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Water Supply Project

Eastern and Midlands Region

Preliminary Options Appraisal Report

Volume 4

Appendix F
Parteen Basin
Reservoir MCA

November 2015

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

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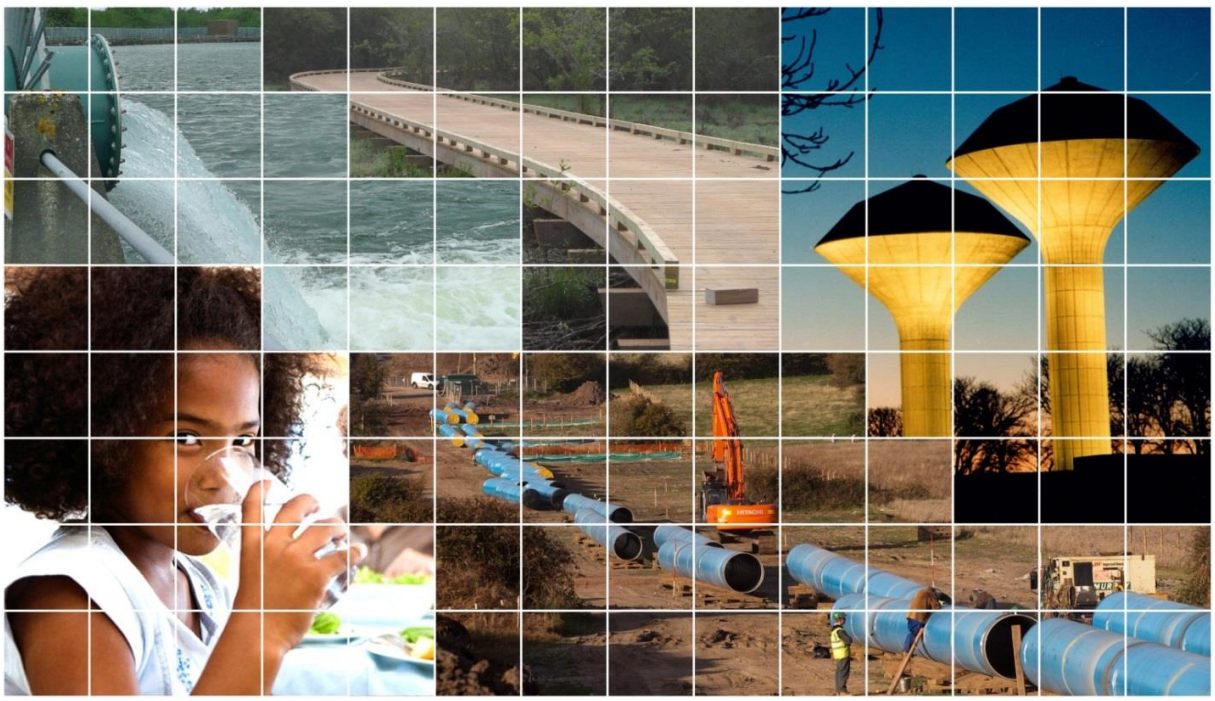


Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F14 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F14 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

1.1.1 Appraisal Process

With the specialists engaged, the following process was employed in the assessment of abstraction locations:

1. Individual Specialists were engaged to independently assess each location relative to the criteria applicable to their field of expertise, and establish an initial position on the least impact under each criterion listed in Table F14 - 1.
2. The initial position of each Specialist was collated and presented in matrix format. The specialists then convened at a workshop.
3. In this workshop setting, the matrix of initial individual assessments was presented to the Specialist Collective. The position of each of the Specialists was then discussed to reach a consensus of agreement on a least constrained location.

1.1.2 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.1.3 Five categories of impact

The relative analysis of potential locations to define a “least constrained” location is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

1.1.4 Water Supply Options Working Paper – Consultation Feedback

Submissions from the public consultation on the Water Supply Options Working Paper were received by the project team; refer to Section 4 of the Preliminary Options Appraisal Report.

Feedback from the consultation process was considered by the Specialists, primarily to establish if there was any impact as part of the individual assessments process, but also within the collective arrangements facilitated by the workshop setting.

2 Specialist Appraisals

2.1 Ancillary Infrastructure

The terminal point location and transmission pipeline route corridors were identified from the initial review of the SEA terminal locations (refer to appendix F13) and mapping of known constraints (refer to appendix F2).

2.2 Specialist Appraisal

Assessment of the abstraction locations by the Specialists relative to the appraisal criteria is presented as 12 separate assessments, namely.

Appendix F3 – Ecology (Terrestrial)

Appendix F4 – Ecology (Aquatic) & Fisheries

Appendix F5 – Surface Water Environment

Appendix F6 – Air

Appendix F7 – Noise

Appendix F8 – Cultural Heritage

Appendix F9 – Landscape and Visual

Appendix F10 – Agronomy

Appendix F11 – Soils, Geology and Hydrogeology

Appendix F12 – Planning

Appendix F13 – Engineering and Design

Appendix F14 – Traffic

Each assessment outlines the decision making process applied by each specialist in this comparative analysis.

2.3 Matrix of Multi-Criteria Analysis

The individual work of each specialist was amalgamated and presented to the Specialist Collective in a workshop environment.

The amalgamated assessment of each ancillary infrastructure element is presented overleaf.

3 Termination Point Reservoir

3.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

3.2 Matrix of Multi-Criteria Analysis

Ref.	Criteria	Location 1 - Peamount
1.0	**Environmental**	
1.1	**Biodiversity, Flora & Fauna**	**Low:** This location is not of significant ecological value.
1.1.1	Potential to impact on Natura 2000 Sites	**Very Low:** The proposed site is well removed from Natura 2000 sites and is not linked to any river SAC/ SPA sites.
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Very Low:** The proposed site is well removed from NHA and pNHA sites.
1.1.3	Potential impact Annex I listed habitats (designated)	**Very Low: None.** The site is not located in Annex 1 habitats within a designated site.
1.1.4	Potential impact Annex I listed habitats (non-designated)	**Very Low:** It is unlikely that non-designated Annex 1 habitats exist at this location.
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**Low:** Hedgerows at this location have local biodiversity value. The majority of land at this location is managed farmland and hedgerows. Hedgerows can be avoided or impact to them minimised.
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Low:** The managed nature of habitats at this location means the risk of protected flora being impacted is low.
1.1.7	Potential to impact on Annex II species	**Very Low:** The managed nature of habitats at this location means the risk of disturbing Annex II listed species is very low.
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Low:** The managed nature of habitats at this location means the risk of disturbing Annex IV listed species is low.
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Very Low:** The location is not important for wintering birds and other Annex 1 listed bird species.
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Low:** Hedgerows at this location have may be utilized by badgers and will be used by breeding birds.
1.1.11	Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***

Ref.	Criteria	Location 1 - Peamount
1.1.14	Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***
1.1.16	Potential to impact marine/coastal birds	**Very Low:** The location is not important for birds and other Annex I listed bird species.
1.1.17	Potential to impact marine mammals	***See Aquatic Ecological Assessment***
1.2	**Biodiversity, Flora & Fauna (Aquatic)**	
1.2.1	Potential to impact on Natura 2000 Sites	**Very low potential impact:** No Natura sites within the area.
1.2.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Very low potential impact:** No NHAs within the area.
1.2.3	Potential impact Annex I listed habitats (designated)	**Very low potential impact:** No Natura sites within the area.
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very low potential impact:** No non-designated aquatic Annex I habitats within the area.
1.2.5	Potential to impact high ecological value habitats (semi-natural habitats)	**Very low potential impact:** No high ecological aquatic habitats within the area.
1.2.6	Potential to impact on protected Flora - Flora Protection Order	**Very low potential impact:** No protected floral or faunal species within the area.
1.2.7	Potential to impact on Annex II species	**Very low potential impact:** No Annex II species within the area.
1.2.8	Potential to Impact on Annex IV species (wherever they occur)	**Very low potential impact:** No Annex IV species within the area.
1.2.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See Terrestrial section*
1.2.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See Terrestrial section*
1.2.11	Potential to impact on salmonid habitat - protected under SI Reg	**Very low potential impact:** No salmonid habitats within the area.
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	**No potential impact:** No Freshwater Pearl Mussels within the area.
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very low potential impact:** No high quality aquatic habitats for protected aquatic species within the area.
1.2.14	Potential to impact on coastal zone habitats (intertidal)	**No potential impact:** No marine habitats within the area.
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	**No potential impact:** No marine habitats within the area.
1.2.16	Potential to impact marine/coastal birds	**No potential impact:** No marine habitats within the area.
1.2.17	Potential to impact marine mammals	**No potential impact:** No marine habitats within the area.
1.3	**Fisheries**	

Ref.	Criteria	Location 1 - Peamount
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	**No potential impact:** No marine habitats within the area.
1.3.2	Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**No potential impact:** No marine habitats within the area.
1.4	**Water**	
1.4.1	Potential to support the objectives of the WFD water bodies . - Potential to impact on the water quality, hydromorphology of a WFD water bodies of "good" or higher status. - Potential to impact on a WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water - Potential to impact on a WFD Annex IV - Protected Areas: B) Areas designated to protect economically significant aquatic species - Potential to impact on a WFD Annex IV - Protected Areas: C) Recreational Waters - Potential to impact on a WFD Annex IV - Protected Areas: D) Nutrient Sensitive Areas - Potential to impact on a WFD Annex IV - Protected Areas: E) Areas designated for the protection of habitats or species (Ecology Scope)	Potential to impede the objectives of WFD is considered to be **low.**
1.5	**Air/Climatic Factors**	
	Air	
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	Predominantly rural area with few residential receptors but hospital is located in the area. Low impact from construction phase dust emissions
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	Very low impacts during operational phase, only operational impacts would be due to traffic generated from staff

Ref.	Criteria	Location 1 - Peamount
1.5.3	Proximity to EPA Waste Licensed facility	Some waste licence facilities located to the south of study area
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	Some IPPC licence facilities located to north east of study area
1.5.5	EPA Air Quality Zone Classification	Zone A
1.5.6	Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
1.5.7	Construction Phase Impact rating	Low impact from construction dust emissions
1.5.8	Operational Phase Impact rating	Very low impact due to additional traffic (likely to be minimal) generated by development
	Noise	
1.5.9	Potential for Construction phase noise impact at Sensitive receptors	The area is predominantly rural with low density residential development. The area also contains a hospital which is classified as a sensitive receptor and a golf course. With consideration of standard good practice measures for the control of noise during construction, there will likely be a **low impact** on these receptors during the construction phase of the proposed terminal reservoir.
1.5.10	Potential for Operational phase noise impact at Sensitive receptors	Operational traffic is likely to have small noise impact and there may be some fixed mechanical plant / pumps which will generate noise. At the detailed design stage noise from fixed plant will be considered and standard noise mitigation measures will be provided to minimise impacts. Considering that the proposed development will lead to a minimal increase in AADT on the surrounding road network, there will be a very **low noise impact** due to traffic.
1.5.11	Existing Ambient Noise Climate in the Area (significant noise sources)	Existing ambient noise climate likely to be reasonably **low**. Nearby noise sources are likely to consist of local and distant traffic from regional / national roads, noise from the nearby Casement Aerodrome and other anthropogenic sources
1.5.12	Construction Phase Impact rating	**Low** noise impact expected during construction phase
1.5.13	Operational Phase Impact rating	**Very low** noise impact expected during operational phase
1.6	**Material Assets (Energy)**	
1.6.1	Potential for energy recovery	***N/A***
1.7	**Cultural Heritage (including Architecture & Archaeology)**	
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	**Very low** as only one RMP recorded in the study area

Ref.	Criteria	Location 1 - Peamount
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	**Low** as the 8 structures are mostly clustered around the existing hospital complex with remainder on the periphery of the study area
1.7.4	Potential to impact (direct/indirect) on NIAH	**Low** as the 16 structures are mostly clustered around the existing hospital complex with remainder on the periphery of the study area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as the two designed landscapes that were present within the landscape have already been subject to impacts from other developments
1.7.6	Potential to impact on ACA	**Very low** as none are present
1.7.7	Recorded shipwreck sites/underwater archaeology	N/A
1.8	**Landscape & Visual**	
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Very Low** - General rural land use zoning
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Very Low** - no distinctive landscape elements identified
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Large fields defined by hedgerows
1.8.4	Potential to impact on woodlands and significant tree groups	**Very Low** – Canal-side vegetation the most notable vegetation pattern
1.8.5	Potential to impact on historic designed landscapes	**Very Low** - Does not appear to be any designed landscapes in this area
1.8.6	Potential to alter the prevailing landscape character	**Low** - Although predominantly rural this is a transition urban fringe area. CDP polies promote rural landuse and enhancement
1.8.7	Potential to impact on designated scenic routes / views	**Very Low** - Some distant views from designations in Dublin Mountains
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Mid-range** - Grand canal adjacent to the north
1.8.9	Potential to impact on views from settlements	**Mid-range** - Rural fringe of Dublin City
1.8.10	Potential to impact on views from dwellings / local roads	**Low** - Sparsely populated rural area despite proximity to western suburbs of Dublin
1.8.11	Potential to impact on views from motorways	**Very Low** - None in the vicinity
1.8.12	Potential to impact on views from other major roads (national or regional roads)	**Mid-range** - R120 adjacent to the SE
1.8.13	Potential to impact on views from rail lines	**Low** - National rail line to Limerick passes <1km to the N and W

Ref.	Criteria	Location 1 - Peamount
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Low** - Casement Aerodrome c. 1.5km SE but not a tourist airport
1.8.15	Potential to impact on views from national 'way marked' walking routes	**Mid-range** - Grand Canal Way
1.8.16	Potential to impact on local walks	**Mid-range** - Grand Canal utilised as a local walking amenity
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Fishing and swimming not particularly popular along this section of Grand Canal but it is utilised by barges
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - Screen planting can be assimilated into prevailing vegetation patterns and built development
1.9	**Material Assets (Agronomy)**	
1.9.1	Approximate % Reduction in overall farm holding	Unknown until precise location is chosen
1.9.2	Farming Enterprise	Predominantly grass and tillage
1.9.3	Number of landowners impacted within site boundary	3-5 Landowners
1.9.4	Land Quality	Very good land quality
1.9.5	Severance based on site location within overall land holdings	Unknown until precise location is established
1.9.6	Potential Impacts on landholdings	Land loss and potential construction disturbance.
1.9.7	Crop rotation practiced	Grass based and tillage.
1.9.8	Overall Impact	Low at national level, potentially high at individual farm level.
1.13	**Soils, Geology and Hydrogeology**	
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Low Potential:** LI - low potential impact, moderately productive
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Mid-range Potential:** Extreme vulnerability (with some rock at surface)
1.13.3	GSI Groundwater Protection Response matrix	**Very low Potential**: No data available for this area
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Very low Potential**: No features identified in this area
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Very low Potential**: None within the vicinity of Peamount
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**No potential impact** identified as no Irish Geological Heritages sites are recorded in this area
1.13.7	Potential to interact with contaminated land	**Very low Potential**: Land is primarily managed grassland

Ref.	Criteria	Location 1 - Peamount
1.13.8	Potential to sterilise mineral resource	**Very low Potential:** No mines/quarries identified
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Mid-range Potential:** areas where rock is at surface or near surface
1.13.10	Potential impact on karst features	**Very low Potential**: No karst features identified in this area
1.13.11	Potential to encounter soft ground	**No potential Impact:** No peat or wetland areas recorded in this area
1.13.12	Soils Types	**Very low Potential** for negative impact as no peat/bog identified in this area
1.13.13	Sub Soil Types	**Very low Potential** for negative impact as no peat/bog identified in this area (Till)
1.13.14	Depth to rock	**Mid-range Potential**: <3m. Potential for direct impact on bedrock during construction, with potential for impact on the underlying groundwater aquifer
2.0	**Technical**	
2.1	**Planning Policy**	Need to carefully site TPR within overall location.
2.1.1	Existing Land Use on Site	Hospital/Agriculture/Existing reservoir
2.1.2	Site Zoning	Peamount Hospital & local policy objective Obj03: To provide for distribution, warehouse and industry; and objective OBJ02: To facilitate opportunities for manufacturing, R&D etc.
2.1.3	Airport Public Safety and Noise Zones	Casement/Baldonnel Airport: Noise boundary; Dept. of defence inner zone.
2.1.4	Local Objectives on Site	There are road proposals; many Protected Structures; Local objectives on the site - TA - To provide for Traveller Accommodation; proposals for an Amenity Layby; Zoning Obj: LZ03; Local Objective LO 33 –for a regional park, LO34 To facilitate the development of Peamount as a centre of excellence , LO35 -Enterprise lands – subject to a Framework Plan
2.1.5	Other Local Objectives on Site	Peamount Hospital development
2.1.6	Land Uses present within 1km of Land Parcel Boundary	Baldonnel/Casement Airport; Newcastle village (1.5km); Adamstown SDZ (1km)
2.1.7	Zoning present within 1km of Land Parcel Boundary	Industry
2.1.8	Airport Public Safety and Noise Zones in the vicinity	Baldonnel inner zone
2.1.9	Local Objectives within 1km of Land Parcel Boundary	Baldonnel Airport

Ref.	Criteria	Location 1 - Peamount
2.1.10	Other Local Objectives present within 1km of Land Parcel Boundary	LZ08:Within the industrial zoned lands at Greenogue, Newcastle, designated as Zoning Objective 'EP3' on Development Plan Maps, the use classes Office-Based Industry and Offices shall not be permitted as stand alone developments independent of industrial/warehousing type uses
2.2	**Traffic**	
2.2.2	Number of crossings required for access road	Assuming access is available from the R120, there will be no road crossings.
2.2.3	Number of crossings of Motorways	None
2.2.4	Number of crossings of National Roads	None
2.2.5	Number of crossings of Regional Roads	Assuming the Peamount Terminal Reservoir site is to the north of the R120, no regional road crossings will be required for the terminal.
2.2.6	Number of crossings of Local Roads	None
2.2.7	Number of Railway Crossings	None
2.3	**Capital and Operational Costs**	
2.3.1	CAPEX	Contained with option costs provided
2.3.2	OPEX	Contained with option costs provided
2.4	**Sustainability**	
2.4.1	Carbon Footprint	Emerging Preferred Option is not sufficiently defined to support a calcualtion of embodied or operation carbon at this stage. However, option defintion, as part of the next stage of the options assessment, will include an assessment of carbon to ensure full consideration within the MCA process.

4 Transmission Pipeline Route Corridors

4.1 Corridor Options

An assessment of the potential route corridors was carried out for Option C (Parteen Basin Reservoir Direct).

4.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F5 – 2.

