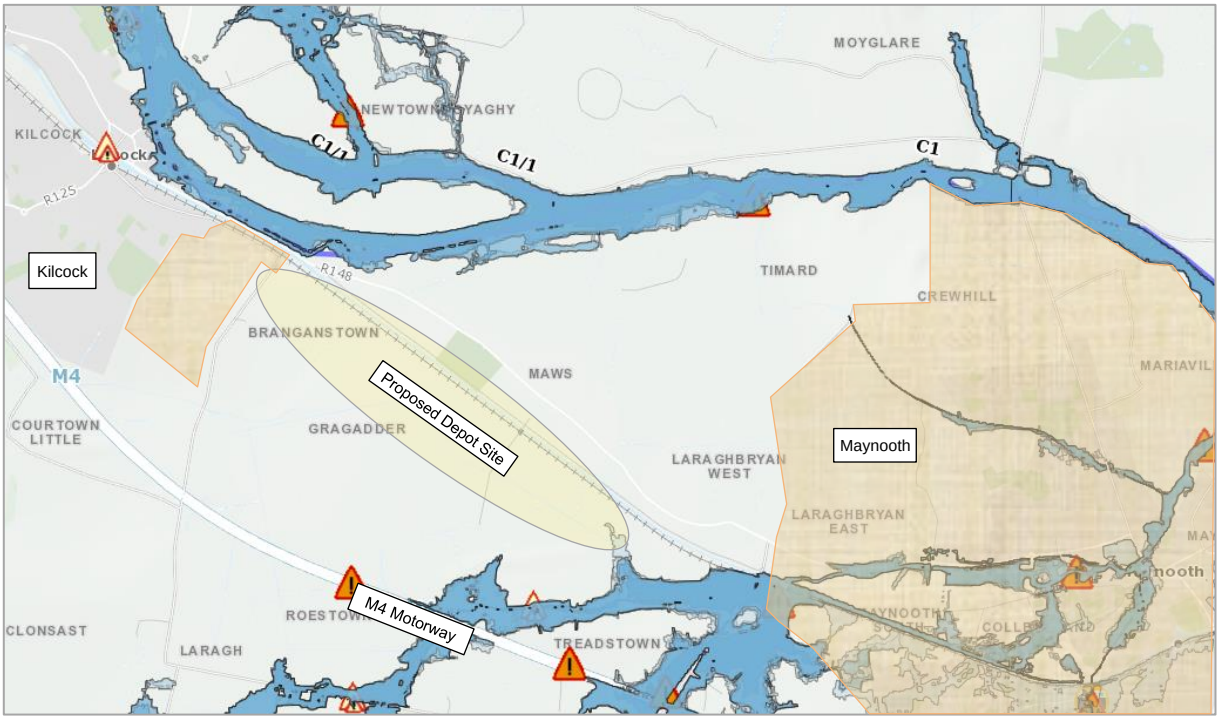

Figure E-2 Preferred Site. OPW Flood Risk Mapping

Output from the Stage 3 flood risk assessment, completed in December 2021 is represented graphically in Figure E3 below. The proposed depot, associated access roads, and realignment of the railway at Jacksons Bridge are shown overlaid on the predicted flood risk extents for clarity. The lands of the proposed depot site are up to 2.0m above those adjacent to the Lyreen river in the vicinity of Jackson's Bridge, and consequently the depths of flooding are significantly lower there.

The outcome of environmental surveys carried out as part of design development were reviewed. No issues were identified in the review which would warrant reconsideration of the site selection in respect of them.

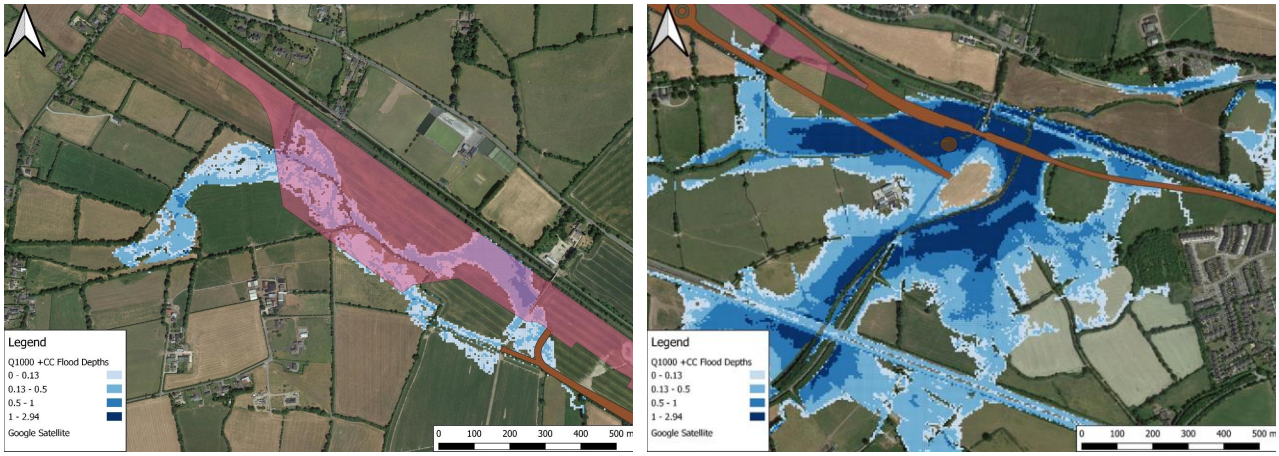

Figure E-3 Stage 3 Flood Risk Assessment Output

The multi criteria analysis summary matrix from the location assessment study of July 2019 is presented in Table E-1 below with format adjusted to reflect the typical presentation of the mca output adopted for the DART+ West project:

Table E-1 Aggregated Summary of Site Appraisal – DART+ Programme

2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
	Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy								
Integration								
Environment								
Accessibility & Social Inclusion								
Safety								
Physical Activity								

From the table above it is evident that Maynooth West and Hazelhatch West are the only options which exhibit less than two disadvantages over other options across the spectrum of assessment criteria. On the basis that the risk of fluvial flooding has been identified on the Maynooth West site following the stage 3 flood risk assessment for the site it is appropriate to examine the Hazelhatch site further in this regard to confirm if the mca ratings would be altered sufficiently to warrant another site being selected as preferred.

To this end published information in respect of the Hazelhatch site was further examined to determine if this site would likely also manifest elevated flood risk following a stage three assessment of the site.

Published flood mapping for the Hazelhatch West site is shown in Figure E-4 above. The Figure also shows aerial photography of the site during a flood event. Examination of the CFRAMS study for this location has identified that, two streams crossing the site and an existing spring on the site, were not included in the CFRAMS study and it is evident that should a stage 3 flood study be carried out for the site it is likely to manifest a risk of fluvial flooding across the site as for the Maynooth West site. It is concluded that in respect of flood risk the sites are equivalent.