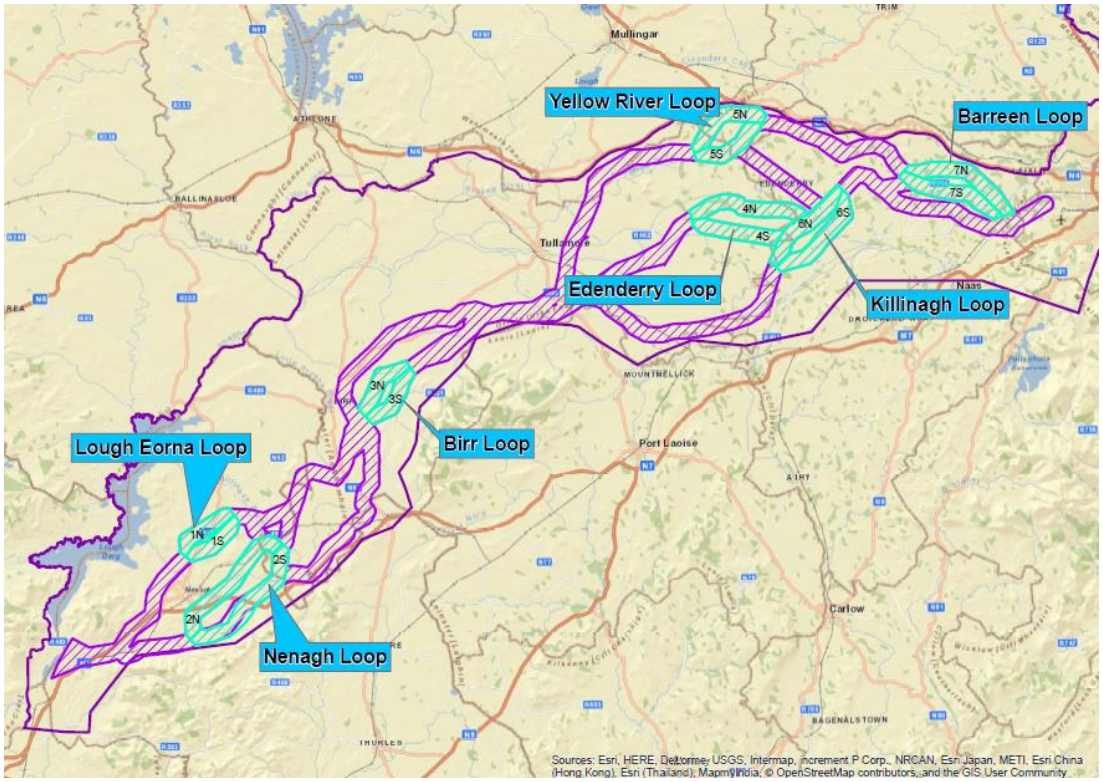


Figure F5 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4.3 Matrix of Multi-Criteria Analysis (Loops)

Ref.	Criteria	Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
		North	South	North	South	North	South	North	South	North	South	North	South	North	South
1.0	Environmental														
1.1	Biodiversity, Flora & Fauna	**Mid-range impacts**: Lough Eorna Ardcrony Turlough	**Mid-range impacts:** turlough / bird site at Coolderry/Ballylusky, Bog woodland and semi natural woodland	**Mid-range impacts:** fen (south), woodland riparian, scrub, forestry (3 areas)	**Low impacts:** Discrete degraded bog – (north), semi natural woodland (north)	**Low impacts:** Discrete areas bog woodland/ cutover bog Rapemills and Camcor rivers require crossing	**Low impacts:** Camcor River requires two crossings	**High impacts:** Partially includes Long Derries SAC & Grand Canal pNHA Extensive cutover bog and developing and fringing semi natural habitats One extensive block remnant raised bog	**Mid-range impacts:** Extensive cutover bog and developing and fringing semi natural habitats	**Low impact:** Discrete cutover bog, fringing semi natural habitats	**Low impact:** Hedgerows	**Mid-range impacts**: Remnant raised bog, Extensive cutover bog and developing and fringing semi natural habitats	**High impacts:** Remnant raised bog. Extensive cutover bog and developing and fringing semi natural habitats	**Mid-range impacts**: River Liffey	**Mid-range impacts**: River Liffey
1.2	Biodiversity, Flora & Fauna (Aquatic)	**Very Low:** No Natura sites present. Only one river crossing at Ballyfinboy River	**Very Low:** No major aquatic habitats present.	**Low:** Nenagh, Ballintotty and Ollatrim Rivers are known salmonid fisheries. Nenagh River flows into L. Derg parts of which are Natura sites.	**Low:** Nenagh, Ballintotty and Ollatrim Rivers are known salmonid fisheries. Nenagh River flows into L. Derg parts of which are Natura sites.	**Low:** Little Brosna and the Rapemills River are known salmonid fisheries.	**Low:** Little Brosna and small tributaries of the Rapemills River are known salmonid fisheries	**Low:** Philips town River supports populations of Brown Trout.	**Low:** Figile, Philips town, Slate, and Black Rivers support populations of Brown Trout.	**Mid-range:** Boyne River is an SAC and an important salmonid habitat/ fishery.	**Mid-range:** Boyne River is an SAC and an important salmonid habitat/ fishery.	**Low:** Slate River is a known Brown Trout fishery.	**Low:** Slate River is a known Brown Trout fishery.	**Low:** River Lyreen is a known Brown Trout fishery	**Low:** River Lyreen is a known Brown Trout fishery
1.3	Fisheries	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*	*No issues of significance for Aquafact. Note surface water features*
1.4	Water – WFD	**Mid-range**	**Low**	**Mid-range**	**Low**	**Low**	**Mid-range**	**Low**	**Mid-range**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	Water – Watercourse crossings	**Low**	**Low**	**Low**	**Low**	**Low**	**Mid-range**	**Low**	**Mid-range**	**Low**	**Mid-range**	**Mid-range**	**Low**	**Mid-range**	**Low**

Ref.	Criteria	Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
		North	South	North	South	North	South	North	South	North	South	North	South	North	South
1.5	Air/Climatic Factors														
	Air	Low	Very low	Low	Very low	Very low	Very low	Low	Very low	Very low	Very low	Very low	Low	Very low	Low
	Noise	Low	Very low	Low	Very low	Very low	Very low	Low	Very low	Very low	Very low	Very low	Low	Very low	Low
1.7	Cultural Heritage (including Architecture & Archaeology)	Mid-range	Low	Mid-range	Mid-range	Mid-range	Low	Mid-range	High	Mid-range	Low	High	High	Mid-range	Mid-range
1.8	Landscape & Visual	**South:** Marginal preference due to lower impacts on Ashley Park demesne		**South:** Preferred due to lower impacts on R491 scenic route, national railway line and riparian woodlands on Nenagh River		**No Preference**		**South:** Preferred due to lower potential for impacts on Grand Canal Way and Esker landscape features		**North:** Marginal preference due to more robust landscape character imparted by cement works and lower impact on Castlejordan		**North:** Slight preference due to lower impact on Lullymore Heritage Park and a Kildare CC designated scenic view on R414		**North:** Preferred due to potential impacts on Donadea Wood, Rathcoffey and Barberstown Castle on Southern loop	
1.9	Material Assets (Agronomy)	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low	Long term impacts predicted to be low
1.10	Soils, Geology and Hydrogeology	**Mid-range:** No IGH Sites. Rock at surface in NE corner. Regionally important karstified aquifer in NE area, Karst features recorded.	**Low:** No IGH Sites. Rock at surface in SW and NE areas. Larger areas of more vulnerable GW (High) than 1N. Areas of cutover bog. No karst features.	**Low:** No IGH Sites, cutover bog in NE corner, Ll aquifer. Small areas of rock at surface. GW body karstic (gravels)	**Low:** No IGH Sites. Larger area of High vulnerability than 2N. Ll and Poor aquifer. Areas of rock at surface. GW body karstic (gravels), Closer to SPZ than 2N.	**Mid-range:** No IGH Sites, equal area of High vulnerability to 3S, regionally important aquifer to NE, more cutover bog than 3S, No SPZ.	**Low:** No IGH Sites. Equal area of High vulnerability to 3N. Less cutover bog than 3N. No SPZ. Rock at surface in NE.	**Low:** No IGH Sites, a lot of cutover bog (less than 4S), Ll/Lm	**Mid-range:** One IGH Site (CGS): "Esker Bridge". A lot of cutover bog (more than 4N). Ll/Lm.	**Mid-range:** No IGH Sites. Equally high Vulnerability as 5S. More areas of cutover bog and more areas of extreme vulnerability.	**Low:** No IGH Sites. Equally high Vulnerability as 5N. Small areas of cutover bog and small areas of extreme vulnerability	**Mid-range:** No IGH Sites. A lot of cutover bog. Areas of high vulnerability. Regionally Important Aquifer (karstified) in more areas than 6S.	**Mid-range:** No IGH Sites. A lot of cutover bog (more than 6N). Areas of Regionally Important Aquifer (karstified) less areas than 6N.	**Mid-range:** No IGH Sites. Equal areas of rock and Extreme vulnerability as 7S. More areas of High vulnerability than 7S.	**Mid-range:** 2 CGS Sites: Liffey Oxbow Lake and St. Patrick's Well. Small areas of cutover bog and equal areas of rock at surface and Extreme vulnerability as 7N.
2.0	Technical														

Ref.	Criteria	Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
		North	South	North	South	North	South	North	South	North	South	North	South	North	South
2.1	Planning Policy	Northern branch suitable to serve Borrisokane		Northern branch suitable to serve Nenagh		Northern branch suitable to serve Birr		Northern branch suitable to serve Edenderry		Northern branch suitable to serve Kinnegad		Northern branch suitable to serve Edenderry		Northern branch suitable to serve Maynooth and Leixlip	
2.2	Engineering and Design	Very low	**Low:** Poorer access and ground conditions	Very low	**Mid-range:** Significant elevation challenges	**Low:** Poorer ground conditions and elevation profile	Very low	**Low:** Elevation challenges	**Mid-range:** Poorer ground conditions	**Low:** Poorer ground conditions	Very low	Very low	**Low:** Poorer ground conditions	**Low:** Elevation challenges	Very low
2.3	Traffic	**Low Impact:** Crosses N52 Crosses up to 7 local roads	**Low Impact:** Crosses N52 Crosses 4 local Roads	**Mid-range Impact:** Crosses M7 - more potential to cross under motorway via existing bridge underpasses. Potential to Cross Limerick-Dublink Railway Line Crosses up to 3 Regional Roads Crosses up to 14 Local Roads	**Mid-range Impact:** Crosses M7 Crosses up to 3 Regional Roads Crosses up to 14 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 8 Local Roads	**Low Impact:** Crosses up to 3 Regional Roads Crosses up to 5 Local Roads	**Low Impact:** Crosses 2 Regional Road Crosses up to 9 Local Roads	**Low Impact:** Crosses up to 2 Regional Road Crosses up to 4 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 7 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 7 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 4 Local Roads	**Low Impact:** Crosses up to 3 Regional Roads Crosses up to 2 Local Roads	**Low Impact:** Crosses up to 4 Regional Roads Crosses up to 9 Local Roads	**Low Impact:** Crosses up to 4 Regional Roads Crosses up to 10 Local Roads

4.4 Least constrained Loop Branch

The MCA process concluded the following:

Lough Eorna Loop
The northern branch was least constrained.

Nenagh Loop
The northern branch was least constrained.

Birr Loop
The southern branch was least constrained.

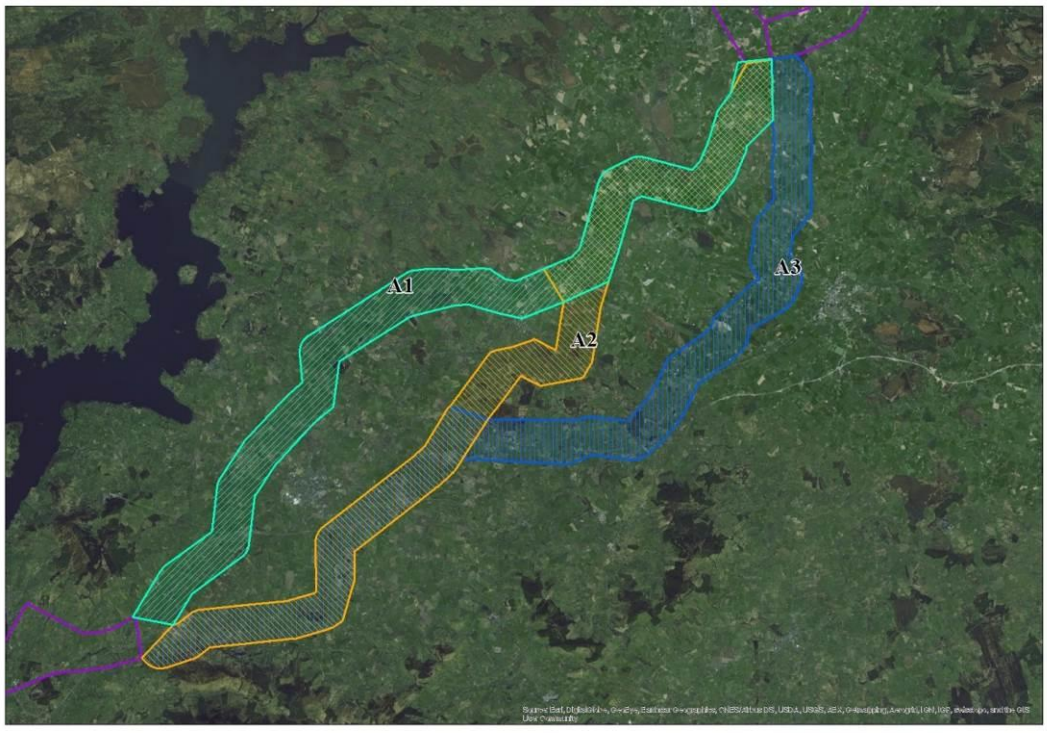
Edenderry Loop
The southern branch was least constrained.

Yellow River Loop
The southern branch was least constrained.

Killinagh Loop
The soutern branch was least constrained.

Barreen Loop
The northern branch was least constrained.

4.5 Matrix of Multi-Criteria Analysis (Route Corridor AB)



Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
1.0	**Environmental**			
1.1	**Biodiversity, Flora & Fauna**	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats.	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats at greater risk than A1.	**High Impact:** Lisduff fen SAC pNHA sites River Brosna and Nenagh River crossings Peatland habitats.
1.1.1	Potential to impact on Natura 2000 Sites	**Mid-range Impact:** Lisduff fen SAC < 2km Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.	**Mid-range Impact:** Lisduff fen SAC < 2km Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.	**High Impact:** Lisduff Fen SAC (sensitive groundwater fed) within corridor, Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Mid-range Impact:** Willsbrook Esker pNHA (effectively avoided), Edge Cangort Bog NHA	**Mid-range Impact:** Edge Cangort Bog NHA	**High Impact:** Mount st Joseph pNHA woodland strip > half corridor at Brosna River crossing, Drumakeenan, Eagle Hill and Perrys Mill (3 areas) within corridor
1.1.3	Potential impact Annex I listed habitats (designated)	**Mid-range Impact:** While well removed residual uncertainty regarding risk to habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC	**Mid-range Impact:** While well removed residual uncertainty regarding risk to habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC	**High Impact:** Potential to impact habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC
1.1.4	Potential impact Annex I listed habitats (non-designated)	**Mid-range Impact:** Annex 1 listed habitats potential at River Brosna callows, Ardcrony Turlough and Lough Eorna	**Mid-range Impact:** Annex 1 listed habitats potential at River Brosna callows	**High Impact:** Annex 1 listed habitats potential at River Brosna callows and at Eagle Hill
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**High Impact:** Rivers Brosna and callows unavoidable, Hedgerows, scrub, stream crossings, Nenagh River, 3 fragments degraded bog	**High Impact:** Rivers Brosna, Ollatrim, and Kilmastulla - unavoidable, Wetlands near Silvermines, Ballinaboy river, fen south Nenagh, Raised bog **and** semi natural woodland at Kyleashinnaun.	**High Impact:** Rivers Brosna, Ollatrim, and Kilmastulla unavoidable. Wetlands near Silvermines, Ballinaboy rivers, fen south Nenagh Raised bog and semi natural woodland at Kyleashinnaun.raised bog, extensive wetland west Dunkerrin, wetland north River brosna
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Mid-range Impact:** Potential at Little Brosna callows	**Mid-range Impact:** Potential at Little Brosna callows	**High Impact:** Potential at River Brosna area and at fen and calcareous grassland around Mount st Joseph pNHA
1.1.7	Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 47.4km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 49.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 52km crossed and associated access routes
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Mid-range Impact:** Ardcrony turlough and River Brosna callows	**Low impact:** River Brosna Callows	**Moderate/ Low impacts:** River Brosna Callows
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 47.4km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 49.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 52km crossed and associated access routes

Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
1.1.11	Potential to impact on salmonid habitat - protected under SI Reg	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats.	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats at greater risk than A1.	**High Impact:** Lisduff fen SAC pNHA sites River Brosna and Nenagh River crossings Peatland habitats.
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.14	Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.16	Potential to impact marine/coastal birds	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.17	Potential to impact marine mammals	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.2	**Biodiversity, Flora & Fauna (Aquatic)**			
1.2.1	Potential to impact on Natura 2000 Sites	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.
1.2.3	Potential impact Annex I listed habitats (designated)	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites	**Very Low:** Nenagh River and its tributaries are not within designated sites
1.2.5	Potential to impact on protected Flora - Flora Protection Order	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.
1.2.6	Potential to impact on Annex II species	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.
1.2.7	Potential to Impact on Annex IV species (wherever they occur)	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.
1.2.8	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
1.2.9	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
1.2.10	Potential to impact high ecological value habitats (semi-natural habitats)	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites.
1.2.11	Potential to impact on salmonid habitat - protected under SI Reg	**Low impact**: As the Nenagh River supports populations of salmonids, the impact is scored at low.	**Low impact**: As the Nenagh River supports populations of salmonids, the impact is scored at low.	**Low impact**: As the Nenagh and Little Brosna River support populations of salmonids, the impact is scored at low.
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	Freshwater Pearl Mussels are not present in the water courses. Impact score is nil.	Freshwater Pearl Mussels are not present in the water courses. Impact score is nil.	Freshwater Pearl Mussels are not present in the water courses Impact score is nil.
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is cored at very low.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is cored at very low.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is cored at very low.
1.2.14	Potential to impact on coastal zone habitats (intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.

Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
1.2.16	Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.17	Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3	**Fisheries**			
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3.2	Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Low impact**: Salmon pass through the system.	**Low impact**: Salmon pass through the system	**Low impact**: Salmon pass through the system
1.4	**Water**			
1.4.1	Significance of Impact - WFD	**Low**	**Mid-range**	**Mid-range**
1.4.2	Significance of Impact - Watercourse Crossings	**Low**	**Mid-range**	**High**
1.5	**Air/Climatic Factors**			
	Air			
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area, one pNHA (Lough Eorna), Cloughjordan Landfill also in area	Very low impact in construction phase due to low density residential receptors in area, Silvermines SAC and SPA in area, some small pits/quarries in area, no IPPC / Waste Licenced Facilities	Low impact in construction phase due to higher density residential receptors in area (Moneygall, Dunkerrin), large number of pNHA's, large pits/quarries in area, landfill and pig farm in area
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase
1.5.3	Proximity to EPA Waste Licensed facility	One Landfill in area	None	Landfill in the area
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area	No facilities present in study area	Pig Farm in the Area
1.5.5	EPA Air Quality Zone Classification	Zone D	Zone D	Zone D
1.5.6	Wind Rose Assessment	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind
1.5.7	Construction Phase Impact rating	Very low impact from construction dust emissions	Very low impact from construction dust emissions	Low impact from construction dust emissions
	Noise			
1.5.9	Potential for Construction phase noise impact at Sensitive receptors	Low density residential. Noise impact transient & manageable	Low density residential. Noise impact transient & manageable	Appears slightly closer to more densely populated residential area
1.5.10	Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
1.5.11	Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
1.5.12	Construction Phase Impact rating	Low density residential. Noise impact transient & manageable	Low density residential. Noise impact transient & manageable	Appears slightly closer to more densely populated residential area
1.5.13	Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase
1.6	**Material Assets (Energy)**			
1.6.1	Potential for energy recovery	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor
1.7	**Cultural Heritage (including Architecture & Archaeology)**			

Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as only two are recorded within the corridor, which covers a large area	**Very low** as none are present	**Very low** as none are present
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	**Mid-range** as a large amount of sites (193) are recorded within the corridor although the areas itself is large	**Low** as although there are a large amount of sites (112) recorded within the corridor the area itself is relatively large	**Mid-range** as a large amount of sites (146) are recorded within the corridor although the areas itself is large
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (38). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (38). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (54). This is low relative to the size of the area
1.7.4	Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (18). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (27). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (44). This is low relative to the size of the area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	**High** due to multiple landscapes (43), some of which survive as open spaces or in association with protected structures	**High** due to multiple landscapes (36), some of which survive as open spaces or in association with protected structures	**High** due to multiple landscapes (48), some of which survive as open spaces or in association with protected structures
1.7.6	Potential to impact on ACA	**Very low** as none are present	**Very low** as none are present	**Very low** as none are present
1.7.7	Recorded shipwreck sites/underwater archaeology	**Very low** as none are present	**Very low** as none are present	**Very low** as none are present
1.8	**Landscape & Visual**			
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Very Low -** No Sensitive landscape Character Areas identified	**Low** - Skirts 'A1 Landscape Area' south of Silvermines and Dolla	**Low -** Skirts the high amenity landscape designation associated with the Slieve Blooms
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Lough Eorna within corridor but can be easily avoided	**Low** - Skirts naturalistic moorland near Silvermines	**Very Low** - none apparent in this farmed landscape
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low -** Woodlands and mature treelines associated with Ashley Park and woodland north of Cloughjordan	**Low** - Woodland at Pollanorman, riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers and woodland patches at Kylenaheskeragh	**Low** - several mixed species woodlands at Busherstown and around Fanure, BallyKnockan.
1.8.4	Potential to impact on woodlands and significant tree groups	**Low** - Woodlands and mature treelines associated with Ashley Park and woodland north of Cloughjordan	**Low** - Woodland at Pollanorman, riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers and woodland patches at Kylenaheskeragh	**Low** - Sections of mature tree lined hedgerows throughout
1.8.5	Potential to impact on historic designed landscapes	**Low -** Principal views from Ashley Park House south across Lough but can be avoided	**Very low** - Nothing notable (see cultural heritage appraisal)	**Low** - tree lined avenue providing views towards woodland from Busherstown house and avenue views from Mount St Josephs - also appears to be several other demesnes
1.8.6	Potential to alter the prevailing landscape character	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated
1.8.7	Potential to impact on designated scenic routes / views	**Very Low -** No Scenic Views in the vicinity	**Low** - Corridor follows R491 between Elmhill and Carrig which is part of a designated view	**Very Low** - designated view 15 in Offaly CDP in townland of Knock looking towards Slieve Blooms and Leap Castle
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Low** - Ashley Park House and demesne and Cloghjordan Eco-village	**Very Low** - nothing notable apparent	**Very Low** - nothing notable apparent
1.8.9	Potential to impact on views from settlements	**Low** - runs through outskirts of Nenagh, Ardcroney cross roads and Cloughjordan	**Very Low** - Skirts Silvermines	**Very Low** - Moneygall and outskirts of Roscrea near edges of corridor
1.8.10	Potential to impact on views from dwellings / local roads	**Low -** some relatively dense clusters of rural housing around outskirts of Nenagh and M7 interchange	**Very low** - modest levels of rural housing	**Low** - generally this is a modestly populated rural area but higher concentrations of dwellings occur around Dunkerrin and along the approach roads to Roscrea
1.8.11	Potential to impact on views from motorways	**Low -** Incorporates the M7 at its western end	**Low -** Crosses M7 at two regional route junctions	**Low** - follows route of M7 in southern reaches
1.8.12	Potential to impact on views from other major roads (national or regional roads)	**Low** - Encompasses M7 and crosses N52 national secondary road and several regional roads	**Low** -Crosses M7 at junctions with the R445 and R498 and follows alignment of R491 further north	**Low** - crosses the R490 and R491
1.8.13	Potential to impact on views from rail lines	**Very Low -** railway lines avoided	Briefly follows national railway line at Shallee as well as between Elmhill and Carrig which is also adjacent to designated view	**Low -** Crosses national railway line near Roscrea
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very Low -** No Airports in vicinity	**Very Low -** No Airports in vicinity	**Very Low -** No Airports in vicinity
1.8.15	Potential to impact on views from national 'way marked' walking routes	**Very Low -** Lough Derg Way >3km W	**Low** - Slieve Felim Way has a trail head in Silvermines	**Very Low** - Slieve Bloom Way outside of corridor
1.8.16	Potential to impact on local walks	**Low -** Nenagh cycle loop and loop walks within woodland north of Cloghjordan	**Very Low** - several loop walks emanate from Silvermines but generally head south into Silvermines mountains	**Very Low** - Moneygall Rock of Loyer loop just outside of corridor

Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Lough Eorna	**Low** - Nenagh, Ballinboy and Ollatrim Rivers recognised fisheries	**Low** - Ollatrim and Little Brosna Rivers recognised fisheries
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low -** nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low -** nothing permanent to screen and this is a modified rural landscape that can be readily reinstated
1.9	**Material Assets (Agronomy)**			
1.9.1	Agronomy	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However A2 is the least constrained route corridor	• Construction impacts mid-range • Long term impacts predicted to be low
1.13	**Soils, Geology and Hydrogeology**			
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Mid-range:** Rkd, Lk, Lm and LL aquifers.	**Mid-range:** Rkd, Lm and LL aquifers.	**Mid-range:** Rkd, Lm and LL aquifers.
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly High to Moderate Groundwater Vulnerability. Some areas of Extreme Vulnerability	**Low:** Mainly High to Moderate Vulnerability. Small areas of Extreme Vulnerability	**Low:** Mainly High to Moderate Vulnerability. Some areas of Extreme Vulnerability.
1.13.3	GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Mid-range:** Patrickswell Boreholes located upgradient of route - Low risk. Ardcroney borehole located outside Corridor. Cloughjordan borehole located outside corridor.	**Mid-range:** Bawn, Cunnahurt and Elmhill boreholes in Corridor. No SPZ delineated	**Mid-range:** Guillfoyles, Busherstown Spring, Dunkerrin and Village Well in Corridor. No SPZ delineated
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Mid-range:** As above but no SPZ delineated	**Mid-range:** As above but no SPZ delineated	**Mid-range:** As above but no SPZ delineated
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**Very Low:** No potential impact identified as no Irish Geological Heritages sites are recorded in this area	**Mid-range:** A number of sites at Silvermines mining district to the south of the Route Corridor	**Mid-range:** A number of sites at Silvermines mining district to the south of the Route Corridor. Gloster and Millpark to the North and South of route Corridor. Area is only preliminarily identified and requires definition.
1.13.7	Potential to interact with contaminated land	**Mid-range:** Gortmore Tailings pond located near Silvermines. Cloughjordan landfill.	**Mid-range:** Gortmore Tailings pond located near Silvermines. Narrow corridor between Tailings and Higher Ground	**Mid-range:** Gortmore Tailings pond located near Silvermines. Ballynavevy Landfill located to the centre of route, may provide pinch point.
1.13.8	Potential to sterilise mineral resource	**Low:** A number of small quarries. No large scale quarry identified	**Low:** A number of small quarries. No large scale quarry identified	**High:** A number of quarries near Roscrea may cause pinch point on route
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Low:** Small areas of rock close to surface, in particular near Nenagh.	**Low:** Small areas of rock close to surface.	**Low:** Small areas of rock close to surface.
1.13.10	Potential impact on karst features	**Mid-range:** Moderate to high potential for impact. Swallow hole identified near Ardcroney so additional features possible in area. A number of sinking streams in the corridor west of Ardcroney.	**Low:** Moderate to low, none identified in Corridor.	**Low:** Moderate to low, none identified in Corridor.
1.13.11	Potential to encounter soft ground	**Mid-range:** small areas of intact peat mainly north of Cloughjordan/Shinrone	**Mid-range:** Low Moderate, some areas of peat mainly near Cloughjordan	**Mid-range:** Low, small areas of peat along route
1.13.12	Soils Types	**Low:** Large variation –low potential impact on environment	**Low:** Large variation –low potential impact on environment.	**Low:** Large variation –low potential impact on environment.
1.13.13	Sub Soil Types	**Low:** Large variation. Predominately Till with some gravel in particular near Birr. Low Potential impact.	**Low:** Large variation. Predominately Till with some gravel in particular near Birr and Roscrea Low Potential impact.	**Low:** Large variation. Predominately Till with some gravel in particular near Birr and Roscrea. Low Potential impact.
1.13.14	Depth to rock	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).
2.0	**Technical**			
2.1	**Planning Policy**			
	Pipelines suitable to provide water to areas already identified for growth	Pipelines suitable to serve Nenagh and Borrisokane	Pipelines suitable to serve Nenagh	Pipelines suitable to serve Roscrea
2.2	**Engineering and Design**			
2.2.1	Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site.	6.87 km^2	11.69 km^2	12.34 km^2

Ref.	Criteria	Corridor A1	Corridor A2	Corridor A3
	- Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.			
2.2.2	Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N52, N62, River Nenagh, Little Brosna River, Railway)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N62, River Nenagh, Little Brosna River, River Ollatrim, Railway)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N62, River Nenagh, Little Brosna River, River Ollatrim, Railway)
2.2.3	Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**High**- this route requires 66no. Crossings	**High** - this route requires 74no. Crossings, including 9no. Crossings of regional roads	**High** - this route requires 85no. Crossings
2.2.4	Karst	**Mid-range** - GSI database has noted a number of karst features along this route	**Low -** GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
2.2.5	Subsoils	**Mid-range** - this route contains 10% peat	High - this route contains 15% peat and 6% alluvium	**High** - this route contains 11% glaciofluvial sand and gravels, 8% peat and 8% alluvium
2.2.6	Accessibility	**Mid-range** - this corridor is served by the N7/N52 for part of the route while the second half is dependent on regional/secondary roads for transport of goods	High - this corridor his the greatest deviation away from national primary and secondary roads, which increases the risk of upgrading local roads or building new access road to complete the works	**Low** - the route is served for a large part of the M7/N7 roads
2.2.7	Elevation Profile	**Mid-range** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km	**Low** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km. This route has a less significant elevation rise	**Mid-range** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km. It is noted that this profile deviates from the centreline near 50km due to the location of a large obstruction (hill)
2.3	**Traffic**			
2.3.1	Number of crossings required for access road	Not applicable	Not applicable	Not applicable
2.3.2	Number of crossings of Motorways	**Mid-range Impact:** Significant potential to Cross M7 Motorway	**High Impact:** Definite Crossing of M7 Motorway Required	**Low Impact:** Low potential to Cross M7 Motorway
2.3.3	Number of crossings of National Roads	**Mid-range Impact:** 2 crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing
2.3.4	Number of crossings of Regional Roads	**Low Impact:** Up to 8 Crossings	**Low Impact:** Up to10 Crossings	**Low Impact:** Up to 9 Crossings
2.3.5	Number of crossings of Local Roads – Primary	**Mid-range Impact:** Up to 19 crossings	**Low Impact:** Up to 14 crossings	**Low Impact:** Up to 11 crossings
2.3.6	Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** Up to 20 crossings	**Low Impact:** Up to 18 crossings	**Mid-range Impact:** Up to 26 crossings
2.3.7	Number of Railway Crossings	**Very Low Impact:** No Railway Crossing	**High Impact:** Up to 4 no Crossings of Limerick - Dublin Railway Required	**Mid-range Impact:** 1 No Crossing of Limerick to Dublin Railway Required
2.4	**Capital and Operational Costs**			
2.4.1	CAPEX	€ 100 – 110 million	€ 105 – 115 million	€ 110 – 120 million
2.4.2	OPEX	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor
2.5	**Sustainability**			
2.5.1	Carbon Footprint	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.

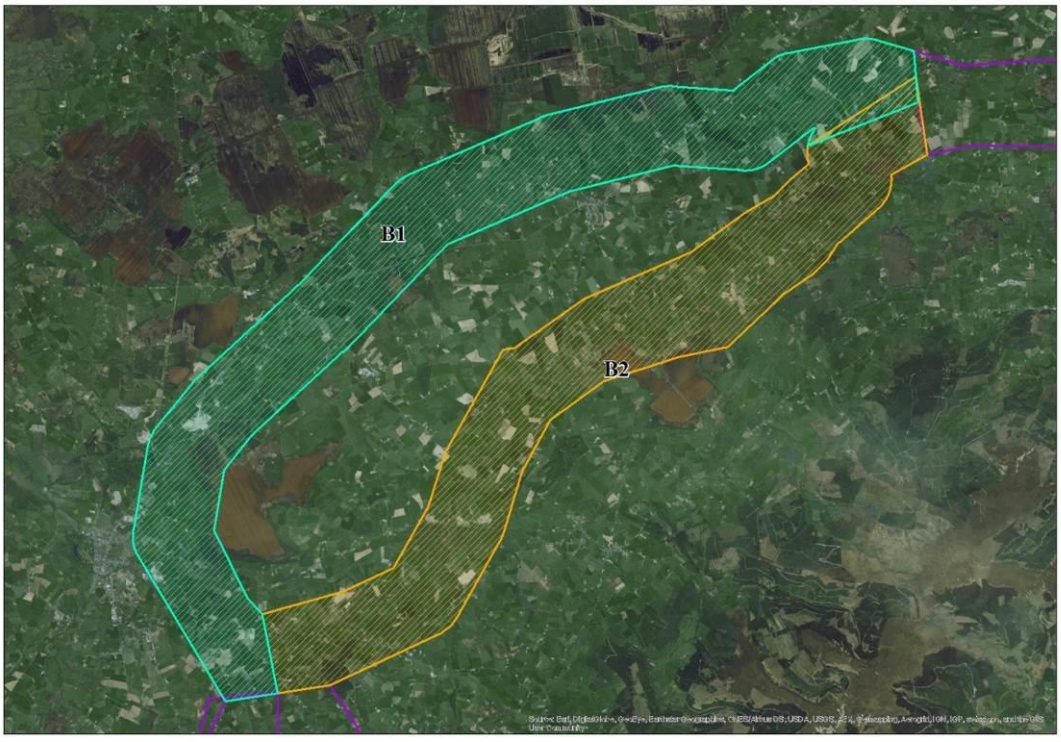
4.1 Least constrained AB Route Corridor

The MCA process identified **Route Corridor A1 as the least constrained.**

Route Corridor A1 is considered to be the least constrained for the following reasons:

- It is the shortest option and thereby would involve the least hedgerow clearance and associated disturbance impacts to fauna..
- Least potential to cross local secondary and tertiary roads and potentially better construction access via the national, regional road and local primary road network.
- Least potential for encountering poor ground and least number of major and minor obstructions
- Lowest potential for watercourse crossings

4.2 Matrix of Multi-Criteria Analysis (Route Corridor BC)



Ref.	Criteria	Corridor B1	Corridor B2
1.0	**Environmental**		
1.1	**Biodiversity, Flora & Fauna**	**Mid-range Impact:** Camcor River, Woodville woods pNHA (avoidable), Lough Coura pNHA (edge only very avoidable), remnant raised bog (Boora), scarce breeding birds (Grey Partridge - Boora area)	**Mid-range Impact:** Raised bog (1/4) at Gortacur
1.1.1	Potential to impact on Natura 2000 Sites	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Low Impact:** Lough Coura pNHA (edge only)	**Very Low Impact:** Well removed from sites
1.1.3	Potential impact Annex I listed habitats (designated)	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.
1.1.4	Potential impact Annex I listed habitats (non-designated)	**Mid-range Impact:** Potential for unidentified areas of Annex 1 habitat in semi natural bog woodland and semi natural grassland	**Mid-range Impact:** Raised bog at Gortacur 1/3 corridor – avoidable Potential for unidentified areas of Annex 1 habitat in semi natural bog woodland and semi natural grassland
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**Mid-range Impact:** Hedgerows, streams and semi natural bog habitats	**Mid-range Impact:** Hedgerows and stream crossings
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Low Impact**: Areas of semi natural grassland may occur with associated protected flora	**Low Impact**: Areas of semi natural grassland may occur with associated protected flora
1.1.7	Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 27.7km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 21.9km crossed and associated access routes
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Low Impact:** Known Important bird sites are avoided Studies are required in particular around Boora Bog to determine bird distribution.	**Low Impact**: Known Important bird sites are avoided Studies are required in to determine bird distribution.
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 27.7km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 21.9km crossed and associated access routes
1.1.11	Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.14	Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.16	Potential to impact marine/coastal birds	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.17	Potential to impact marine mammals	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.2	**Biodiversity, Flora & Fauna (Aquatic)**		

Ref.	Criteria	Corridor B1	Corridor B2
1.2.1	Potential to impact on Natura 2000 Sites	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.
1.2.3	Potential impact Annex I listed habitats (designated)	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very Low:** No designated aquatic site with the area.	**Very Low:** No designated aquatic site with the area.
1.2.5	Potential to impact on protected Flora - Flora Protection Order	**Very Low:** No protected aquatic flora or fauna recorded from the area.	**Very Low:** No protected aquatic flora or fauna recorded from the area.
1.2.6	Potential to impact on Annex II species	**Very Low:** No Annex II aquatic species recorded from the area.	**Very Low:** No Annex II aquatic species recorded from the area.
1.2.7	Potential to Impact on Annex IV species (wherever they occur)	**Very Low:** No Annex IV aquatic species recorded from the area.	**Very Low:** No Annex IV aquatic species recorded from the area.
1.2.8	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*
1.2.9	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*
1.2.10	Potential to impact on salmonid habitat - protected under SI Reg	**Low impact**: As the River Camcor supports populations of Brown Trout the impact, is scored at low.	As the River Camcor supports populations of Brown Trout, the impact is scored at low.
1.2.11	Potential to impact on a freshwater pearl mussel - protected under SI Reg	Freshwater Pearl Mussels do not occur in the water courses therefore impact score is nil.	Freshwater Pearl Mussels do not occur in the water courses therefore impact score is nil.
1.2.12	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.
1.2.13	Potential to impact on coastal zone habitats (intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.14	Potential to impact on marine habitats (e.g. Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.15	Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.16	Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3	**Fisheries**		
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3.2	Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Low impact**: Salmonids may pass through the site	**Low impact**: Salmonids may pass through the site
1.4	**Water**		
1.4.1	Significance of Impact - WFD	**Low**	**Mid-range**
1.4.2	Significance of Impact - Watercourse Crossings	**Low**	**Low**
1.5	**Air/Climatic Factors**		
	Air		
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Birr), large number of large pits/quarries in area, pNHA also located in area	Very low impact in construction phase due to low density residential receptors in area, one pNHA in area (Derrykeel Meadows), some small pits/quarries in area
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase
1.5.3	Proximity to EPA Waste Licensed facility	None	None
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	None	No facilities present in study area
1.5.5	EPA Air Quality Zone Classification	Zone D	Zone D
1.5.6	Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind

Ref.	Criteria	Corridor B1	Corridor B2
1.5.7	Construction Phase Impact rating	Low impact from construction dust emissions	Very low impact from construction dust emissions
	Noise		
1.5.9	Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to slightly higher Density Residential Receptors in area	Very low impact in construction phase due to low Density Residential Receptors in area
1.5.10	Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
1.5.11	Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
1.5.12	Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area
1.5.13	Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase
1.6	**Material Assets (Energy)**		
1.6.1	Potential for energy recovery	Not a differentiating factor	Not a differentiating factor
1.7	**Cultural Heritage (including Architecture & Archaeology)**		
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Very low** as none are present
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	**Low** as although there 46 sites recorded within the corridor the area itself is relatively large	**Low** as although there 33 sites recorded within the corridor the area itself is relatively large
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (11). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (9). This is low relative to the size of the area
1.7.4	Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (11). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (10) though this is low relative to the size of the area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as a number of demesne are recorded within the area (10), although many are no longer extant	**Low** as although a number of demesne are recorded within the area (10), many are no longer extant and are located on the edge of the corridor
1.7.6	Potential to impact on ACA	**Very low** as none are present	**Very low** as none are present
1.7.7	Recorded shipwreck sites/underwater archaeology	**Very low** as none are present	**Very low** as none are present
1.8	**Landscape & Visual**		
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Low** - small portion of Lough Boora bog and several eskers inside corridor	**Very Low** - Contains portions of a moderately sensitive landscapes (bog)
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Eskers and bog	**Low** - Scrubby woodland and bog
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Very low** - generally large fields with low hedgerows, but with some mature tree lines	**Low** - Hedgerows and geometric forest plantations
1.8.4	Potential to impact on woodlands and significant tree groups	**Low** - Riparian woodland on Camcor and Silver Rivers and scrubby woodlands at bog fringes	**Low** - Scrubby woodland at bog fringe and mixed species woodland flanking Camcor River
1.8.5	Potential to impact on historic designed landscapes	**Low** - Demesne Landscape at Ballynacard	**Very low** - Nothing notable (see cultural heritage appraisal)
1.8.6	Potential to alter the prevailing landscape character	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated
1.8.7	Potential to impact on designated scenic routes / views	**Low** - Crosses R440 designated scenic route and encompasess designated view 5 in Offaly CDP from N52 to Slieve Blooms	**Low** - Crosses R440 designated scenic route and encompasess designated view 17 in Offaly CDP 'across lowland' from Knockhill
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Very low** - Birr Castle west of corridor and Lough Boora Parklands a short distance to north of northern end of corridor	**Very low** - None apparent
1.8.9	Potential to impact on views from settlements	**Low** - Birr, outskirts of Kilcormac and Mountbolus	**Very low** - No substantial settlements
1.8.10	Potential to impact on views from dwellings / local roads	**Low** - Fairly modest and dispersed rural settlement outside of settlements	**Very low** - sparse and dispersed rural housing
1.8.11	Potential to impact on views from motorways	**Very low** - No Motorways in the vicinity	**Very low -** No Motorways in the vicinity