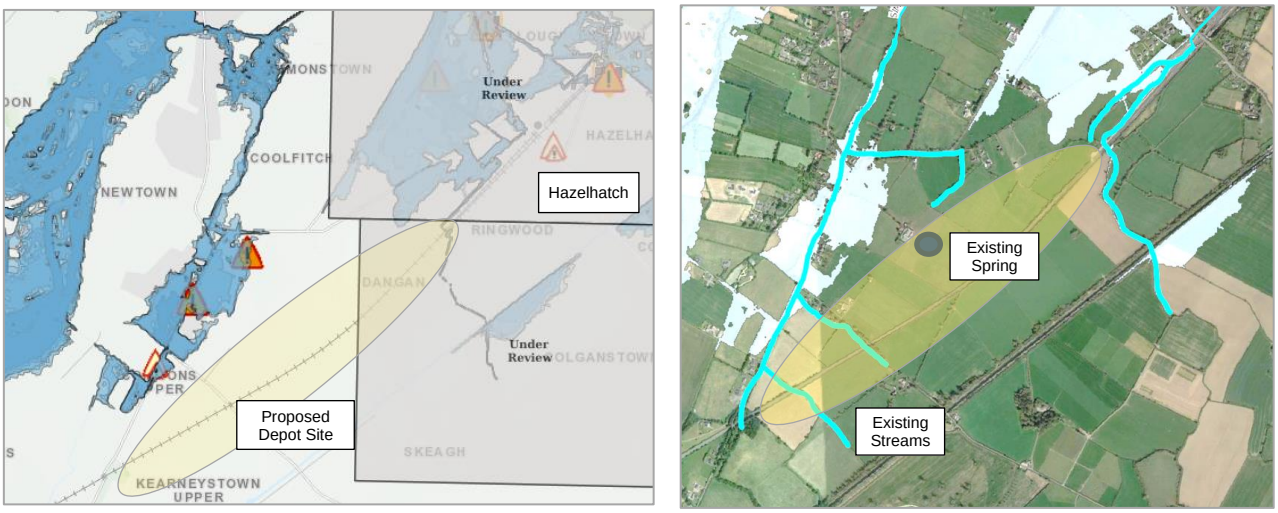

Figure E-4 Hazelhatch West OPW Flood Mapping and Aerial Photography

Having carried out a comparative desktop review of the flood risk on the sites a broad review was carried out other aspects of the multi criteria analysis to take account of current environmental information and planning context. The review resulted in some adjustment to the summary table which is presented in Table E-2 below.

Table E-2 Amended Aggregated Summary of Site Appraisal – DART+ Programme

	2021 Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy									
Integration									
Environment									
Accessibility & Social Inclusion									
Safety									
Physical Activity									

From examination of the updated table it is evident that Option 2, Maynooth West, performs better than other options considered across the spectrum of assessment criteria. Further comparison was made with Option 3 M3 Parkway North, and Option 4 Hazelhatch West, the best performing of the remaining options, to confirm the choice of Preferred Option for the site.

Table E-3 presents differing characteristics between the options below.

Table E-3 Salient Site Comparators; Maynooth West, M3 Parkway North and Hazelhatch West

Option 2 Maynooth West	Option 3 Parkway North	Option 4 Hazelhatch West
• The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. There is advantage to delivery of the DART+ West project first. A depot on the Maynooth line, consequently best suits the effective delivery of the	• The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. There is advantage to delivery of the DART+ West project first. A depot on the Maynooth line, consequently best suits the effective delivery of the	• The Kildare Line exhibits weaker passenger growth characteristics than the Maynooth Line and consequently Option 4 Hazelhatch West does not perform as well as Option 2 Maynooth West in this regard.

Option 2 Maynooth West	Option 3 Parkway North	Option 4 Hazelhatch West
proposed train service specification.	proposed train service specification.	
• Based on the current train service specification, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines.	• Based on the current train service specification, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines.	• Based on the current train service specification, electrification of the Kildare Line would displace 4 ICR/DMU trains which will be cascaded to other non-electrified lines.
• The railway fronting the site is straight on plan for a length of 2.5 km. The site configuration is better suited to installation of the depot with associated stabling than is Option 4 Hazelhatch West.	• The railway would need to be extended to accommodate the depot. The site is sufficiently flexible to accommodate the depot and associated stabling.	• The railway fronting the site is approximately 1.7 km long. The site configuration is less well suited to installation of the depot with associated stabling than is Option 2 Maynooth West.
• A depot west of Maynooth is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex.	• The potential depot is on a spur to the Maynooth Line and joins at an at-grade junction at Clonsilla. This will result in significant disadvantages in comparison to other options.	• A depot west of Hazelhatch is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex.
• There is a risk of fluvial flooding on the site	• There is a risk of fluvial flooding on the site;	• There is a risk of fluvial flooding on the site;
• The R148 runs parallel to the railway, north of the proposed site and the M4 is located to the south of the site. The site is well located for staff access from Maynooth or Kilcock;	• The R154 runs adjacent to the proposed site, and access to the M3 is located to the south of the site. The site is well located for staff access from Dunboyne	• Access to the site is more constrained than for the Maynooth West site, being located remote from both the M4 and the M7 motorways;
• There are no houses within the site of the proposed depot at Maynooth West.	• The presence of ribbon development along the adjacent R154 will constrain the layout of the proposed facility or some may need to be acquired.	• There are three houses within the site of the proposed depot at Hazelhatch West. These will constrain the layout of a proposed facility or some may need to be acquired.

Although all three sites exhibit a risk of fluvial flooding in the 1 in 1000 year event, Option 2 Maynooth West exhibits significant advantages over other sites in respect of layout, access for trains and facilitating passenger growth at the earliest practicable timeframe in respect of DART+ programme delivery.

Conclusion: The multi-criteria analysis process for site selection in respect of the proposed DART+ Programme depot has been re-examined following identification of the risk of fluvial flooding on the preferred site and following receipt of other information during design development. Having reviewed the multicriteria analysis and the option comparators included in Table E-3, it is concluded that Option 2 Maynooth West remains the preferred site for the proposed depot.

1. DEPOT SITE PREFERRED OPTION SELECTION

1.1 Introduction

The current DART network is 50 km long, extending from Malahide/ Howth to Greystones. The DART+ Programme will increase the length of the DART network to 150 km of railway corridor to support railway electrification and increased rolling stock for increasing passenger capacity.

The DART+ Programme also includes the purchase of new train fleet. The DART+ Programme will deliver frequent, modern, electrified services from Dublin City Centre (Connolly & Spencer Dock) to:

- Maynooth, M3 Parkway.
- Hazelhatch & Celbridge.
- Drogheda.
- Greystones.

The DART+ Programme is a key transportation improvement to form a high quality and integrated public transport system. It will have benefits for the residents of the Greater Dublin Area and also those living in the other regions. It will assist in providing a sustainable transport system and a societal benefit for current and future generations.

Since 2008 several reports have been prepared documenting considerations in respect of the appropriate site for a proposed depot to support railway electrification and increased rolling stock for increasing passenger capacity. The most recent report: *Centre of Excellence: DART Expansion - Maintenance Depot, Site Location Assessment*', July 2019 presents a consideration of earlier studies and documents a multi-criteria analysis of options based on the principals of the Department of Transport: Common Appraisal Framework. It proposes an emerging preferred option for the DART+ Programme in respect of the location of the depot.

As part of the DART+ Programme it is necessary to confirm the preferred option for the site prior to confirming the preliminary design to be progressed to railway order. This report has been prepared to review the selection and to take account of additional information which has become available as part of design development of the project.

1.2 Depot Site Selection

The Site 'Location Assessment Report', dated 2019, documents an extensive study to recommend the most suitable location on the Iarnród Éireann railway network for the proposed Electric Multiple Unit (EMU) depot. It considered the plots of land and facilities that could be suitable to contain the depot, the considered sites were:

- Fairview depot.
- Connolly Station.
- Heuston Station.
- Pearse Station.
- North Wall Railway Yard.
- East Wall Railway Yard.
- Inchicore Railway Works.
- Drogheda Station / depot.
- Maynooth Station.
- M3 Parkway Station.
- Hazelhatch Station.
- Greystones Station.
- Bray Station.

The location assessment contains two stages:

- The first stage of preliminary appraisal for the 13 alternative locations was based on the capacity of the area to hold the depot.
- The second stage of mca for the chosen options considered criteria such as access, operation, availability of the land, neighbouring environment, and the impact on the DART+.

Stage 1 included a sifting exercise to remove any options which are obviously unsuitable due to macro scale issues as follows:

A. Is the site equal to or greater than 20 hectares.
B. Is there 1,800m linear length directly adjacent to the operational railway.
C. Is it practical to develop a Maintenance Depot at the exact strategic node?
D. Is it practical to develop a Maintenance Depot lineside in the wider environs of the strategic node?
E. Are there fundamental issues with the specific strategic node that deem it unfeasible to continue in the assessment?

9 of the options were set aside following this initial review with four locations identified for further investigation in the second stage of the process. They are Drogheda Environs, Maynooth Environs, M3 Parkway Environs, and Hazelhatch Environs. Aerial views of potential sites at each of the four locations are illustrated below.

Option 1 Drogheda Environs

This option is approximately 50 km north of Connolly and is split into Drogheda South and Drogheda North.

Figure 1-1 Option 1. EMU Depot Location Assessment 2019

Option 2 Maynooth Environs

This option is approximately 25 km west of Connolly and is split into Maynooth East and Maynooth West.

Figure 1-2 Option 2. EMU Depot Location Assessment 2019

Option 3 M3 Parkway Environs

This option is approximately 18 km west of Connolly and is split into M3 Parkway South and M3 Parkway North.

Figure 1-3 Option 3. EMU Depot Location Assessment 2019

Option 4 Hazelhatch Environs

This option is approximately 16 km west of Heuston Station and is split into Hazelhatch East and Hazelhatch West.

Figure 1-4 Option 4. EMU Depot Location Assessment 2019

The assessment concluded Maynooth Environs, and specifically Maynooth West as the preferred location for the depot. The outcome of the mca process is presented in summary below with a focus on the principal parameters which affected the selection. The following is a summary of the Site Appraisal carried out as per Section 10 of 'Centre of Excellence: DART Expansion - Maintenance Depot, Site Location Assessment'. Table 1-1 has been formatted to align to with the project wide MCA's.

Table 1-1 Aggregated Summary of Site Appraisal 2019

2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
	Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Minimised empty running								
Maximise track access								
Complexity of access & egress								
Availability of suitable lands								
Adjacent environment								
Road vehicle access								
Transport & Land Use Compliance								
Short term impact on DART+								

The results of the study concluded that the emerging preferred location is Option 2 Maynooth West. Tables 1-2 and 1-3 present the outcome of the mca process aligned with the published CAF parameters as implemented on DART+ West. In the tables the detailed assessments are aggregated to the summary table for each CAF parameter.

Table 1-2 Comparative DART+ West: mca

	2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy	Minimised empty running								
	Maximise track access								
	Complexity of access and egress								
	Road vehicle access								
Integration	Short term impact on DART+								
	Transport and Land-Use Compliance								
	Availability of suitable lands								
Environment	Adjacent environment								
Accessibility & Social Inclusion									
Safety									
Physical Activity									

Table 1-3 Aggregated Summary of Site Appraisal – DART+ West

	2019 Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy									
Integration									
Environment									
Accessibility & Social Inclusion									
Safety									
Physical Activity									

2. STAGE 3 FLOOD RISK ASSESSMENT OF THE EMERGING PREFERRED SITE

2.1 Flood Risk Assessment

Flood Risk Assessment has been prepared in accordance with 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' herein referred to as 'The Guidelines' as published by the Office of Public Works (OPW) and Department of Environment, Heritage and Local Government (DoHLG) in 2009.

A staged approach is adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the site specific level. The stages of appraisal and assessment are:

- Stage 1 Flood risk identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;
- Stage 2 Initial flood risk assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped and;
- Stage 3 Detailed flood risk assessment – Where the need for a stage 3 assessment is identified following completion of stages 1 and 2, a detailed model is prepared to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

2.2 Stage 3 Flood Risk Assessment

The emerging preferred site for the proposed depot is located west of Maynooth and is illustrated below in Figure 2-1 below.

Figure 2-1 Option 2. EMU Depot, Western Line – Location Feasibility Study

The matter of pre-existing fluvial flooding needs to be addressed immediately downstream of the depot site at Jackson's Bridge where the railway floods in extreme conditions. At this location the existing railway acts to curtail downstream flooding associated with the Lyreen river and it's tributary streams. The Lyreen river passes under the railway at this location by means of an inverted syphon, which acts as a significant constraint on flow. The condition is illustrated in OPW mapping included in Figure 2-2.