Ref.	Criteria	Corridor B1	Corridor B2
1.8.12	Potential to impact on views from other major roads (national or regional roads)	**Low** - Crosses R440 (scenic route) follows N52 national secondary route	**Low** - Crosses R440 (designated scenic route)
1.8.13	Potential to impact on views from rail lines	**Very low** - No railway lines in near vicinity	**Very low** - No railway lines in near vicinity
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
1.8.15	Potential to impact on views from national 'way marked' walking routes	**Low** -Crosses Offaly Way near Kilcormac	**Low** -Crosses Offaly Way near Kilcormac
1.8.16	Potential to impact on local walks	**Low** - Birr town and river bank walks	**Very low** - Knockbarron Wood eco-walk nearby (enclosed)
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Camcor River is a recognised fishery	**Low -** Camcor River is a recognised fishery
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated
1.9	**Material Assets (Agronomy)**		
1.9.1	Agronomy	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However B2 is the least constrained route corridor
1.13	**Soils, Geology and Hydrogeology**		
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Mid-range:** Mainly Rkd, some LL	**Low:** Mainly Ll, some Rkd, lm
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly High to Moderate	**Low:** Mainly High to Moderate, some areas of Extreme on elevated locations
1.13.3	GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Mid-range:** Camcor Stream abstraction and Kilcormac Wells located near Kilcormac	**Mid-range:** Newgate Well, Mountbolus
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Low:** As above, SPZ not delineated	**Low:** As above, SPZ not delineated
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**Mid-range:** Birr Five Alley Kilcormac Esker system through entire area however only marked as a point at present on maps. Potential Geological NHA along majority of route corridor	**Low:** None Identified
1.13.7	Potential to interact with contaminated land	**Mid-range:** Birr Landfill and Kilcormac Landfill. Due to the large number of pits along the esker system possibly some dumping sites in old quarries along esker system	**Low:** None Identified
1.13.8	Potential to sterilise mineral resource	**High:** Large quarries /pits near Birr. Also peat extraction. High possibility of some conflicts	**Low:** Moderate to low possibility, no large pits identified but some present along corridor
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc)	**Low:** Moderate to low potential	**Mid-range:** Moderate possibility between Kilcormac and Cadamstown
1.13.10	Potential impact on karst features	**Mid-range:** a number of karst features along line route. Karst springs are located to the edge of the corridor	**Low:** no karst features identified along line route.
1.13.11	Potential to encounter soft ground	**Mid-range:** High possibility, extensive peat and alluvial adjacent to esker system	**Low:**, some peat extraction areas along corridor
1.13.12	Soils Types	**Low:** Varied. Large areas of peat soils and podzols.	**Low:** Varied
1.13.13	Sub Soil Types	**Low:** Principally Gravels, Alluvial and Peat	**Low:** Till with some peat and gravels
1.13.14	Depth to rock	**Low:** <5m in most areas	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required)
2.0	**Technical**		
2.1	**Planning Policy**		
	Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve Birr	Pipeline suitable to serve Birr

Ref.	Criteria	Corridor B1	Corridor B2
2.2	**Engineering and Design**		
2.2.1	Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	3.93 km^2	4.49 km^2
2.2.2	Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route requires 4no. Crossings (N52 x2, River Camcor, River Silver)	**Low** - this route 1no. Crossing (River Silver)
2.2.3	Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**Mid-range** - this route requires 31no. Crossings	**High** - this route requires 29no. Crossings
2.2.4	Karst	**Mid-range** - GSI database has noted a number of karst features along this route	**Low** - GSI database notes no karst features along here
2.2.5	Subsoils	**Very High** - this route contains 18% peat, 34% glaciofluvial sands and gravels, 9% alluvium	**High** - this route contains 17% peat, 7% glaciofluvial deposits and 7% alluvium
2.2.6	Accessibility	**Low** - the route is served for a large part by the N52 road	**High** - this route his relatively poor access to main roads and will likely require significant upgrade works to existing road infrastructure to complete works
2.2.7	Elevation Profile	**Mid-range** - this route has a relatively consistent rise to its termination	**High** - the proposed profile will result in hydraulic issues which will impact on the design due to the large number of rises/falls
2.3	**Traffic**		
2.3.1	Number of crossings required for access road	Not Applicable	Not Applicable
2.3.2	Number of crossings of Motorways	None	None
2.3.3	Number of crossings of National Roads	**Mid-range Impact:** Up to 3 crossings	None
2.3.4	Number of crossings of Regional Roads	**Low Impact:** 2 crossings	**Low Impact:** 1 definite and 2 unlikely crossings
2.3.5	Number of crossings of Local Roads – Primary	**Low Impact:** Up to 4 crossings	**Low Impact:** 3 crossings
2.3.6	Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** up to 16 crossings	**Low Impact:** up to 16 crossings
2.3.7	Number of Railway Crossings	None	None
2.4	**Capital and Operational Costs**		
2.4.1	CAPEX	€ 25 – 35 million	€ 20 – 30 million
2.4.2	OPEX	Not a differentiating factor	Not a differentiating factor
2.5	**Sustainability**		
2.5.1	Total embodied Carbon	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.

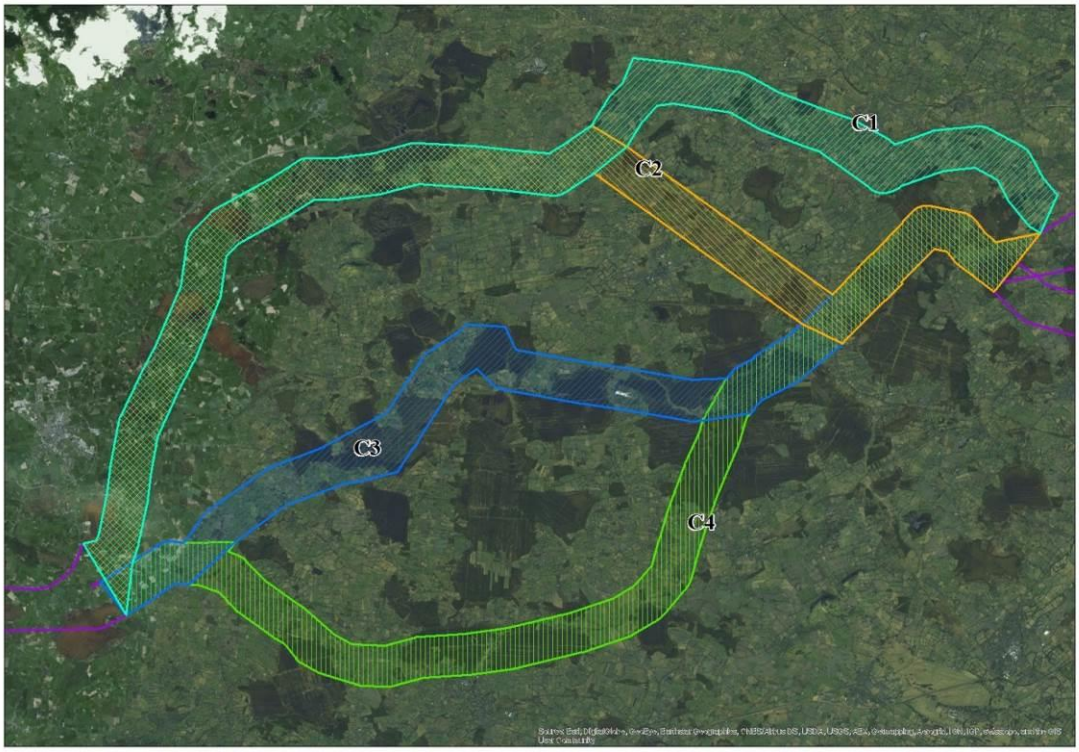
4.3 Least constrained AB Route Corridor

The MCA process identified Route **Corridor B2 as the least constrained**.

Route Corridor B2 is considered to be the least constrained for the following reasons:

- It is the shortest option resulting in the least hedgerow clearance and associated disturbance impacts to fauna.
- Least potential for encountering poor ground, least number of crossings of major obstructions and has an acceptable elevation profile.
- It encounters he lowest number of cultural heritage constraints.
- Presence of extensive areas of peat and the potential to sterilise mineral resources along corridor B1.

4.4 Matrix of Multi-Criteria Analysis (Route Corridor CD)



Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
1.0	**Environmental**				
1.1	**Biodiversity, Flora & Fauna**	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA (2 crossings) various river crossings are linked to the River Boyne and Barrow SAC/ SPA	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA (2 crossings), various river crossings (linked Boyne SAC and Barrow SAC - TBC)	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed,, Grand Canal pNHA crossing, various river crossings (linked River Barrow SAC)	**High Impacts:** Key issue is extensive revegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA, various river crossings (linked River Barrow SAC)
1.1.1	Potential to impact on Natura 2000 Sites	**High Impacts:** No direct impacts. Potential Moderate/ highindirect impacts to River Boyne and Blackwater SAC/SPA	**High Impacts:** No direct impacts. Potential Moderate / high indirect impacts to River Boyne and Blackwater SAC/SPA	**Mid-range Impact:** No direct impacts. Potential Moderate indirect impacts to River Barrow and River Nore SAC	**Mid-range Impact:** No direct impacts. Potential Moderate indirect impacts to River Barrow and River Nore SAC
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Mid-range Impact:** Grand Canal pNHA (2 crossings), Ballina Bog pNHA (edge)	**Mid-range Impact:** Grand Canal pNHA (2 crossings) , Ballina Bog pNHA (edge)	**Mid-range Impact:** Grand Canal pNHA	**Mid-range Impact:** Grand Canal pNHA
1.1.3	Potential impact Annex I listed habitats (designated)	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats
1.1.4	Potential impact Annex I listed habitats (non-designated)	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats
1.1.7	Potential to impact on Annex II species	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 62.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 61.8km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 52km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 56.9km crossed and associated access routes
1.1.11	Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.14	Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.16	Potential to impact marine/coastal birds	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.17	Potential to impact marine mammals	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.2	**Biodiversity, Flora & Fauna (Aquatic)**				
1.2.1	Potential to impact on Natura 2000 Sites	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.
1.2.3	Potential impact Annex I listed habitats (designated)	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.
1.2.5	Potential to impact high ecological value habitats (semi natural habitats)	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.
1.2.6	Potential to impact on protected Flora - Flora Protection Order	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.
1.2.7	Potential to impact on Annex II species	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact
1.2.8	Potential to Impact on Annex IV species (wherever they occur)	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact
1.2.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
1.2.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
1.2.11	Potential to impact on salmonid habitat - protected under SI Reg	**Mid-range impact.** River Boyne is an important salmonid	**Mid-range impact.** River crossings. River Boyne River Boyne is an important salmonid fishery.	**Low impact.** Shannon and Barrow Rivers are important salmonid fisheries but are far from the	**Mid-range impact.** River Boyne is an important salmonid fishery.

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
		fishery.		sites.	
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.
1.2.14	Potential to impact on coastal zone habitats (intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.16	Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.17	Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3	**Fisheries**				
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3.2	Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Mid-range impact.** Salmon pass through the rivers.	**Mid-range impact.** Salmon pass through the rivers.	**Very Low Impact:** Salmon unlikely to pass through the rivers, therefore impact scored at very low.	**Mid-range impact.** Salmon pass through the rivers.
1.4	**Water**				
1.4.1	Significance of Impact - WFD	**Mid-range**	**Low**	**Very low**	**Very low**
1.4.2	Significance of Impact – Watercourse Crossings	**High**	**Mid-range**	**Low**	**Very low**
1.5	**Air/Climatic Factors**				
	Air				
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Enfield), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice.	Very low impact in construction phase due to low density residential receptors in area (only dense residential south of Edenderry), few small pits/quarries, one large quarry.	Very low impact in construction phase due to low density residential receptors in area (only dense residential north of Portarlington), few small pits/quarries, one large quarry.

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase
1.5.3	Proximity to EPA Waste Licensed facility	None	None	None	None
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	None	None	No facilities present in study area	No facilities present in study area
1.5.5	EPA Air Quality Zone Classification	Zone D	Zone D	Zone D	Zone D
1.5.6	Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
1.5.7	Construction Phase Impact rating	Low impact from construction dust emissions	Low impact from construction dust emissions	Very low impact from construction dust emissions	Very low impact from construction dust emissions
	Noise				
1.5.9	Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Enfield).	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry).	Very low impact in construction phase due to low Density Residential Receptors in the area (only dense residential south of Edenderry).	Very low impact in construction phase due to low Density Residential Receptors in area (only dense residential north of Portarlington).
1.5.10	Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.
1.5.11	Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
1.5.12	Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area.
1.5.13	Operational Phase Impact rating	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.
1.6	**Material Assets (Energy)**				
1.6.1	Potential for energy recovery	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor
1.7	**Cultural Heritage (including Architecture & Archaeology)**				
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low as none are present**	**Very low as none are present**
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	**Mid-range** as a large amount of sites (144) are recorded within the corridor although the area itself is relatively large	**Mid-range** as a large amount of sites (154) are recorded within the corridor although the area itself is relatively large	**Low** as a large amount of sites (82) are recorded within the corridor although the area itself is relatively large	**Low** due to relatively low number (30) in large area
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (35). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (30). This is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (19), this is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (8), this is low relative to the size of the area
1.7.4	Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (35). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (30). This is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (22), this is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (8), this is low relative to the size of the area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as a number of demesnes are recorded within the area (12), seven of which are associated with RPS	**Low** as only nine demesnes are recorded within the corridor, three of which are associated with RPS	**Mid-range** as a number of demesnes are recorded within the area (14), five of which are associated with RPS	**Low** as only nine demesnes are recorded within the corridor, three of which are associated with RPS
1.7.6	Potential to impact on ACA	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low** as none are present	**Very low** as only one is recorded in a large area

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
1.7.7	Recorded shipwreck sites/underwater archaeology	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low** as none are present	**Very low** as only one is recorded in a large area
1.8	**Landscape & Visual**				
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Low** - crosses the Grand canal twice near Tullamore and also an esker present in this area (high sensitivity Offaly CDP). Northern Hills LCA contained in north-eastern section of this corridor (high sensitivity Kildare CDP)	**Very low** - medium and low classifications only	**Low** - Crosses Eskers near lugmore and Springfield (high sensitivity Offaly CDP) and crosses Grand canal at eastern end of corridor (high sensitivity Kildare CDP)	**Very low** - medium and low classifications only
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Bogs (mainly cutaway)	**Low** - Bogs (mainly cutaway)	**Low** - Eskers and bogs (mainly cutaway)	**Low** - Bogs (mainly cutaway)
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Hedgerows, tree lines and forest plantations throughout	**Low -** Hedgerows, tree lines and forest plantations throughout	**Low** - Hedgerows, tree lines and forest plantations throughout	**Very low** - mainly large fields with little enclosure by hedgerows
1.8.4	Potential to impact on woodlands and significant tree groups	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes
1.8.5	Potential to impact on historic designed landscapes	**Very low -** some demesne landscapes but nothing with strong axial views	**Low** - Highfield House appears to have some axial views NW	**Very low** - none apparent	**Very low** - none apparent
1.8.6	Potential to alter the prevailing landscape character	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated
1.8.7	Potential to impact on designated scenic routes / views	**Very low** - none contained within corridor. Several with potential elevated views from just beyond corridor (Tyrellspass WM and Northern Hills Kildare)	**Very low** - scenic route associated with views of Carbury Castle a short distance outside of corridor (views in opposite direction)	**Very low** - none in Offaly and corridor runs between two designated Canal Views from Kildare CDP	**Very low** - none within the corridor or in the near vicinity
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Very low** - several golf courses that can be avoided	**Low** - Edenderry golf course and Highfield country club and golf course create a 'pinch point' in corridor	**Low -** Grand Canal	**Very low** - none apparent
1.8.9	Potential to impact on views from settlements	**Low** - Several small settlements within corridor (Killeigh, Castlejordan, Cadamstown, Thomastown, Kilmurry, Johnstown Bridge)	**Low** - Derrinturn	**Very low** - no significant settlements within corridor	**Low** - corridor skirts past Portarlington but no other significant settlements
1.8.10	Potential to impact on views from dwellings / local roads	**Low** - Generally sparsely populated but some relatively dense areas around Cadamstown and Thomastown	**Low** - Generally sparsely populate area but with concentration of linear development at Ballyhagan	**Low** - dispersed rural settlement in the vicinity of Ticknevin Bridge	**Low** - whilst there are several small concentrations of rural residences most of this corridor is very sparsely populated
1.8.11	Potential to impact on views from motorways	**Low** - corridor includes two small sections of M4 at northern periphery	**Very low** - none in the vicinity	**Very low** - none in the vicinity	**Very low** - none in the vicinity
1.8.12	Potential to impact on views from other major roads (national or regional roads)	**Low** - crosses R400 and R402 regional roads	**Low** - crosses R401 and R402 regional roads	**Low -** crosses R400, R401, R420 and R402 regional roads	**Low** - crosses R401, R419 and R420 regional roads
1.8.13	Potential to impact on views from rail lines	**Low** - Crosses national rail line south of Tullamore	**Very low** - none within corridor	**Low** - Crosses national rail line south of Tullamore	**Low** - follows substantial portions of railway line between Tullamore and Portarlington
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
1.8.15	Potential to impact on views from national 'way marked' walking routes	**Low** - crosses Grand Canal Way twice near Tullamore	**Very low** - None in the vicinity	**Low -** Crosses Grand Canal Way at eastern end of corridor	**Very low** - None in the vicinity
1.8.16	Potential to impact on local walks	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - crosses the River Boyne at Offaly Kildare border (recognised fishery) Other watercourse small in this boggy watershed area	**Low** - crosses the River Boyne at Meath Kildare border (recognised fishery)	**Very low** - crosses the Tullamore River but few other substantial watercourses in this watershed area	**Low** - Encompasses confluence of Cushina, Figile and Slate Rivers (recognised fisheries)
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated
1.9	**Material Assets (Agronomy)**				
1.9.1	Agronomy	• Construction impacts mid-range • Long term impacts predicted to be	• Construction impacts mid-range • Long term impacts predicted to be	• Construction impacts mid-range • Long term impacts predicted to	• Construction impacts mid-range • Long term impacts predicted to be

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
		low	low	be low • However C3 is the least constrained route corridor	low
1.13	**Soils, Geology and Hydrogeology**				
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Low:** Mainly locally important aquifers - LL and LM	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly High to Moderate. Some areas of low vulnerability
1.13.3	GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Mid-range:** Wood of O Borehole located in corridor	**Low:** None Identified	**Mid-range:** Danganbeg spring, Toberfin Spring, Clonarrow BH, Dalgan Spr located in corridor	**Mid-range:** Kilnantoge BH adjacent to Slate River and within corridor
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Mid-range:** As above SPZ not delineated	**Low:** NA	**Mid-range:** As above	**Mid-range:** As above, no SPZ delineated
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**Low:** Rahugh Ridge (Esker) located on western boundary, Esker not fully defined but may extend into Corridor	**Mid-range:** Carrick Hill	**Mid-range:** Esker Bridge to the edge of Corridor, boundary not defined	**Low:** None Identified
1.13.7	Potential to interact with contaminated land	**Low:** None Identified	**Low:** Drehid Landfill to the edge of corridor	**Mid-range:** Drehid Landfill to the edge of corridor, Edenderry power plant and ash pit to the centre of the route corridor	**Low:** Drehid Landfill to the edge of corridor
1.13.8	Potential to sterilise mineral resource	**High:** Large risk, presence of Derryarkin Pit, south of Rochfordbridge with extensive Wind farm proposed for the area. some peat extraction fields along route, possible conflict with BNM extraction plans	**High:** Large risk, presence of Derryarkin Pit, south of Rochfordbridge with extensive Wind farm proposed for the area. some peat extraction fields along route, possible conflict with BNM extraction plans	**Mid-range:** Low to moderate, some peat extraction fields along route, possible conflict with BNM extraction plans	**Mid-range:** Low to moderate, some peat extraction fields along route, possible conflict with BNM extraction plans
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc)	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface
1.13.10	Potential impact on karst features	**Low:** low to moderate possibility. Some karst prone bedrock along route corridor, No major features identified	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified.	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified
1.13.11	Potential to encounter soft ground	**Mid-range:** High possibility of soft ground, extensive peat along route	**High:** extensive peat along route. Some areas of high bog south of Derrinturn.	**Mid-range:** High possibility of soft ground, extensive peat along route	**Mid-range:** High possibility of soft ground, extensive peat along route
1.13.12	Soils Types	**Low:** Highly variable	**Low:** Highly variable	**Low:** Highly variable	**Low:** Highly variable
1.13.13	Sub Soil Types	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.
1.13.14	Depth to rock	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m
2.0	**Technical**				
2.1	**Planning Policy**				
	Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve Gateway town of Tullamore	Pipeline suitable to serve Edenderry.	Pipeline suitable to serve Edenderry.	Pipeline suitable to serve Portarlington, Mountmellick, Monasterevin
2.2	**Engineering and Design**				
2.2.1	Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive	9.61 km^2	9.99 km^2	7.22 km^2	9.65 km^2