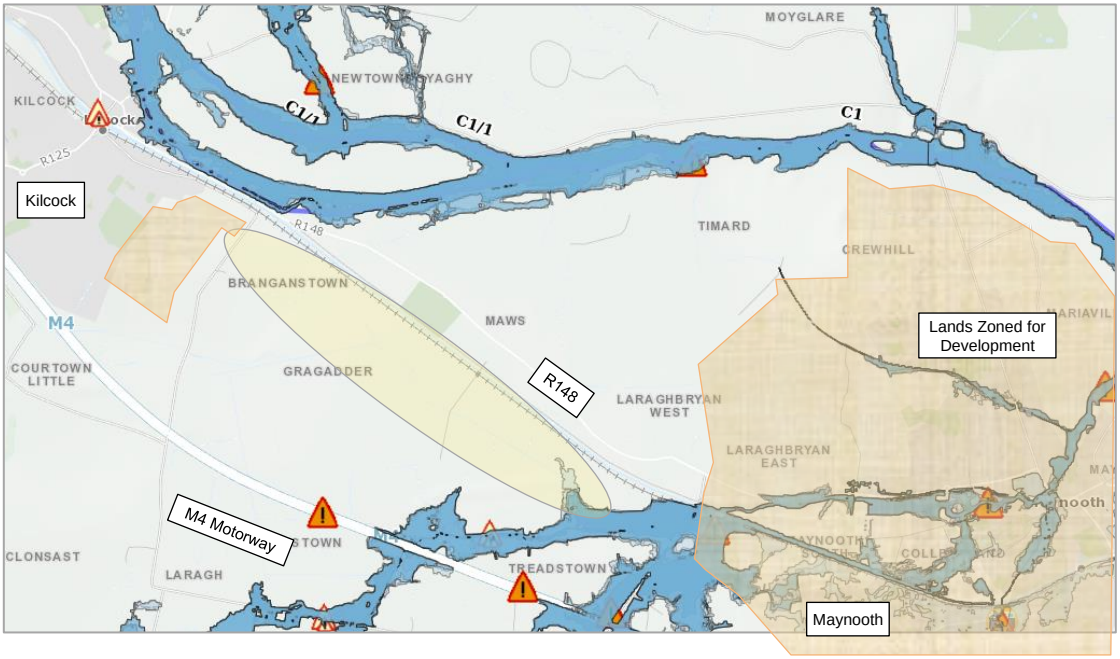

Figure 2-2 Option 2. OPW Flood Mapping

To fully characterise the flood risk it was necessary to complete a detailed, stage 3 flood risk assessment of the site including the proposed depot lands. This study facilitated the accurate prediction of the extent of fluvial flooding, and the associated levels. Given the critical importance of railway infrastructure a 1 in 1000 year return period was used in advancement of the assessment.

The outcome of the stage 3 flood risk assessment in the vicinity of Jackson's Bridge is illustrated graphically in Figure 2-3.

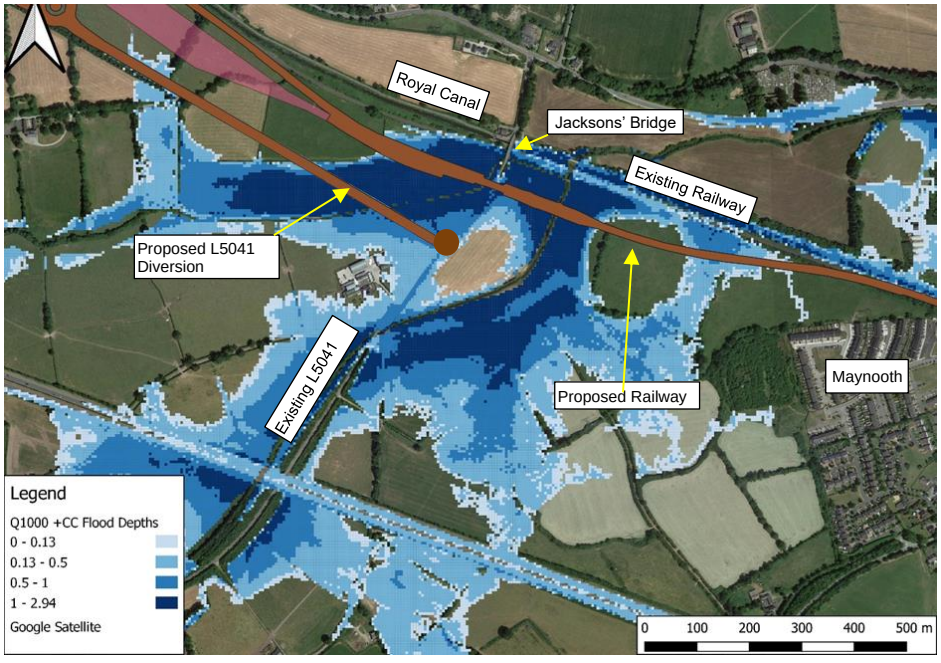

Figure 2-3 Stage 3 FRA Output: Jackson's Bridge

The colours on the graphic are graded to indicate the predicted depths of flooding as indicated on the legend. The study also identified the risk of fluvial flooding at the proposed depot site. This had not been anticipated as site selection stage. The predicted extent of flooding is illustrated in Figure 2-4.

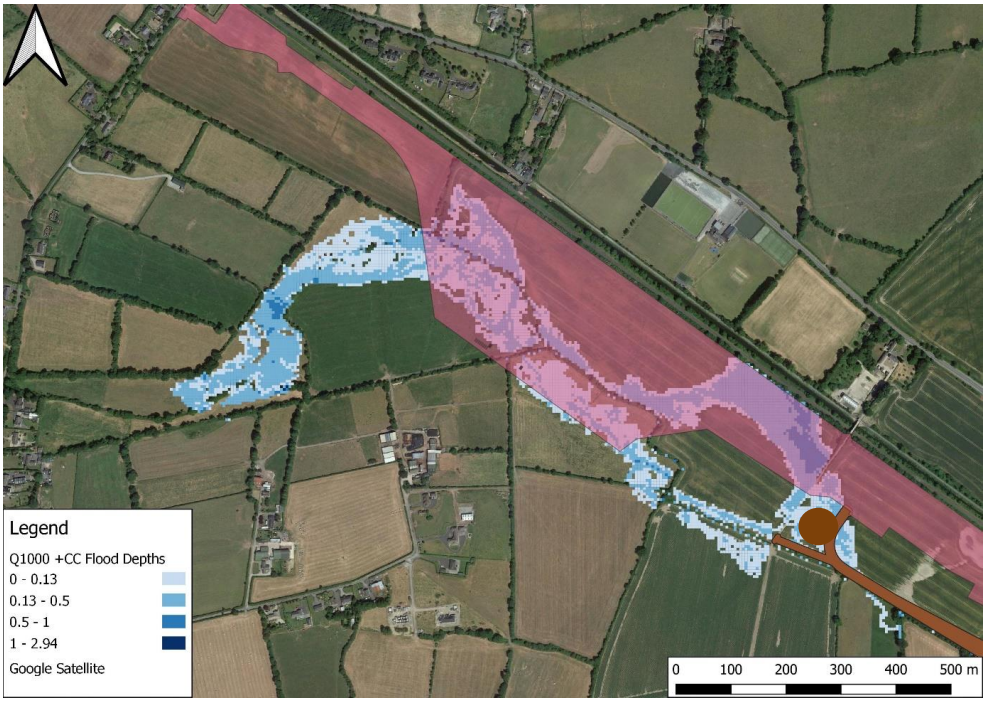

Figure 2-4 Stage 3 FRA Output: Preferred Depot Site

The mapping in Figures 2-3 and 2-4 includes the proposed works overlaid for illustrative purposes. From the mapping it is clear that the lands immediately south of Jackson's bridge are lower than those at the site at the proposed depot. The depths of predicted fluvial flooding are consequently shallower at the depot.

Where works are proposed in a flood plain, it is necessary to ensure that the proposed works do not result in additional flooding due to displacement of water under the footprint of the proposed works. Any displaced flood water must be accommodated by the provision of a corresponding quantity of compensatory storage. This is typically achieved by lowering the ground level of land immediately contiguous with the outfall watercourse so the contiguous land floods in a controlled way rather than cause uncontrolled flooding elsewhere.

From Figure 2-3 it is clear that the railway acts as a dam in respect of flooding protecting the lands to the north and east. It is not practicable to alter the existing railway embankment at this location to address flooding. Rather it is necessary to construct a new railway embankment offline to the south and to provide compensatory storage for floodwater displaced by the proposed works. These works will be necessary as part of the project to address this pre-existing flood condition, irrespective of the presence of the proposed depot south of the railway.

The detailed flood risk assessment examined the full extent of the site of Jackson's bridge and the proposed depot and confirmed that although the proposed site of the depot is higher than that at Jackson's Bridge some fluvial flooding is evident along the alignment of an historic watercourse. The watercourse passed under the footprint of the proposed depot at one time but, does not currently as it was realigned along the southern extremity of the site for agricultural purposes. The detailed flood assessment determined that as water levels rise during flood conditions, flood waters return to their original flow path.

The study identified the need for compensatory storage at the proposed location of the depot and the design of the depot was developed to take account of this. The depth of ground level reduction within compensatory storage areas associated with the depot are of the order of 600 mm. Refer to Sheets 29 and 30 of Annex 1.0 to OSR Volume 1 for the extent of proposed compensatory storage at the location of the site.

3. ENVIRONMENTAL SURVEYS OF THE PREFERRED DEPOT SITE

As part of the design development of the preferred depot site environmental surveys were carried out to confirm characterisation of the site and in preparation for environmental assessment. The outcome of the surveys is summarised below:

Land and Soils

A desktop study and intrusive investigations were carried out in the vicinity of the site to confirm the geotechnical character of the site. Although karst features were identified east of Maynooth, mudstones were confirmed at the site of the depot which are not subject to karstification. At the site of the depot the underlying rock was characterised as medium strong to strong thinly to thickly laminated dark grey fine grained interbedded argillaceous mudstone. The mudstone at the site was noted to be highly weathered.

The typical ground profile and type of soils encountered at the site are as follows:

- 0.3m to 1.0m of topsoil on;
- 1.0m to 9.8m of fine-grained glacial till on;
- 0.0m to 1.5m of coarse-grained glacial till.

No concerns were raised in respect of land and soils of the preferred depot site which would require the options selection process to be revisited in this regard.

Hydrogeology:

The Hydrogeological Assessment undertaken to inform the site characterisation concluded that the proposed development would result in imperceptible to slight impacts on the groundwater system immediately surrounding the proposed depot. It concluded the effects will be attenuated with distance from the depot.

No concerns were raised in respect of hydrogeology which would warrant reappraisal of the site selection.

Biodiversity

A wide range of biodiversity surveys have been carried out in the vicinity of the site. Characterisation included the following:

- Royal Canal pNHA.
- Mature treelines dominated by large oaks.
- Fields with improved agricultural grassland bounded by hedgerows and mature treelines.
- Otters.
- Badgers.
- Common frog and smooth newt.
- Compensatory storage areas which will have biodiversity function.

No issues arose in respect of biodiversity which would warrant revisiting the site selection.

Air Quality:

The baseline ambient air quality environment was characterised through a desk study of publicly available published data sources and site-specific baseline ambient monitoring surveys.

No issues arose in respect of air quality which would warrant revisiting the site selection.

Noise and Vibration

Baseline noise and vibration surveys to be conducted along the length of the study area to determine the existing noise and vibration environment at the most sensitive properties along the length of the site. Typically, the presence of sensitive receptors has a significant bearing on the perceived impact of change.

No issues arose in respect of noise and vibration which would warrant revisiting the site selection.

Landscape and Visual

The landscape was characterised as rural and lowland in character with predominantly arable uses which has led to an expansion of field sizes, however, some notable hedgerows with mature trees are still present.

The characterisation notes the fabric of mainline is contained largely within the existing operational MGWR line. The line is largely at-grade with surrounding areas and the alignment parallels the Royal Canal. Due to the proximity to the canal, road crossing across the line are provided by bridges which span both the line and the canal. The line generally runs close to the bank of the canal and screening from the canal / towpath is generally limited to some scrubby vegetation.

The site characterisation noted the following:

- Amenity Designations: Royal Canal is an Area of High Amenity, an NHA and Inland Waterway. Maynooth.
- Tree Preservation Order (TPO): None.
- Tree / Woodland Preservation Objectives: None.
- Protected Views: Protected views to and from all bridges on the Royal Canal.
- Protected Structures: Jackson's Bridge. – east of the site.
- Other: Notable hedgerows with mature trees.

No issues arose in respect of landscape and visual which would warrant revisiting the site selection.

Archaeology and Cultural Heritage

In addition to a desktop study and field inspections, archaeological investigation in the form of geophysical surveys was carried out at the site to characterise it in respect of archaeology and cultural heritage. Investigations were curtailed to portions of the site where access was available.

No issues arose in respect of archaeology and cultural heritage which would warrant revisiting the site selection.

Radiation and Stray Current

The baseline radiation and stray current environment was defined through a desktop study, consultation with stakeholders and field surveys. The baseline environment was then categorised standardised criteria. No potentially sensitive receptors were identified in domestic or commercial premises, in the vicinity of the site.