Ref.	Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
	surface water receptors.				
2.2.2	Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Low** - this route 2no. Crossing (River Boyne, Railway)	**Low** - this route 2no. Crossing (River Boyne, Railway)	**Low** - this route 2no. Crossing (River Figile, Railway)	**Low** - this route 2no. Crossing (River Figile, Railway)
2.2.3	Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**Mid-range** - 64no. Crossings	**Low** - 50no. Crossings	**Low** - 35no. Crossings	**Low** - 39no. Crossings
2.2.4	Karst	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
2.2.5	Subsoils	**High** - this route contains 33% peat, 13% glaciofluvial deposits, 6% alluvium	**High** - this route contains 44% peat, 7% glaciofluvial deposits, 5% alluvium	**Very High** - this route contains 65% peat	**Very High** - this route contains 59% peat
2.2.6	Accessibility	**Low** - the route is served for a large part by the N52, N80, M4/M6 and several regional roads	**Low** - the route is served for a large part by the N52, N80, M4/M6 and several regional roads	Mid-range - this route is served by the N80 and several regional roads. There is a greater likelihood of upgrade works to roads being required	**Mid-range** - this route is served by the N80 and several regional roads. There is a greater likelihood of upgrade works to roads being required
2.2.7	Elevation Profile	**High** - this route has a large fall and rise at 5km	**High** - this route has a large fall and rise at 5km	**Low** - the route has a consistent fall to its termination	**Low** - the route has a consistent fall to its termination
2.3	**Traffic**				
2.3.1	Number of crossings required for access road	Not applicable	Not Applicable	Not Applicable	Not Applicable
2.3.2	Number of crossings of Motorways	**None**	**None**	**None**	**None**
2.3.3	Number of crossings of National Roads	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing
2.3.4	Number of crossings of Regional Roads	**Low Impact:** 4 crossings	**Low Impact:** 5 crossings	**Low Impact:** 6 crossings	**Low Impact:** 5 crossings
2.3.5	Number of crossings of Local Roads - Primary	**Low Impact:** 3 crossings	**Low Impact:** 4 crossings	**Low Impact:** up to 4 crossings	**Low Impact**: up to 6 crossings
2.3.6	**Criteria**	**Corridor C1**	**Corridor C2**	**Corridor C3**	**Corridor C4**
2.3.7	Number of crossings of Local Roads - Secondary / Tertiary	**Mid-range** Impact: up to 29 crossings	**Mid-range** Impact: up to 28 crossings	**Low Impact:** up to 14 crossings	**Low Impact:** up to 16 crossings
2.3.8	Number of Railway Crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing
2.4	**Capital and Operational Costs**				
2.4.1	CAPEX	€ 60 – 70 million	€ 60 – 70 million	€ 50 – 60 million	€ 55 – 65 million
2.4.2	OPEX	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor	Not a differentiating factor
2.5	**Sustainability**				
2.5.1	Carbon Footrprint	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.

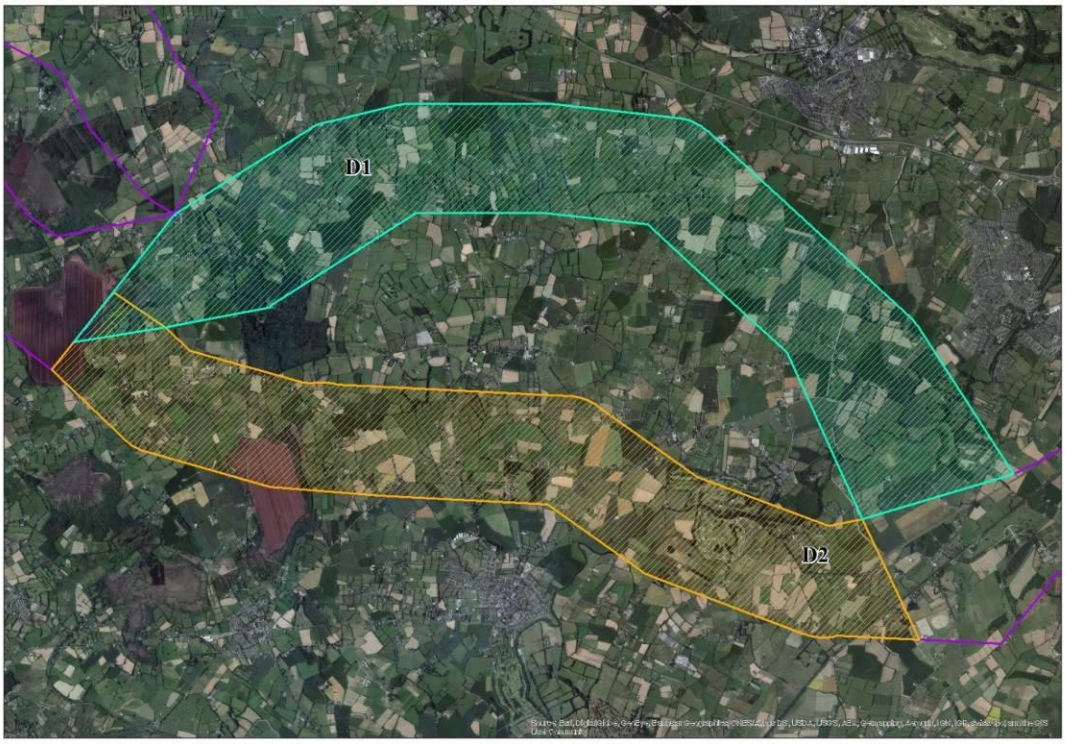
4.5 Least constrained CD Route Corridor

The MCA process identified Route Corridor C3 as the least constrained.

Route Corridor C3 is considered to be the least constrained for the following reasons:

- It is the shortest option hence fewer locally important habitats will be impacted compared to Route Corridors C1, C2 and C4.
- It also likely presents the least risk to sensitive salmonid spawning areas in the River Boyne and Blackwater river SAC catchment compared to other options.
- Fewer local secondary and tertiary road crossings and that there is potentially better construction access via the regional road network.

4.6 Matrix of Multi-Criteria Analysis (Route Corridor DE)



Ref.	Criteria	Corridor D1	Corridor D2
1.0	**Environmental**		
1.1	**Biodiversity, Flora & Fauna**	**Mid-range Impact:** River Liffey and other river crossings. Donadea Wood pNHA	**Mid-range Impact:** River Liffey and other river crossings. Donadea Wood pNHA
1.1.1	Potential to impact on Natura 2000 Sites	**Low Impact:** Lyreen River crossed is linked to the Rye Water SAC Natura 2000 sites are well removed from this corridor.	**Low Impact:** Natura 2000 sites are well removed from this corridor.
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Low Impact:** Donadea Wood pNHA is avoidable	**Low Impact:** Donadea Wood pNHA
1.1.3	Potential impact Annex I listed habitats (designated)	**Very Low Impact:** Designated Annex 1 habitats are not at significant risk	**Very Low Impact:** Designated Annex 1 habitats are not at significant risk
1.1.4	Potential impact Annex I listed habitats (non-designated)	**Low Impact:** The study area consists of managed farmland with low risk of encountering Annex 1 undesignated habitats	**Low Impact:** The study area consists of managed farmland with low risk of encountering Annex 1 undesignated habitats
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**Mid-range Impact:** Hedgerows and river crossings	**Mid-range Impact:** Hedgerows and river crossings
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Low Impact:** Semi natural habitats with potential for protected flora are rare in the study area	**Low Impact:** Semi natural habitats with potential for protected flora are rare in the study area
1.1.7	Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 16.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 15.8km crossed and associated access routes
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Low Impact:** Known Important bird sites are avoided Studies are required in particular around Boora Bog to determine bird distribution.	**Low Impact:** Known Important bird sites are avoided Studies are required in to determine bird distribution.
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 16.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 15.8km crossed and associated access routes
1.1.11	Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.14	Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.16	Potential to impact marine/coastal birds	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.1.17	Potential to impact marine mammals	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
1.2	**Biodiversity, Flora & Fauna (Aquatic)**		
1.2.1	Potential to impact on Natura 2000 Sites	Very Low impact No Natura sites in the area	Very Low impact: No Natura sites in the area
1.2.3	Potential impact Annex I listed habitats (designated)	Very Low impact No Natura sites in the area	Very Low impact: No Natura sites in the area

Ref.	Criteria	Corridor D1	Corridor D2
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very Low Impact:** As no non-designated Annex I listed habitats are recorded for the area, impact scored at very low.	**Very Low Impact:** As no non-designated Annex I listed habitats are recorded for the area, impact scored at very low.
1.2.5	Potential to impact high ecological value habitats (semi natural habitats)	**Very Low Impact:** As no high ecological value aquatic habitats are recorded for the area, impact scored at very low.	**Very Low Impact:** As no high ecological value aquatic habitats are recorded for the area, impact scored at very low.
1.2.6	Potential to impact on protected Flora - Flora Protection Order	**Low Impact:** As no protected aquatic flora or fauna are recorded aquatic habitats are recorded for the area, impact scored at very low.	**Mid-range Impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
1.2.7	Potential to impact on Annex II species	**Low Impact:** As no Annex I aquatic species are recorded for the area, impact is scored at very low.	**Low Impact:** As no Annex I aquatic species are recorded for the area, impact is scored at very low.
1.2.8	Potential to Impact on Annex IV species (wherever they occur)	**Low Impact:** As no Annex IV aquatic species are recorded for the area, impact is scored at very low.	**Low Impact:** As no Annex IV aquatic species are recorded for the area, impact is scored at very low.
1.2.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*
1.2.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*
1.2.11	Potential to impact on salmonid habitat - protected under SI Reg	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	As there are no Freshwater Pearl Mussels in the water courses, impact scored at nil.	As there are no Freshwater Pearl Mussels in the water courses, impact scored at nil.
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
1.2.14	Potential to impact on coastal zone habitats (intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.16	Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.2.17	Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3	**Fisheries**		
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
1.3.2	Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Mid-range impact:** Salmonids pass up the rivers.	**Mid-range impact:** Salmon pass up the Liffey.
1.4	**Water**		
1.4.1	Significance of Impact - WFD	**Low**	**Mid-range**
1.4.2	Significance of Impact – Watercourse Crossings	**Low**	**Low**
1.5	**Air/Climatic Factors**		
	Air		

Ref.	Criteria	Corridor D1	Corridor D2
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area few small pits/quarries.	Low impact in construction phase due to low density residential receptors in area few small pits/quarries. However route traverses lands of/near K Club
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase
1.5.3	Proximity to EPA Waste Licensed facility	None	None
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area	No facilities present in study area
1.5.5	EPA Air Quality Zone Classification	Zone D	Zone D
1.5.6	Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
1.5.7	Construction Phase Impact rating	Very low impact from construction dust emissions	Low impact from construction dust emissions
	Noise		
1.5.9	Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors	Low impact in construction phase due to route passing slightly more densely populated Receptors in area (Clane) and the K Club
1.5.10	Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
1.5.11	Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
1.5.12	Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
1.5.13	Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase
1.6	**Material Assets (Energy)**		
1.6.1	Potential for energy recovery	Not a differentiating factor	Not a differentiating factor
1.7	**Cultural Heritage (including Architecture & Archaeology)**		
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Low** as only one is recorded in a relatively large area
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	**Low** as there are 17 sites recorded within a relatively large area	**Low** as there are 21 sites recorded within a relatively large area
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (16). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (17). This is low relative to the size of the area
1.7.4	Potential to impact (direct/indirect) on NIAH	**Very low** as only three structures are recorded within the area	**Low** although there are a number of structures recorded within the area (12). This is low relative to the size of the area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	**Low** although there are a number of landscapes recorded within the area (5). This is low relative to the size of the area	Mid-range as a number of demesne are recorded within the area (10)
1.7.6	Potential to impact on ACA	**Very** low as none are present	**Very low** as none are present
1.7.7	Recorded shipwreck sites/underwater archaeology	**Very low** as none are present	**Very low** as none are present
1.8	**Landscape & Visual**		
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Mid-range** - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)	**Mid-range** - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Woodland at Donadea Demesne and River Liffey	**Low** - Bog, Woodland at Donadea Demesne and River Liffey
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Hedgerows, tree lines throughout	**Low -** Hedgerows, tree lines throughout
1.8.4	Potential to impact on woodlands and significant tree groups	**Low** - Woodland at Donadea Demesne, but this can be avoided	**Low -** Woodland at Donadea Demesne, but this can be avoided

Ref.	Criteria	Corridor D1	Corridor D2
1.8.5	Potential to impact on historic designed landscapes	**Low** - Several stately houses and Demesnes within the corridor	**Low** - Clongowes Wood College, Straffan demesne
1.8.6	Potential to alter the prevailing landscape character	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated
1.8.7	Potential to impact on designated scenic routes / views	**Low** - Portion of a scenic route east of Barbertown castle encompassed by corridor	**Low** - RL4 from Straffan Bridge designated in Kildare CDP encompassed by corridor
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Low** - Donadea woodland	**Mid-range -** The K Club internationally renowned golf course and the Grand Canal/ Grand Canal Way
1.8.9	Potential to impact on views from settlements	**Low -** Corridor tends to thread between significant settlements	**Low** - Corridor tends to thread between significant settlements
1.8.10	Potential to impact on views from dwellings / local roads	**Mid-range** - Some sections of substantial linear rural developments along local roads which may be difficult to thread through	**Mid-range** - Some sections of substantial rural residential development around Ballnaboley and Straffan
1.8.11	Potential to impact on views from motorways	**Very low** - reasonable distance from M4	**Very low** - no motorways in the vicinity
1.8.12	Potential to impact on views from other major roads (national or regional roads)	**Low -** crosses R403, R406, R407 and R408 regional roads	**Low** - crosses R403, R406, R407 and R408 regional roads
1.8.13	Potential to impact on views from rail lines	**Very low** - railway line runs just to the south east of this corridor	**Low** - corridor crosses railway line at eastern end
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
1.8.15	Potential to impact on views from national 'way marked' walking routes	**Very low** - Grand Canal Way just beyond the eastern end of this corridor	**Low** - Corridor crosses Grand Canal Way at its eastern end
1.8.16	Potential to impact on local walks	**Low** - Several loop walks associated with Donadea Woodland	**Very low** - Several loop walks associated with Donadea Woodland
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - River Liffey	**Low** - River Liffey, Grand Canal
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated
1.9	**Material Assets (Agronomy)**		
1.9.1	Agronomy	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However D2 is the least constrained route corridor
1.13	**Soils, Geology and Hydrogeology**		
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Low:** Mainly LL with some Pl	**Mid-range:** Mainly LL with Some Rkd
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Low:** Some Extreme, mainly high to moderate	**Low:** Some Extreme, mainly high to moderate
1.13.3	GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Low:** none identified, possibly some large private supplies	**Low:** none identified, possibly some large private supplies
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Low:** None identified	**Low:** None identified
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**Mid-range:** St Patricks Well - Geothermal, possibly high importance, consultation with GSI required. Liffey Oxbow Lake	**Low:** St Peters Well, geothermal
1.13.7	Potential to interact with contaminated land	**Low:** No large quarries identified	**Low:** No large quarries identified
1.13.8	Potential to sterilise mineral resource	**Low:**- No significant quarries identified in the corridor	**Low:** No significant quarries identified in the corridor
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc)	**Mid-range:** a number of areas with rock close to surface	**Mid-range:** a number of areas with rock close to surface
1.13.10	Potential impact on karst features	**Low:** none Identified	**Low:** none Identified
1.13.11	Potential to encounter soft ground	**Low:** Predominately till deposits	**Low:** Predominately till deposits
1.13.12	Soils Types	**Low:** Predominantly well drained soils	**Low:** Predominantly well drained soils

Ref.	Criteria	Corridor D1	Corridor D2
1.13.13	Sub Soil Types	**Low:** Predominantly till with gravels to the south of the Liffey. Occasional alluvial	**Low:** Predominantly till with gravels to the south of the Liffey. Occasional alluvial. Peat soils near Prosperous
1.13.14	Depth to rock	**Low:** Variable	**Low:** Variable
2.0	**Technical**		
2.1	**Planning Policy**		
	Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve large growth towns	Pipeline could serve large area of North Kildare
2.2	**Engineering and Design**		
2.2.1	Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	6.21 km^2	3.22 km^2
2.2.2	Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route has 2no. Crossings (River Liffey, Railway)	**Mid-range -** this route has 3no. Crossings (River Morell, River Liffey, Railway)
2.2.3	Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**High -** this route requires 20no. Crossings	**Mid-range** - this route requires 17no. Crossings
2.2.4	Karst	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
2.2.5	Subsoils	**Mid-range** - this route contains 7% peat, 7% glaciofluvial deposits and 5% alluvium	**High** - this route contains 10% peat, 17% glaciofluvial deposits, 6% made ground
2.2.6	Accessibility	**Low** - the route is served by the M4 and several regional roads	**Low** - the route is served by the N7 and several regional roads
2.2.7	Elevation Profile	**Low** - the route has a consistent fall to its termination	**Low** - the route has a consistent fall to its termination
2.3	**Traffic**		
2.3.1	Number of crossings required for access road	Not Applicable	Not Applicable
2.3.2	Number of crossings of Motorways	None	None
2.3.3	Number of crossings of National Roads	None	None
2.3.4	Number of crossings of Regional Roads	**Low Impact:** 4 crossings	**Low Impact:** 4 crossings
2.3.5	Number of crossings of Local Roads - Primary	**Low Impact:** up to 2 crossings	**Low Impact:** up to 2 crossings
2.3.6	**Criteria**	**Corridor D1**	**Corridor D2**
2.3.7	Number of crossings of Local Roads - Secondary / Tertiary	**Mid-range Impact:** up to 12 crossings	**Low Impact:** up to 9 crossings
2.3.8	Number of Railway Crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing
2.4	**Capital and Operational Costs**		
2.4.1	CAPEX	€ 35 – 45 million	€ 30 – 40 million
2.4.2	OPEX	Not a differentiating factor	Not a differentiating factor
2.5	**Sustainability**		
2.5.1	Carbon Footprint	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.	Pipeline is not sufficiently defined to support a calculation of embodied or operation carbon at this stage.

4.7 Least constrained DE Route Corridor

The MCA process identified Route Corridor D1 as the least constrained.

Route Corridor D1 is considered to be the least constrained for the following reasons:

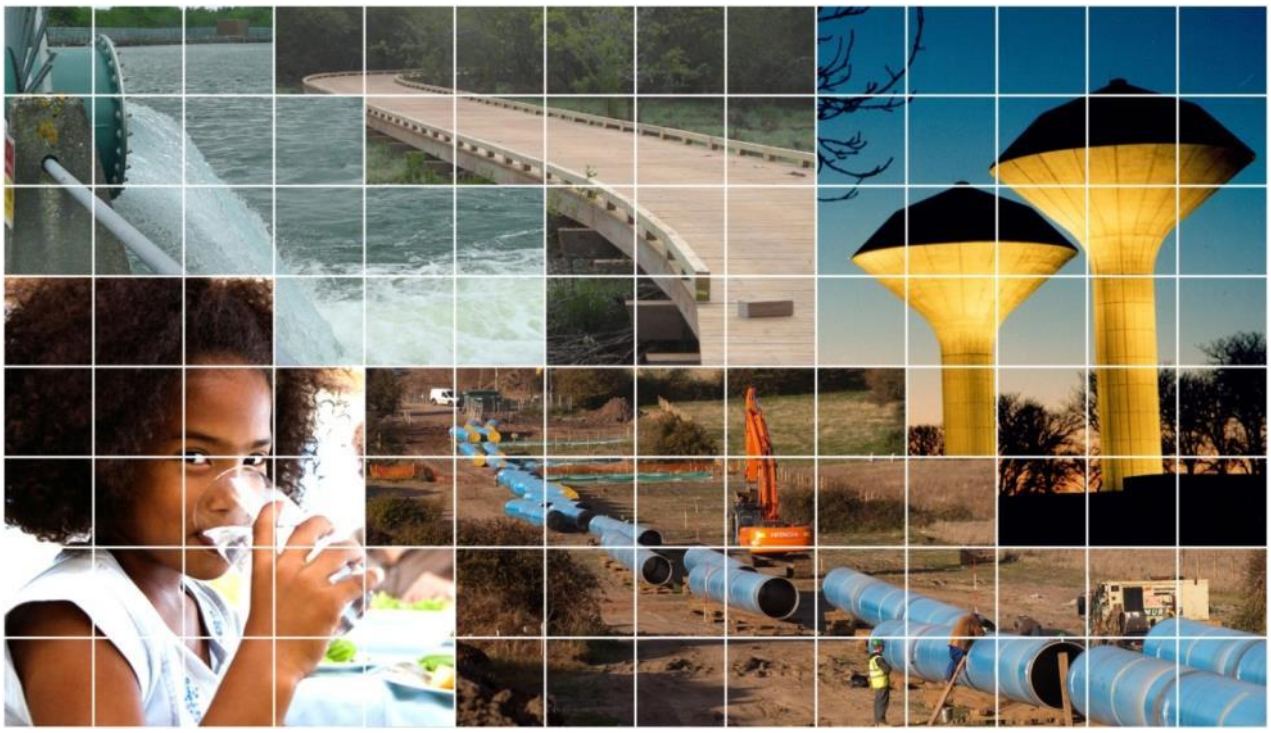
- A significant portion of the D2 corridor is occupied by the highly sensitive receptor of the K-Club Golf
- Least potential for encountering poor ground, least number of crossings of major obstructions and has an acceptable elevation profile.
- It encounters he lowest number of cultural heritage constraints.

Water Supply Project – Eastern and Midlands Region

Appendix F: Parteen Basin Reservoir MCA

Appendix F2: Identification of Preliminary Route Corridors

October 2015 **F01**



Contents

+

1 Introduction

1.1 Background to Report

This report documents the methodology applied to identify "Preliminary Route Corridors" (approximately 2km wide) from within the "White Space" selected/identified under "Linear Site Methodology – Step 1" of the Site Selection Methodology, refer to Appendix B.

The report builds upon previous work undertaken in support of option appraisal; it is based on the following outcomes reached:

- Parteen Basin as the least constrained abstraction location for a Shannon Option
- Peamount as the least constrained terminal location.

1.2 Methodology

The selection of the "Preliminary Route Corridors" is based upon the following:

- Mapping of the constraint datasets assigned a red or amber classification by each of the specialisms; and
- Consideration of technical constraints/requirements.

The following process was adopted to help define those areas of least constraint from within the existing "White Space":

1. Agreed constraints were mapped in the GIS database (detailed in Chapter 2);

2. Areas were excluded where a constraint or combination of constraints ("Red" or "Amber" classification as listed in Chapter 2) were of sufficient footprint to influence the routing of 2km route corridors. (detailed in Chapter 3);

3. Areas were excluded where housing densities in combination with constraints ("Red" or "Amber" classification as listed in Chapter 2) were of sufficient area to influence the routing of 2km route corridors. (detailed in Chapter 4);

4. Areas outside those excluded in Step 2 & 3 which, through a combination of previous exclusions, were no longer considered viable area for the siting of route corridors, were then themselves excluded (detailed in Chapter 5);

5. Routes where then compiled from the remaining lesser constrained areas. (detailed in Chapter 6);

The areas identified for exclusion from the "White Space" are detailed within the following sections.

2 Constraint Classification

2.1 Constraints Assessment by Specialists

The engaged project specialists were requested to independently assess and identify constraints/issues that would reflect their opening position for the selection of the "Preliminary Route Corridors" which would result in least impact to the overall site selection.

A full list of these constraints was compiled (by classification) and applied to the GIS database. The constraints used to define the "White Space"(refer to *Water Supply Options Working Paper* - June 2015) were also included in this stage of the assessment.

The following classification system was adopted:

Colour	Classification	Criteria
Red	High	Avoid unless no alternative available
Amber	Medium	Avoid where possible
Green	Low	Minimal impact if encountered

A full list of the constraints database and assigned classification is detailed in Table F2-1 below.

Table F2 – 1 Constraints database and classification

Dataset	Source	High	Medium	Low
Quarries	EPA	x		
Landfills	EPA	x		
Licensed IPPC Facilities	EPA	x		
Water Treatment Plants	EPA	x		
Waste Water Treatment Plants	EPA	x		
Mines	EPA	x		
National Monuments: - Subject to a preservation order (or temporary preservation order). - In the ownership or guardianship of the Minister for Arts, Heritage and the Gaeltacht or a Local Authority.	DoAHG	x		
Settlements	CSO	x		
Building Density (>100 per Km2)	Processed from Geodirectory (An Post)	x		
Record of Protected Structures	local authority	x		
Recreational Waters WFD Annex V (iii)	EPA	x		
Limestone Pavement	NPWS	x		
Pearl Mussels	NPWS	x		
Nature Preserves	NPWS	x		
Nature Preserves	NPWS	x		

Dataset	Source	High	Medium	Low
Pollardstown Fen	Processed Data (from GSI datasets)	x		
Curragh Aquifer	Processed Data (from GSI datasets)	x		
Ancient Woodlands	NPWS	x		
Fens	NPWS	x		
Turloughs	NPWS	x		
Coastal Lagoon	NPWS	x		
Intact Raised Bog	NPWS	x		
Blanket Bog	NPWS	x		
Salt Marsh	NPWS	x		
Potential Turloughs	NPWS	x		
Limestone Pavement	NPWS	x		
Building Density (>50 per Km2)	Processed from Geodirectory (An Post)		x	
Lakes WFD	EPA		x	
Zoning Ireland	DoECLG		x	
Geological Heritage Sites Exceptions do apply so review on a case by case basis.	GSI		x	
Groundwater Vulnerability (Subsets include Extreme and Extreme Rock at Surface)	GSI		x	
Karst Features	GSI		x	
Record of Protected Structures RPS Dun Laoghaire Rathdown	local authority		x	
Record of Protected Structures RPS Kilkenny	local authority		x	
Record of Protected Structures RPS South Dublin	local authority		x	
Record of Protected Structures RPS Wicklow	local authority		x	

Dataset	Source	High	Medium	Low
Wet Heath	Source NPWS: Significant Ecological Receptor sensitive to development. Evaluation will range between Local and International Importance		x	
Floodplains	OPW		x	
Coastal Floodplains	OPW - Irish Coastal Protection Strategy Study (ICPSS)		x	
Coillte Forestry	Coillte		x	
Salmonid Water Salmonid Regulations (S.I. 293 / 1988)	EPA		x	
Waters used for the abstraction of drinking water WFD Annex V (i)	EPA		x	
Areas designated to protect economically significant aquatic species WFD Annex V (ii)	EPA		x	
Recreational Waters WFD Annex V (iii)	EPA		x	
Tree Preservation Orders	local authority		x	
Mineral Locations	GSI		x	
Source Protection Area	GSI		x	
Bathing Water Locations	EPA		x	
WFD Coastal Water Bodies	EPA		x	
WFD Transitional Water Bodies	EPA		x	
National Trails, Walking routes and Cycle Routes	local authority		x	
Dive Clubs	MIDA		x	
Fishing Ports	MIDA		x	
Marinas	MIDA		x	
Moorings	MIDA		x	
Sailing Clubs	MIDA		x	
Surf Clubs	MIDA		x	
Blue Marinas	MIDA		x	

Dataset	Source	High	Medium	Low
Water Abstraction Point	EPA		x	
Windsurfing Schools	MIDA		x	
Landscape Character Areas (Local Authorities)	local authority		x	
Sensitive Land Cover Kilkenny	local authority		x	
Views Prospects Local Authorities	local authority		x	
Architectural Conservation Areas (ACA)	local authority		x	
Record of Protected Structures (RPS)	local authority		x	
County Geological Sites	GSI		x	
National Parks should be included	NBDC		x	
Forestry 12	Department Of Agriculture		x	
Special Areas of Conservation (SAC) (Natura 2000 Sites)	NPWS		x	
Special Protection Areas (SPA) (Natura 2000 Sites)	NPWS		x	
Record of Monuments and Place (RMP)	DoAHG		x	
Proposed Natural Heritage Areas (pNHA)	NPWS		x	
Ramsar	NPWS		x	
Unesco Sites	MIDA		x	
Natural Heritage Areas (NHA)	NPWS		x	
Native Woodland Survey 2010	NPWS		x	
Local Authority Habitat Surveys	local authority		x	
Important Bird Areas (Refuge for Fauna)	MIDA		x	
Iwebs data Bird watch Ireland	BW Ireland		x	
Wintering bird Site - International / National/ Regional	BW Ireland		x	
I-webs Site Local	BW Ireland		x	
Woodland Habitat	NPWS		x	
Semi Natural Grasslands	NPWS		x	
Raised Bog (un-surveyed) – vegetated	NPWS		x	
Soil (Subsets Include different Bog Classes)	EPA			x
Subsoil (Subsets Include different Bog Classes)	EPA			x
Commonage Base Plan 2011	NPWS			x
Commonage Base Station 2011	NPWS			x

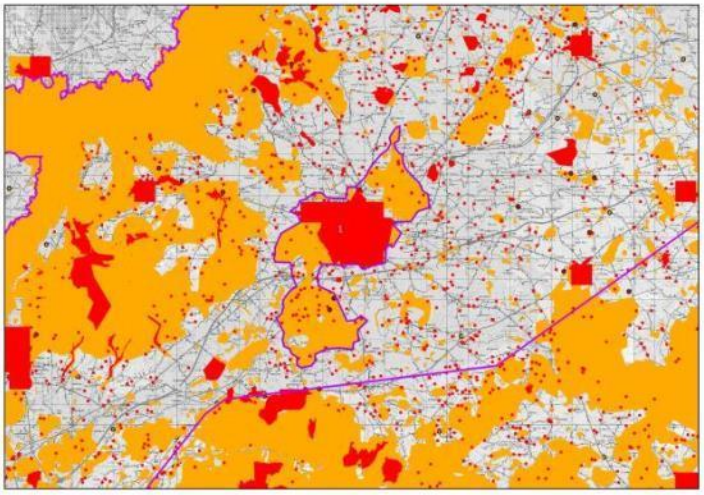
Dataset	Source	High	Medium	Low
Commonage Base SU 2011	NPWS			x
High Power Electric Transmission Lines	ESB			x for Material Assets
WFD Groundwater Bodies	EPA			x
Groundwater Zones of Contribution	EPA			x
Blue Flag Beaches	MIDA			x
Fishing Spots	MIDA			x
Green Coast Award	MIDA			x
Surf Spots	MIDA			x
Contaminated Land	EPA, County Council			x

2.2 Technical Constraints

In order to further reduce the "White Space" area the engineering specialists introduced the Geodirectory database to the desktop study. A 40m buffer was placed around each Geodirectory node as a conservative position on the footprint of private dwellings for the purposes of this constraint mapping process.

3 Areas Removed From “White Space” Based on Constraints

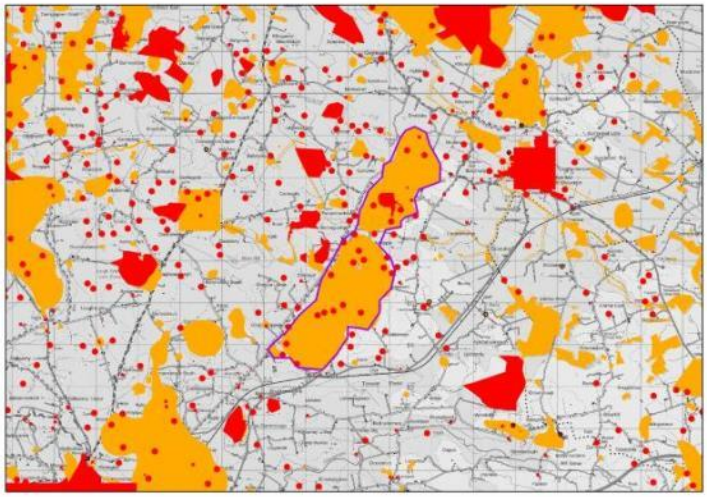
3.1 Area 1



Constraints
Settlements
High and medium density buildings
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland and Turloughs
Forestry

Additional Factors
N/A

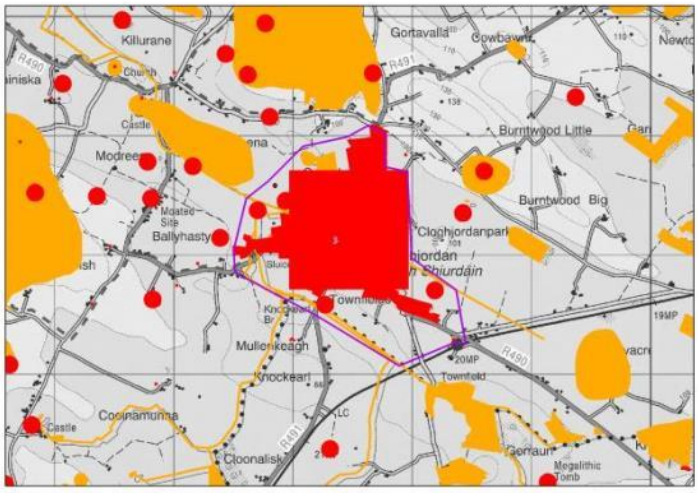
3.2 Area 2



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland
Forestry

Additional Factors
N/A

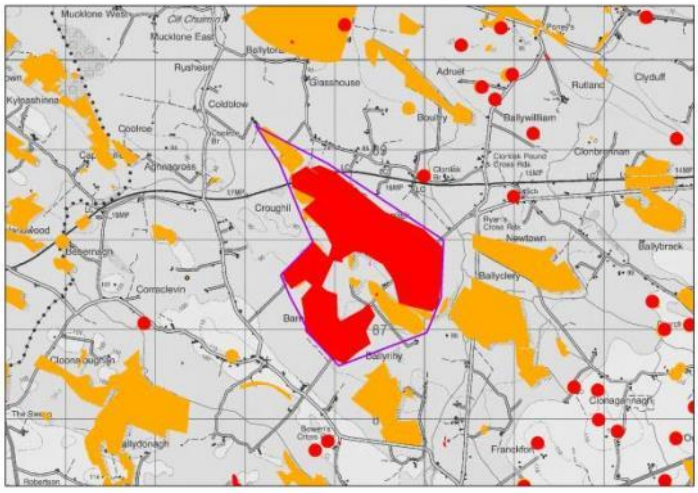
3.3 Area 3



Constraints
Settlements
High and medium density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

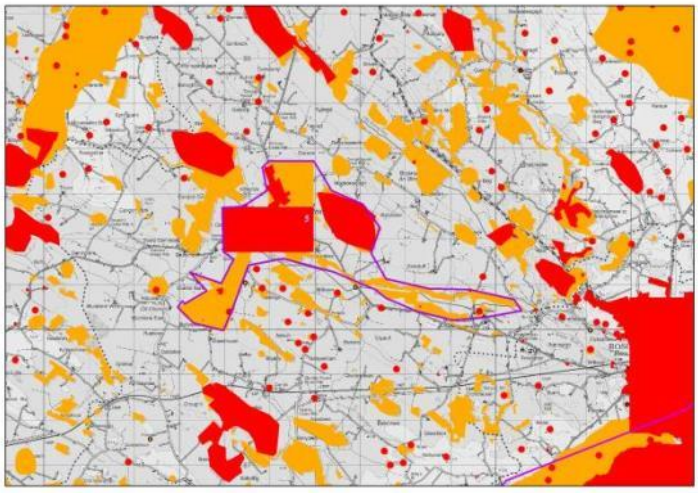
3.4 Area 4



Constraints
Quarries
Important Habitats, Bog Woodland and Raised Bog

Additional Factors
N/A

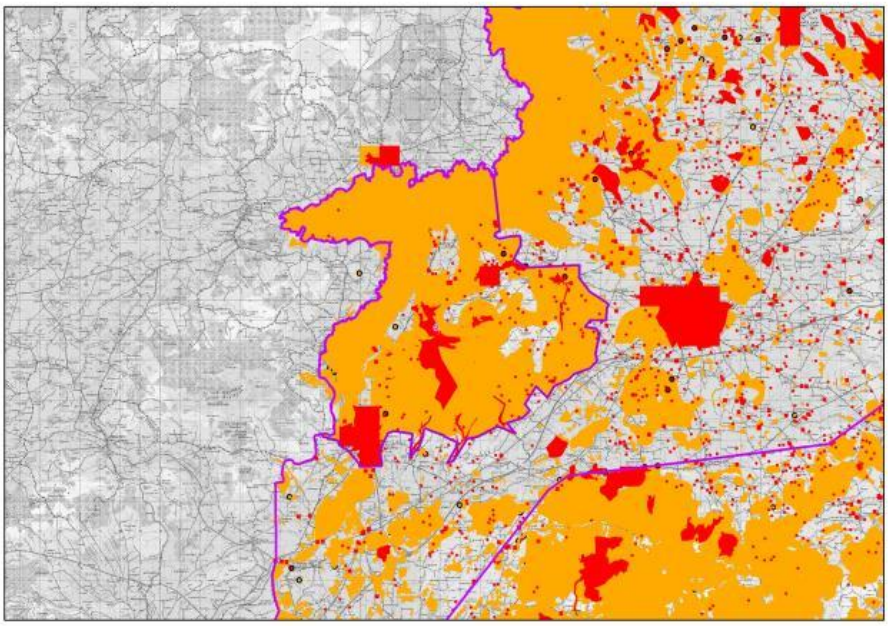
3.5 Area 5



Constraints
Settlements
pNHA
High and medium density buildings
Groundwater Source Protection Area
Groundwater Zone of Contribution
High Sensitivity Landscape
Forestry

Additional Factors
N/A

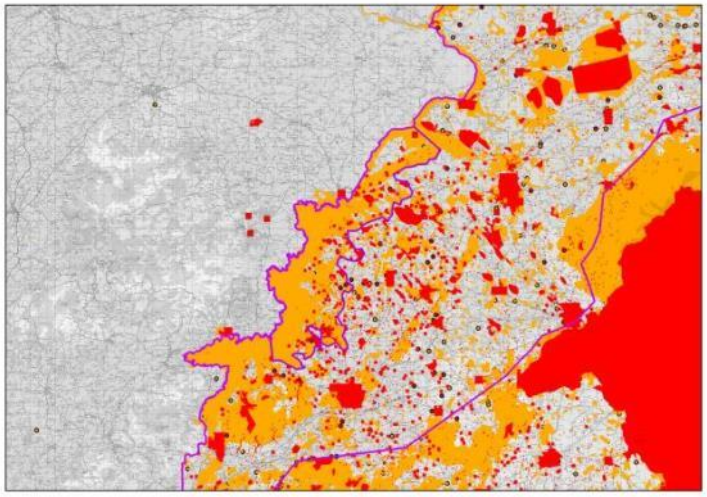
3.6 Area 6



Constraints
Settlements
High and medium density buildings
SPA, pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland and Heaths

Additional Factors
N/A

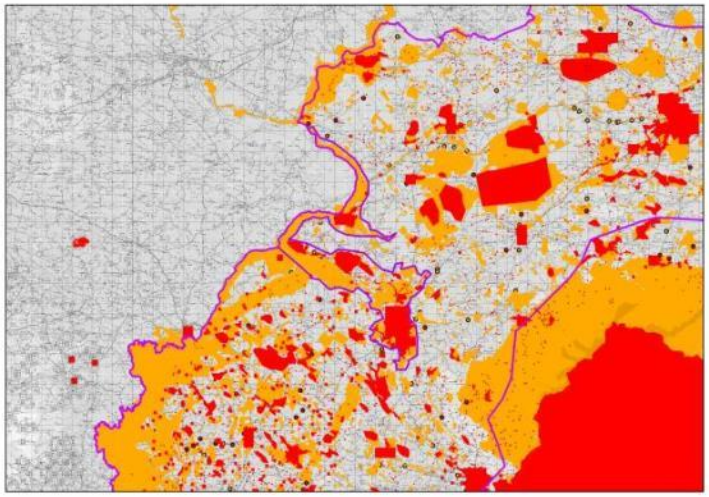
3.7 Area 7



Constraints
SAC , SPA , pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland, Turloughs, Bog Woodland and Raised Bog