No issues arose in respect of radiation and stray current which would warrant revisiting the site selection.

4. FURTHER CONSIDERATION OF THE PREFERRED DEPOT SITE

Had it been clear at the site selection stage that Option 2 Maynooth West was at risk of fluvial flooding, the outcome of the environmental evaluation could have changed to pale brown: 'some disadvantage over other options'. Such a change would warrant re-examination of Maynooth West against Hazelhatch West as these are the only options emerging from the mca process with less than two classifications of some disadvantage under the CAF parameters.

Option 4 Hazelhatch West: This option is approximately 16km west of Heuston. The location and associated flood mapping are provided below.

Figure 4-1 Option 4. EMU Depot Location Assessment 2019

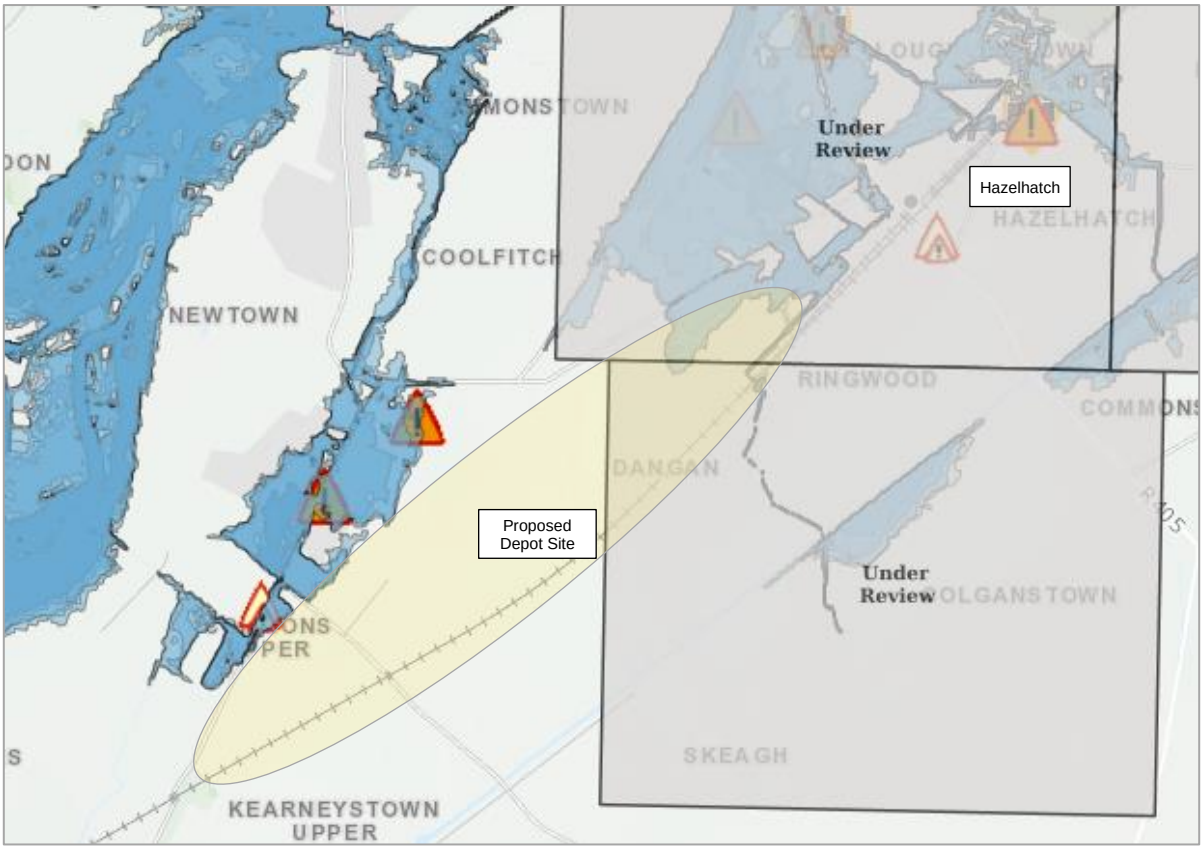

Figure 4-2 Option 4. OPW Flood Mapping

Examination of the OPW flood mapping for the proposed site at Hazelhatch West shows evidence of fluvial flood risk northeast of the site associated with the Shinkeen and Hazelhatch Rivers and to the northwest of the site associated with the River Liffey. Flood risk to the northeast of the site constrains the available railway frontage to approximately 1,700m. This is a significant constraint on the site in comparison to Option 2: Maynooth West. Maynooth West has 2,500 m railway frontage by comparison.

Further examination of publicly available information has identified streams at the southern extremity of the site, and a spring approximately halfway along the site, which, it appears have not been included in the CFRAMS study. This is illustrated in Figure 2-7 below which shows aerial photography of flooding at the Hazelhatch West site with the relevant streams and spring marked. Comparison of the Maynooth West Site and the Hazelhatch West site suggests they are equivalent from the perspective of flood risk.

Figure 4-7 Option 4. OPW Flood Mapping

The fluvial flood risk and zoning impact of each of the other options is presented below:

Figure 4-3 Option 1 Drogheda South and North: Flood Mapping & Impact on Zoned Lands

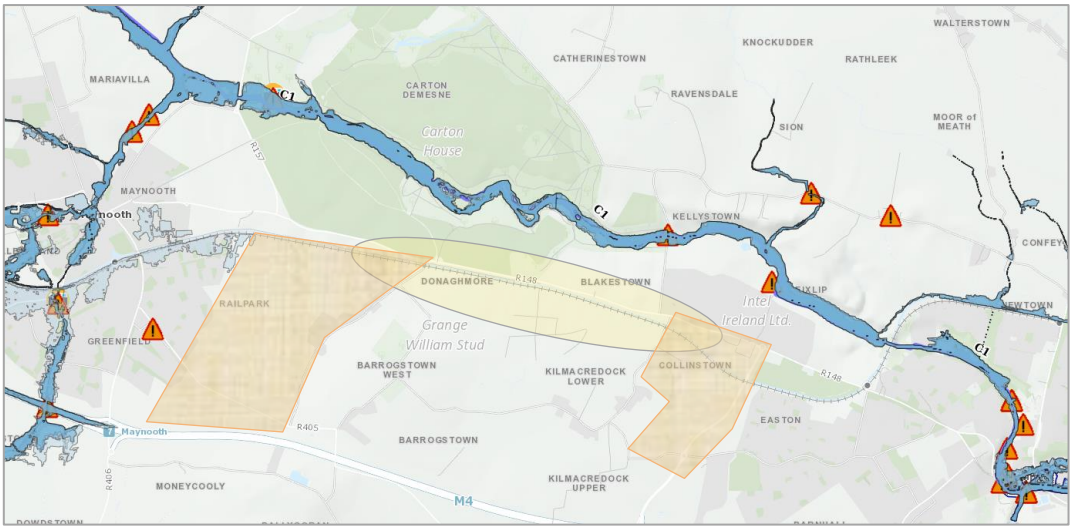

Figure 4-4 Option 2 Maynooth East. OPW Flood Mapping and Lands Zoned for Development