Additional Factors
N/A

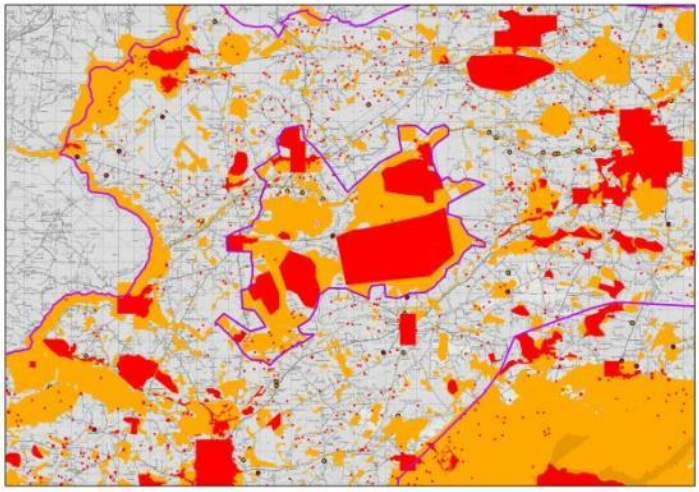
3.8 Area 8



Constraints
Settlements
High and medium density buildings
SAC , SPA , pNHA, NHA
Important Habitats
Groundwater Extreme Vulnerability
Groundwater Source Protection Area
Groundwater Zone of Contribution
Ancient Woodland
Forestry

Additional Factors
N/A

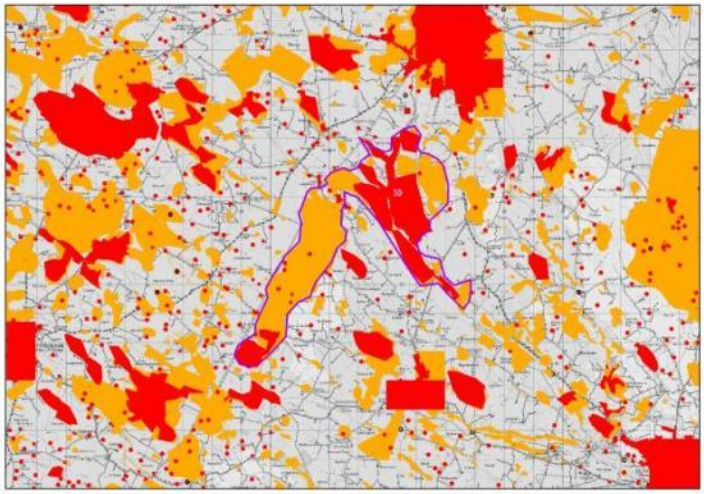
3.9 Area 9



Constraints
Settlements
High density buildings
pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Boora Parklands Wetlands and Fens
Geological Heritage Sites
High Sensitivity Landscape and High Amenity Area
Forestry
Architectural Conservation Areas

Additional Factors
N/A

3.10 Area 10



Constraints
pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Raised Bog and Fen, Other Wetlands
High Sensitivity Landscape
Forestry

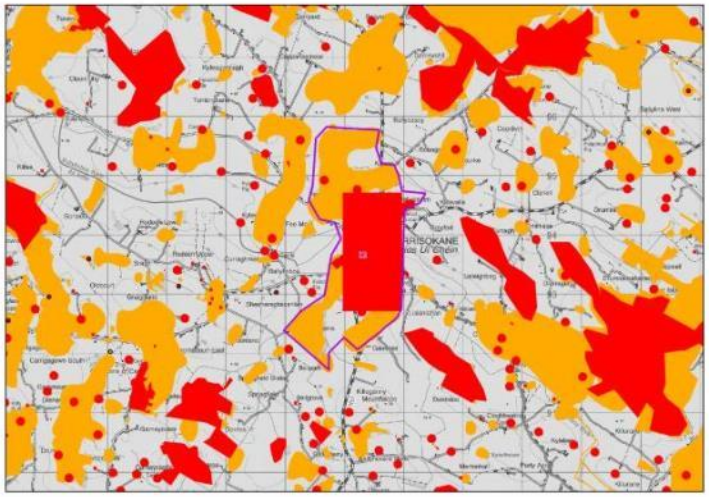
Additional Factors
N/A

3.11 Area 11

Constraints
NHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Bog Woodland and Raised Bog
Groundwater Source Protection Area
Forestry

Additional Factors
N/A

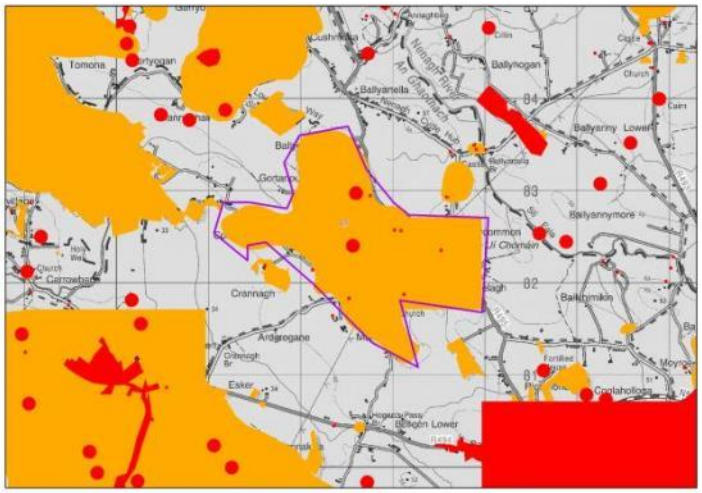
3.12 Area 12



Constraints
Settlements
High density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

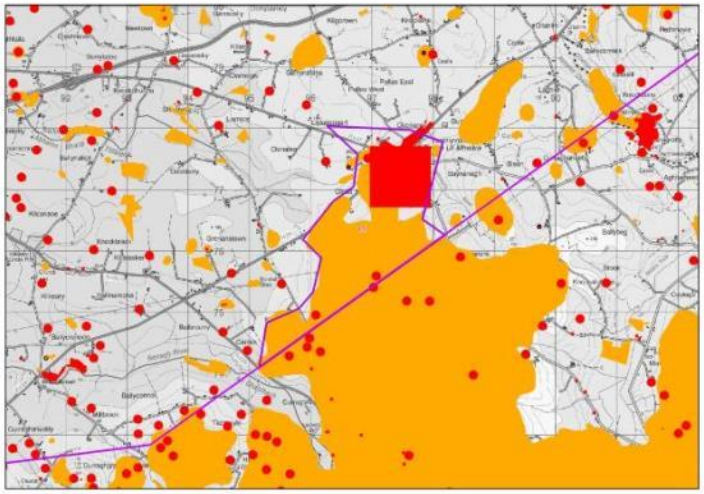
3.13 Area 13



Constraints
Medium density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

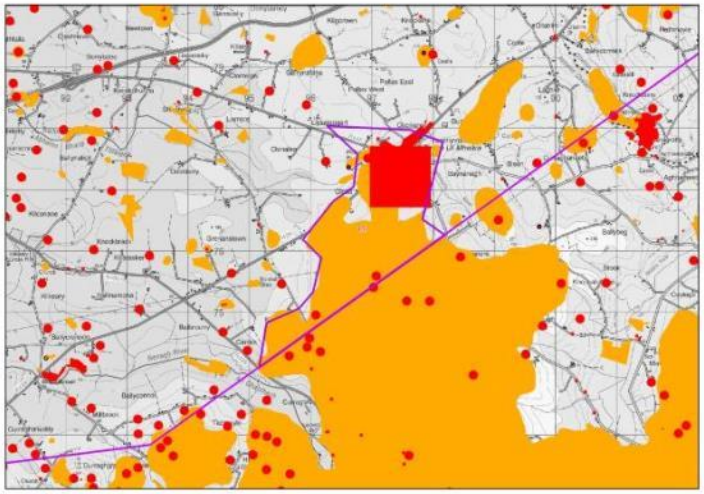
3.14 Area 14



Constraints
Settlements
High density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

Additional Factors
N/A

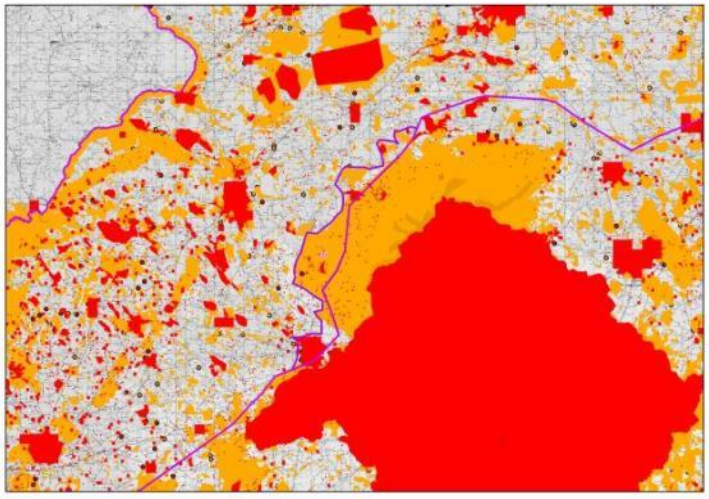
3.15 Area 15



Constraints
Settlements
High density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

Additional Factors
N/A

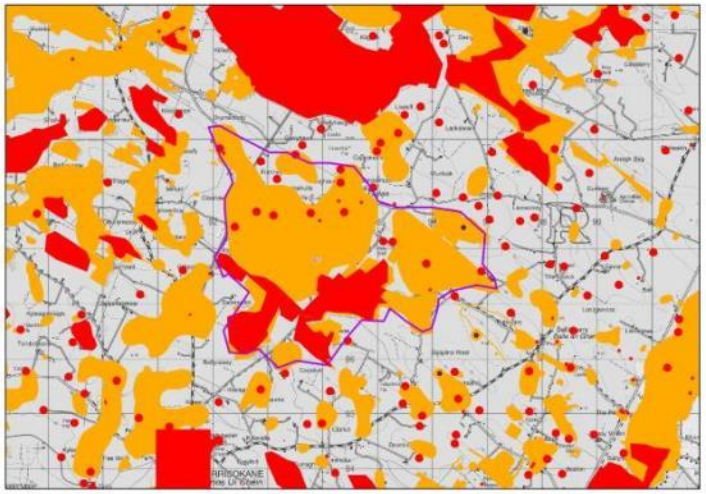
3.16 Area 16



Constraints
Settlements
High density buildings
pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Geological Heritage Sites
High Sensitivity Landscape and High Amenity Area
Forestry
Architectural Conservation Areas

Additional Factors
N/A

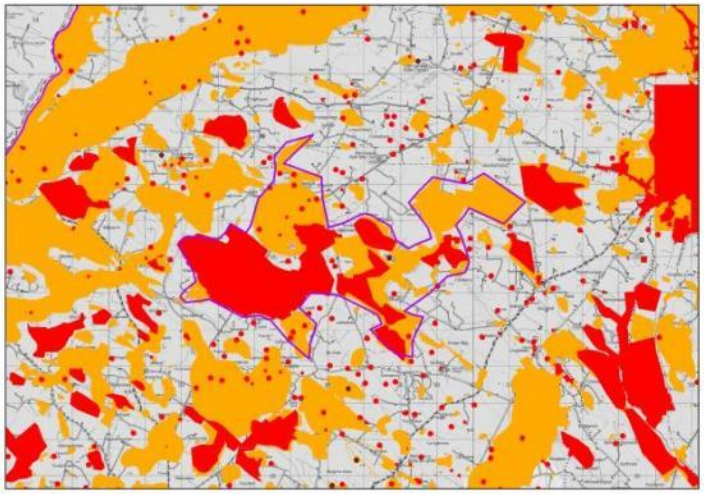
3.17 Area 17



Constraints
SAC, pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Fens and Raised Bog
Forestry

Additional Factors
N/A

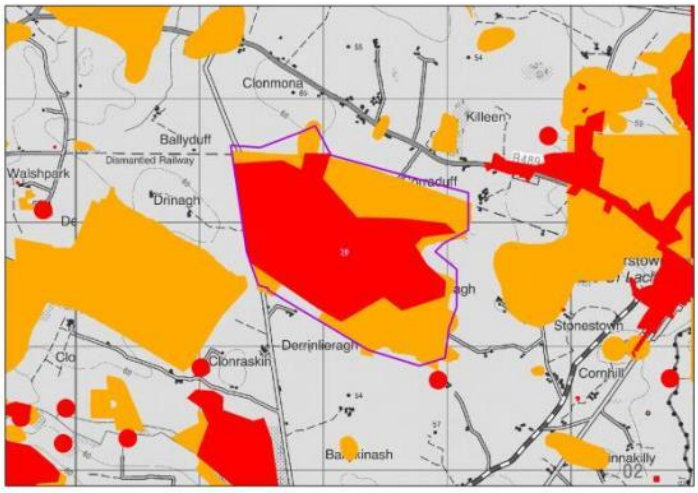
3.18 Area 18



Constraints
SAC , NHA , pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Important Wetland Bird Sites, Fens, Bog Woodland and Raised Bog
Geological Heritage Sites
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

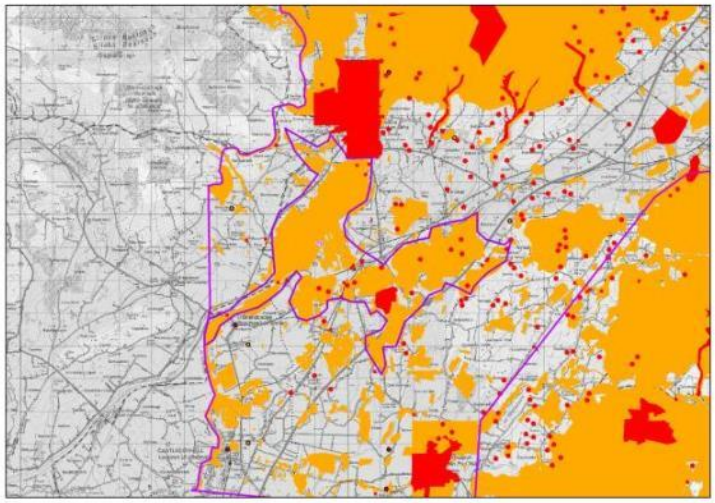
3.19 Area 19



Constraints
NHA
Important Habitats, Raised Bog

Additional Factors
N/A

3.20 Area 20



Constraints
SAC
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Bog Woodland and Raised Bog
Forestry

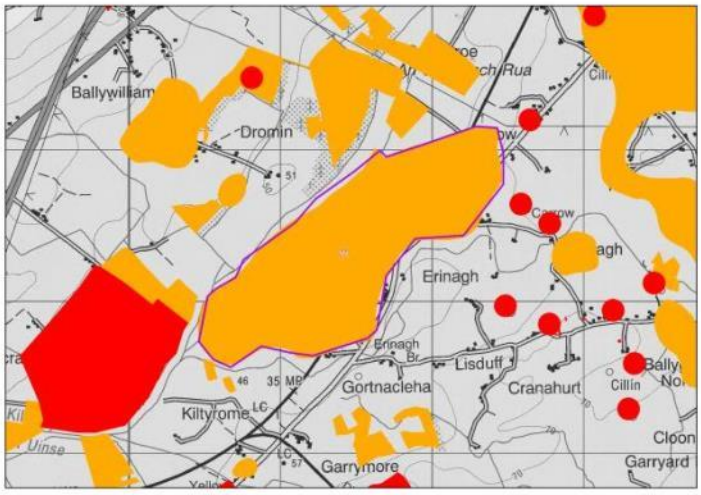
Additional Factors
N/A

3.21 Area 21

Constraint
Mines
Forestry

Additional Factors
N/A

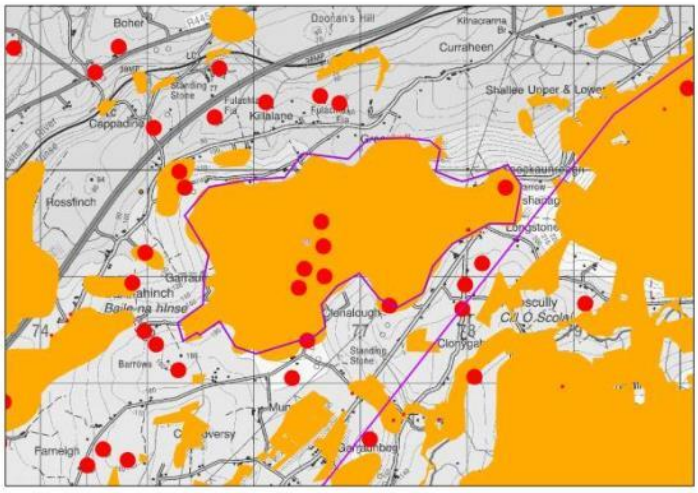
3.22 Area 22



Constraints
Groundwater Extreme Vulnerability

Additional Factors
N/A

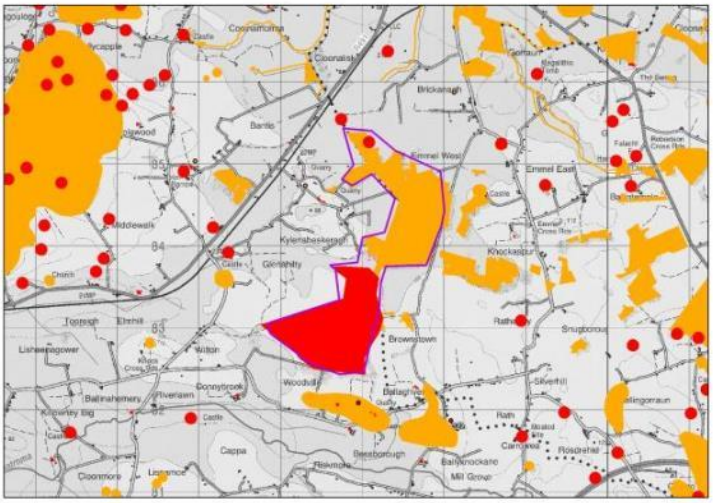
3.23 Area 23



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

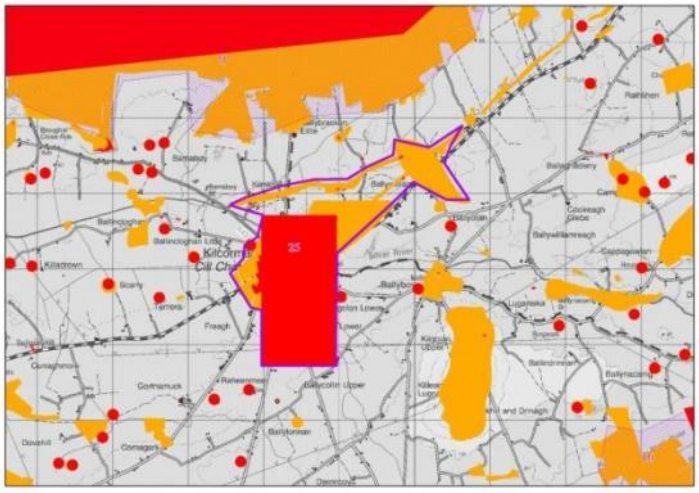
3.24 Area 24



Constraints
Important Habitats, Bog Woodland and Raised Bog
Forestry

Additional Factors
N/A

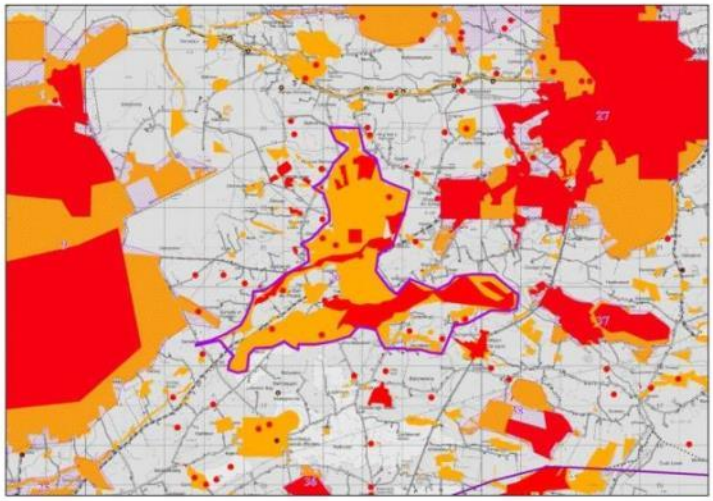
3.25 Area 25



Constraints
Settlements
High density buildings
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
Groundwater Zone of Contribution
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