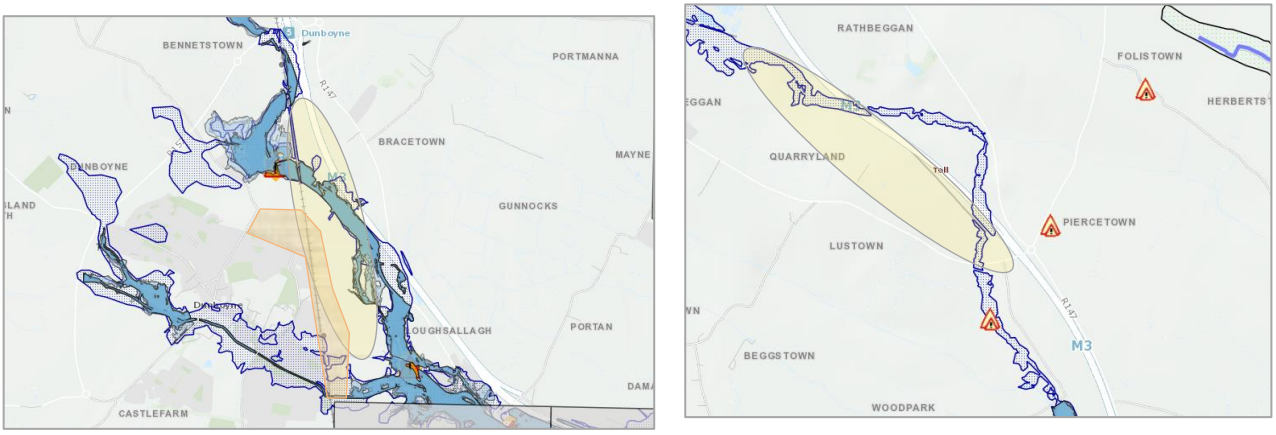

Figure 4-5 Option 3.M3 Parkway South and North : Flood Mapping & Impact on Zoned Lands

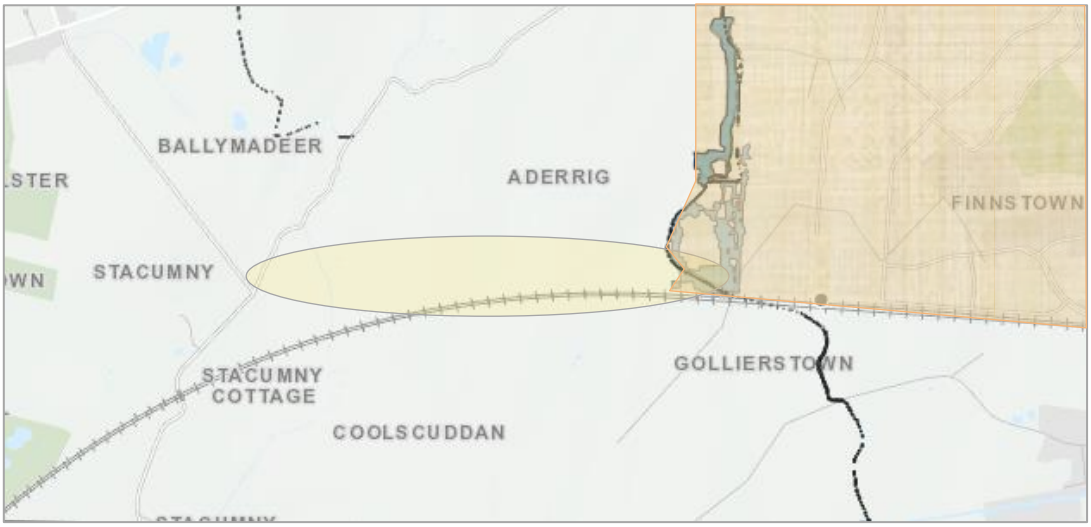

Figure 4-6 Option 4. OPW Flood Mapping & Impact on Zoned Lands

As part of DART+ West project the Integration and Environmental criteria of the multicriteria assessment were re-examined to account for information acquired during design development. The table below illustrates the comparative performance under each environmental parameter.

Table 4-1 Detailed Multi Criteria Analysis – DART+ West 2021

	Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy	Minimised empty running								
	Maximise track access								
	Complexity of access and egress								
	Road vehicle access								
Integration	Short term impact on DART+								
	Availability of suitable lands								
	Land Use Integration								
	Transport Integration								
	Geographical Integration								
	Other Government Policy Integration								
Environment	Noise & Vibration								
	Air Quality & Climate								
	Landscape and Visual								
	Biodiversity								
	Cultural, Archaeological and Architectural Heritage								
	Water Resources								
	Agricultural & Non Agricultural								
	Geology & Soils								
	Radiation & Stray Current								
Accessibility & Social Inclusion									
Safety									
Physical Activity									

The amended summary table is as follows:

Table 4-2 Amended Aggregated Summary of Site Appraisal – DART+ West 2021

	2021 Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Economy									
Integration									
Environment									
Accessibility & Social Inclusion									

	2021 Location Assessment	Option 1		Option 2		Option 3		Option 4	
		Drogheda South	Drogheda North	Maynooth East	Maynooth West	M3 Parkway South	M3 Parkway North	Hazelhatch East	Hazelhatch West
Safety									
Physical Activity									

Note: The table has been adjusted to ensure balanced comparison across options.

Changes arising in the mca are described below for each Option.

- Option 1 Drogheda South has some advantage over other options under environment as the risk of fluvial flooding on this site is lower than other options and there are no national monuments or protected structures on the site;
- Option 2 Maynooth East has some advantage over other options in respect of environment due to the low likelihood of flooding on the site and the curtailed development in the immediate vicinity of the site;
- Option 2 Maynooth West has some disadvantage over other options in respect of environment due to the risk of fluvial flooding on the site;
- Option 3 M3 Parkway South has been adjusted in respect of environment, amending significant disadvantage to some disadvantage to ensure balance across the mca table;
- Option 3 M3 Parkway North has significant advantage in respect of integration as it does not impact on zoned lands to the extent others do;
- Option 4 Hazelhatch East has some advantage in respect of environment due to the curtailed presence of houses in the immediate vicinity of the proposed site and due to the curtailed presence of national monuments and protected structures;
- Option 4 Hazelhatch West has some advantage in respect of Integration as it does not impact on lands zoned for development, and some disadvantage in respect of environment due to the risk of fluvial flooding on the site.

From examination of the updated table it is evident that Option 2, Maynooth West, performs better than other options considered across the spectrum of assessment criteria. Further comparison was made with Option 3 M3 Parkway North, and Option 4 Hazelhatch West, the best performing of the remaining options, to confirm the choice of Preferred Option for the site.

Table 4-3 presents differing characteristics between the options below.

Table 4-3 Salient Site Comparators; Maynooth West, M3 Parkway North and Hazelhatch West

Option 2 Maynooth West	Option 3 Parkway North	Option 4 Hazelhatch West
• The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. There is advantage to delivery of the DART+ West project first. A depot on the Maynooth line, consequently best suits the effective delivery of the proposed train service specification.	• The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. There is advantage to delivery of the DART+ West project first. A depot on the Maynooth line, consequently best suits the effective delivery of the proposed train service specification.	• The Kildare Line exhibits weaker passenger growth characteristics than the Maynooth Line and consequently Option 4 Hazelhatch West does not perform as well as Option 2 Maynooth West in this regard.
• Based on the current train service specification, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines.	• Based on the current train service specification, electrification of the Maynooth Line would displace 9 ICR/DMU trains which will be cascaded to other non-electrified lines.	• Based on the current train service specification, electrification of the Kildare Line would displace 4 ICR/DMU trains which will be cascaded to other non-electrified lines.

Option 2 Maynooth West	Option 3 Parkway North	Option 4 Hazelhatch West
• The railway fronting the site is straight on plan for a length of 2.5 km. The site configuration is better suited to installation of the depot with associated stabling than is Option 4 Hazelhatch West.	• The railway needs to be extended to accommodate the depot. The site is sufficiently flexible to accommodate the depot and associated stabling.	• The railway fronting the site is approximately 1.7 km long. The site configuration is less well suited to installation of the depot with associated stabling than is Option 2 Maynooth West.
• A depot west of Maynooth is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex.	• The potential depot is on a spur to the Maynooth Line and joins at an at-grade junction at Clonsilla. This will result in significant disadvantages in comparison to other options.	• A depot west of Hazelhatch is at the end of line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex.
• There is a risk of fluvial flooding on the site	• There is a risk of fluvial flooding on the site;	• There is a risk of fluvial flooding on the site;
• The R148 runs parallel to the railway, north of the proposed site and the M4 is located to the south of the site. The site is well located for staff access from Maynooth or Kilcock;	• The R154 runs adjacent to the proposed site, and access to the M3 is located to the south of the site. T he site is well located for staff access from Dunboyne	• Access to the site is more constrained than for the Maynooth West site, being located remote from both the M4 and the M7 motorways;
• There are no houses within the site of the proposed depot at Maynooth West.	• The presence of ribbon development along the adjacent R154 will constrain the layout of the proposed facility or some may need to be acquired.	• There are three houses within the site of the proposed depot at Hazelhatch West. These will constrain the layout of a proposed facility or some may need to be acquired.

Although all three sites exhibit a risk of fluvial flooding in the 1 in 1000 year event, Option 2 Maynooth West exhibits significant advantages over other sites in respect of layout, access for trains and facilitating passenger growth at the earliest practicable timeframe in respect of DART+ programme delivery.

5. CONCLUSION

The multi-criteria analysis process for site selection in respect of the proposed DART+ Programme depot has been re-examined following identification of the risk of fluvial flooding on the emerging preferred site and to take account of additional information secured as part of design development.

The preferred site for the depot is illustrated in Figure 5-1 below:

Figure 5-1 EMU Depot Site Preferred Option: Option 2 Maynooth West

Advantages associated with the proposed site are as follows:

- The site at the **western extremity of the proposed DART+ West project**, is a location well positioned to serve the whole of the proposed DART+ network.
- The site is located **west of the proposed DART+ West terminal station** on the Maynooth Line. Train movements between the depot and proposed railway network are best facilitated by a terminal configuration. A depot west of Maynooth is at the end of electrified line and will only interface with one train/hour passenger service. The access/egress from the operational line to the depot is not considered complex. This will result in significant advantages in comparison to other prospective sites.
- The railway alignment is **straight on plan for a length of 2.5 km** adjacent to the site. The **site is large enough to accommodate all the requirements of the depot**. The layout of the site has significant advantages over other prospective sites.
- The **land is generally flat** over the extent of the site. The site has an area of 83.1 acres.
- There is **no residential development on the site**. Other prospective sites have houses on them.
- The land of the site is **zoned for agricultural purposes**. Significant portions of other sites are zoned for development or as amenity space.
- The R148 runs parallel to the railway, north of the proposed site and the M4 is located to the south of the site. The **site is well located for staff access** from Maynooth or Kilcock.
- With a single centre of excellence maintenance depot, a number of trains at commencement and termination of daily passenger timetable will run empty between city centre and depot. By virtue of the distance, a depot in the Maynooth environs has some advantages over other prospective sites.
- **Maximising track access time for maintenance**: A site in the vicinity of Maynooth offers advantages over other prospective sites in this regard.
- The delivery of DART+ West exhibits the strongest passenger growth characteristics of projects on the DART+ Programme and consequently the best return for investment. **There is advantage to delivery of the DART+ West project first**. To provide the train services to DART+ West it is

necessary to construct a depot. A depot on the Maynooth line, consequently best suits the effective delivery of the proposed train service specification.

Disadvantages associated with the proposed depot site are as follows:

- There is a **single national monument** recorded on the proposed site. The presence of recorded monuments and protected structures is evident at other prospective sites also.
- **Farmlands on the site will see significant impact** consequent on the delivery of a depot on this site. Other prospective sites would exhibit similar impacts.
- There is evidence of **historical localised pluvial flooding** on the site. In addition, there is evidence of significant downstream pre-existing fluvial flooding associated with the Lyreen river and its tributary which flow into the Rye Carton SAC downstream. The presence of flooding issues is common along the railway as they have historically been constructed in low lying flat areas along rivers or canals. Many of the potential sites manifest this issue. A stage 3 flood risk assessment has confirmed the degree of flood risk and has identified the need for compensatory flood storage to be incorporated into the design.

Having completed a full multi-criteria analysis of the site options in accordance with the requirements of the Common Appraisal Framework, and having considered the principal advantages and disadvantages of the emerging preferred option for the depot site, it is concluded that Option 2 Maynooth West is the preferred site for the proposed depot.