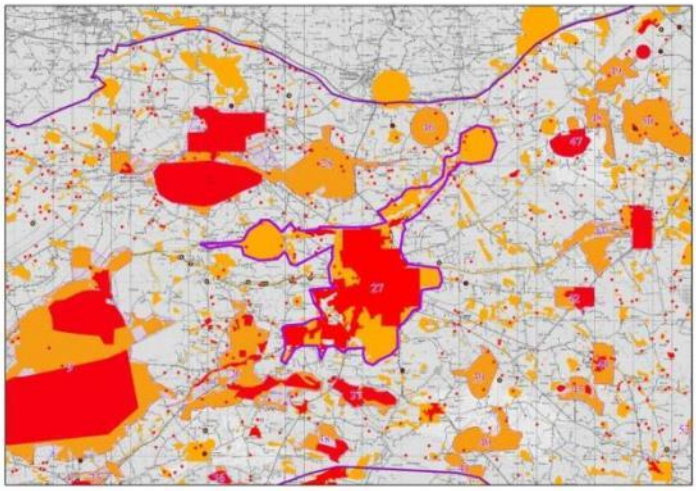
3.26 Area 26



Constraints
NHA , pNHA
Quarries
Important Habitats, Bird Sites, Bog Woodland and Wetlands
Groundwater Extreme Vulnerability and Rock at or Near surface
Karst Features
Groundwater Source Protection Area
High Sensitivity Landscape and High Amenity Area
Forestry
Architectural Conservation Areas

Additional Factors
N/A

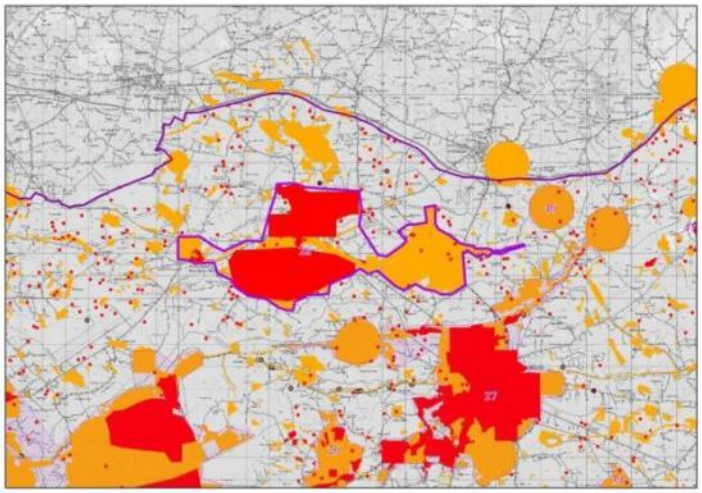
3.27 Area 27



Constraints
Settlements
High and medium density buildings
pNHA
Groundwater Extreme
High Sensitivity Landscape and High Amenity Area

Additional Factors
N/A

3.28 Area 28



Constraints
Settlements
High and medium density buildings
SAC , pNHA, Ramsar Site
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Raised Bog
Groundwater Zone of Contribution
Geological Heritage Sites
High Sensitivity Landscape and High Amenity Area
Forestry
Architectural Conservation Areas

Additional Factors
N/A

3.29 Area 29

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

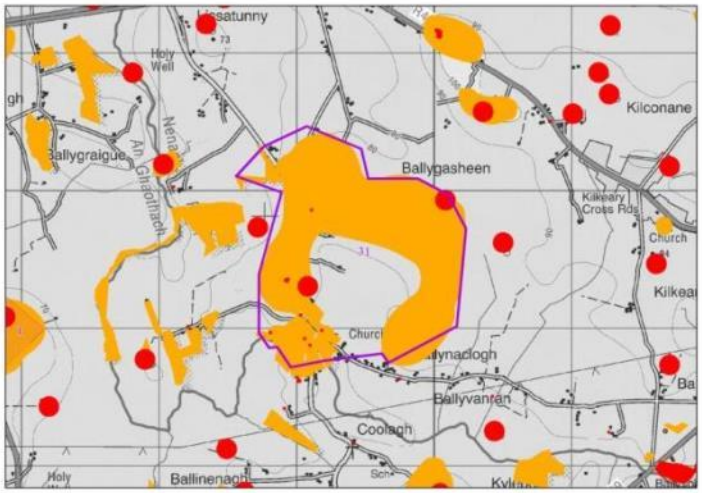
Additional Factors
N/A

3.30 Area 30

Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

3.31 Area 31



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry
Architectural Conservation Areas

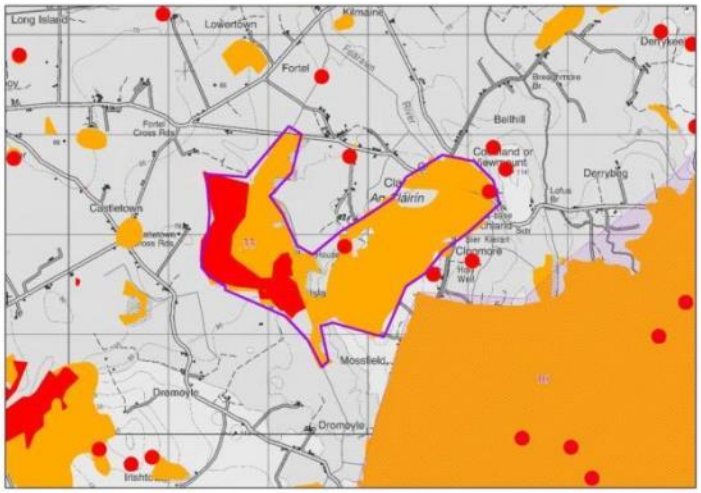
Additional Factors
N/A

3.32 Area 32

Constraints
NHA
Important Habitats, Bog Woodland and Raised Bog
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

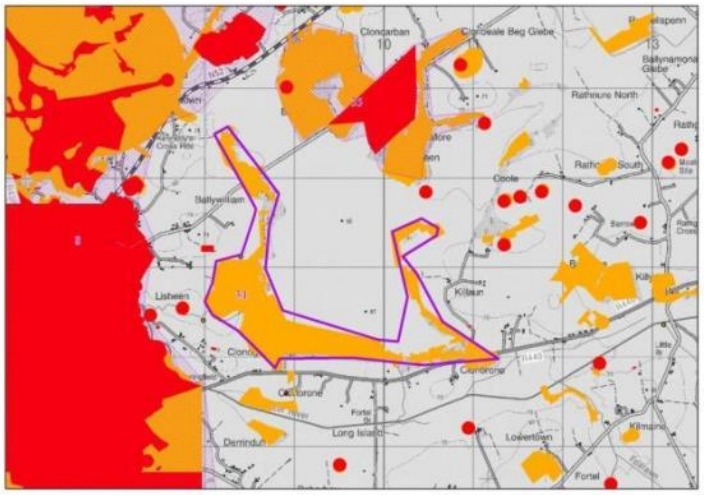
3.33 Area 33



Constraints
SAC
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland and Fens
High Sensitivity Landscape
Forestry
Architectural Conservation Areas

Additional Factors
N/A

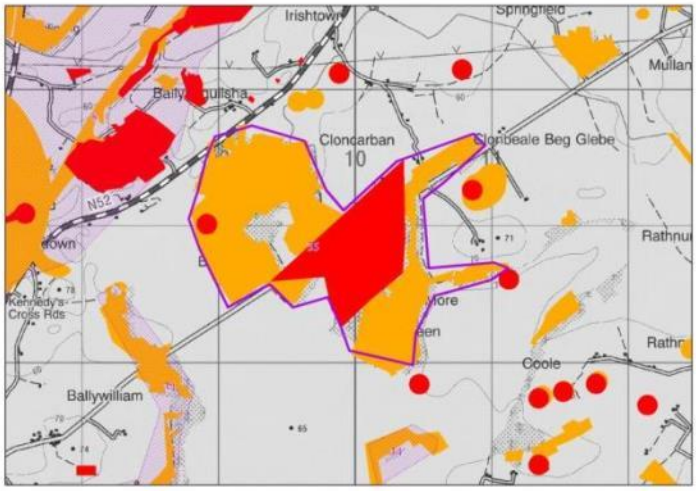
3.34 Area 34



Constraints
Forestry

Additional Factors
Mapping and Aerial data used to indicate additional forest area to extend Cut and close gap

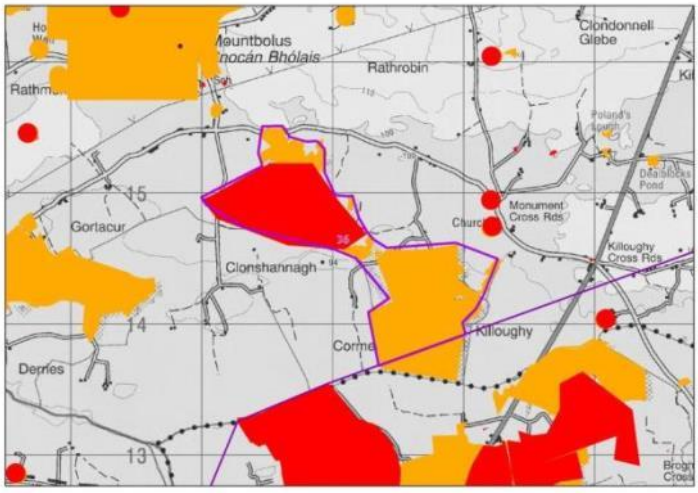
3.35 Area 35



Constraints
Important Habitats, Bog Woodland and Raised Bog
Forestry

Additional Factors
N/A

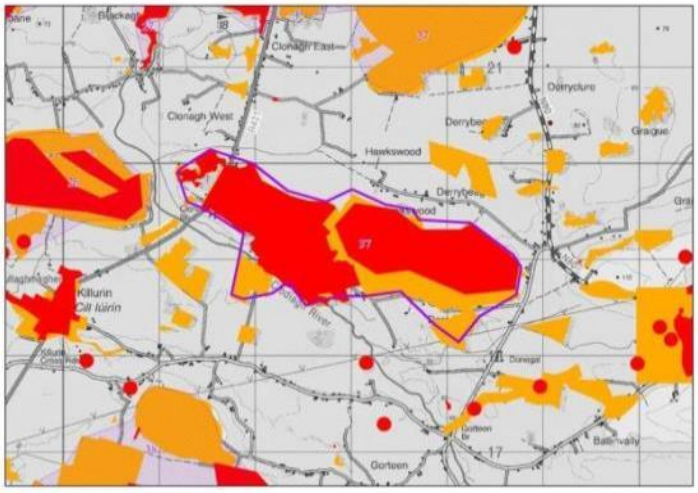
3.36 Area 36



Constraints
Important Habitats, Bog Woodland and Raised Bog
Forestry
Native Woodland

Additional Factors
Mapping and Aerial data used to indicate additional forest area to extend Cut and close gap

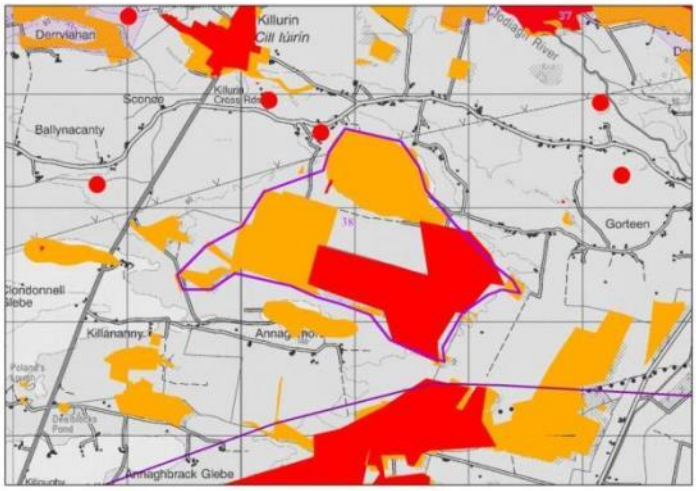
3.37 Area 37



Constraints
NHA, pNHA
Important Habitats Raised Bog
High Sensitivity Landscape
Forestry
Ancient Woodland
Architectural Conservation Areas

Additional Factors
N/A

3.38 Area 38



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats Raised Bog
Forestry

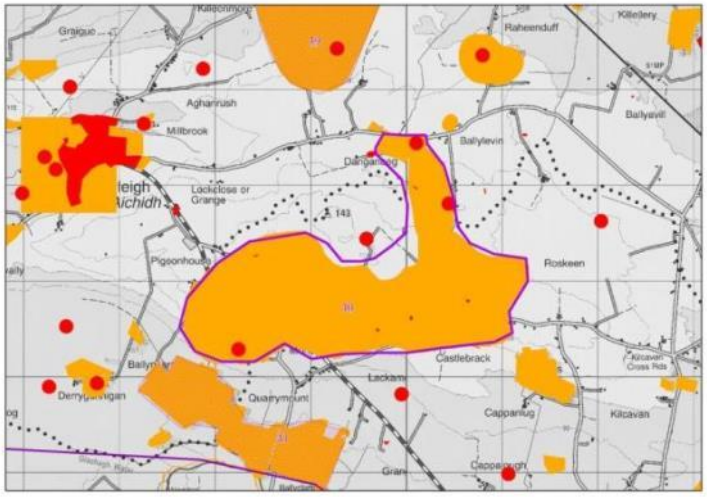
Additional Factors
N/A

3.39 Area 39

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
Forestry
Architectural Conservation Areas

Additional Factors
N/A

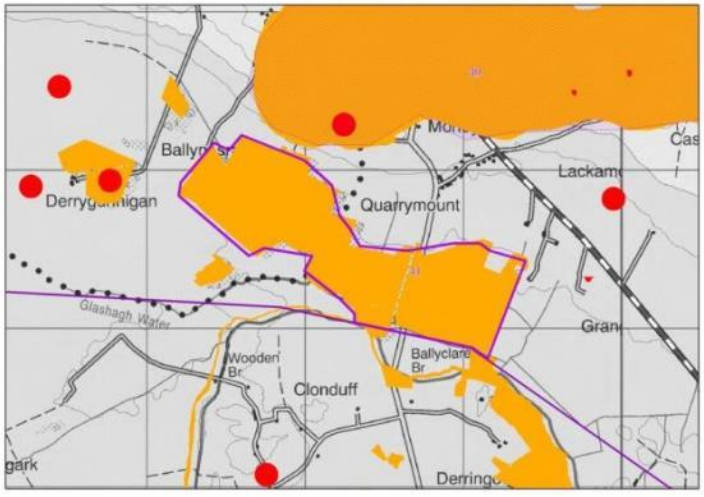
3.40 Area 40



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area

Additional Factors
N/A

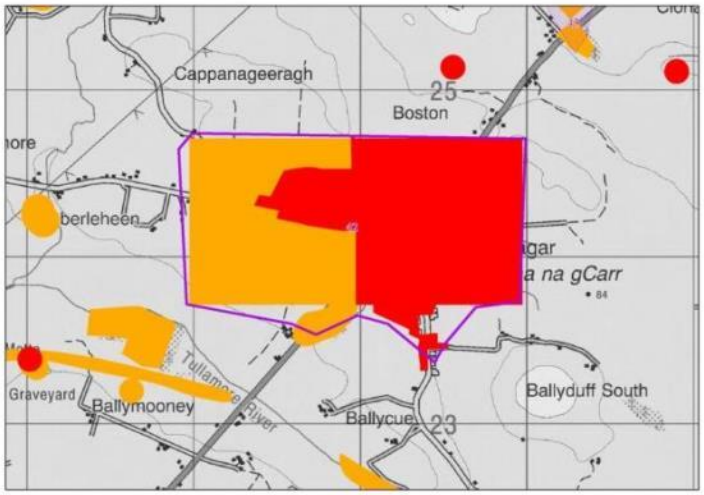
3.41 Area 41



Constraints
Forestry

Additional Factors
N/A

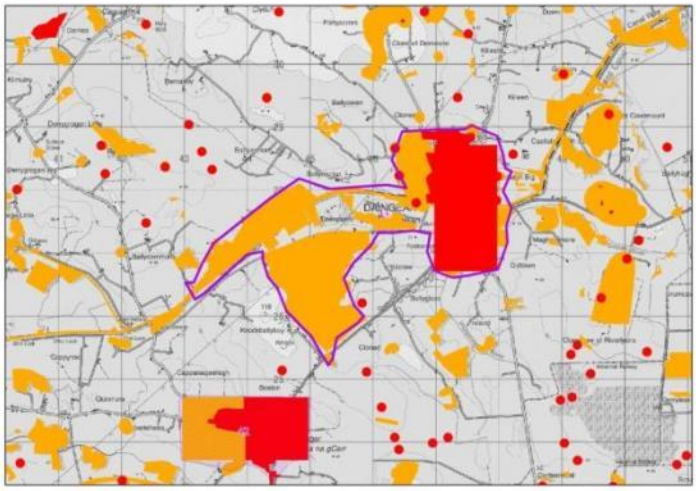
3.42 Area 42



Constraints
Settlements
High and medium density buildings
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

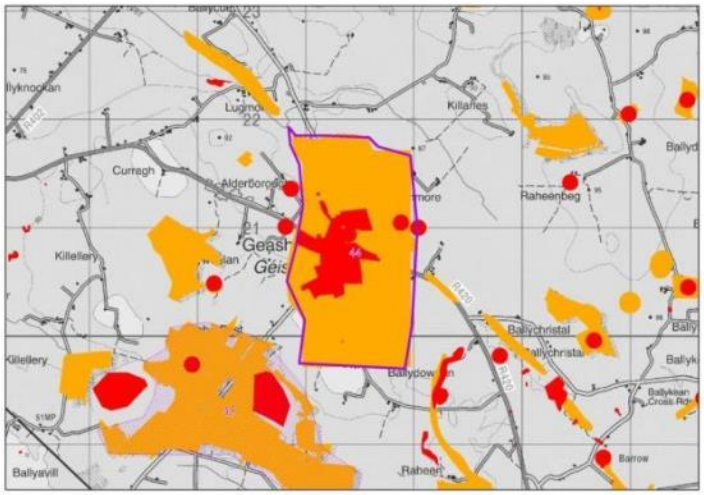
3.43 Area 43



Constraints
Settlements
High and medium density buildings
NHA , pNHA
Quarries
Forestry

Additional Factors
N/A

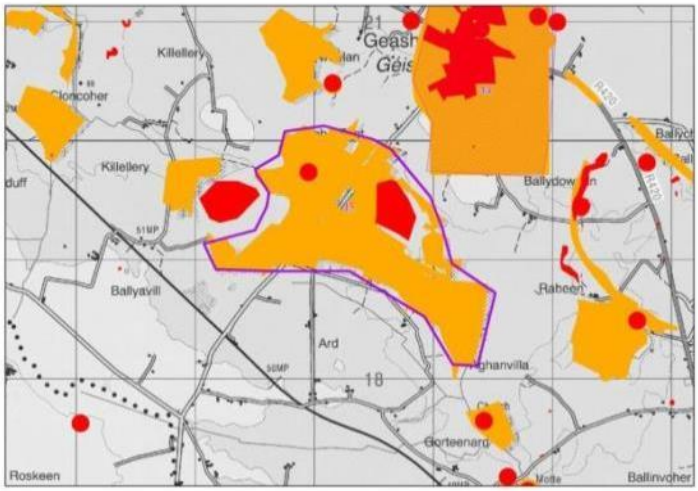
3.44 Area 44



Constraints
Settlements
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
High Sensitivity Landscape
Architectural Conservation Areas

Additional Factors
N/A

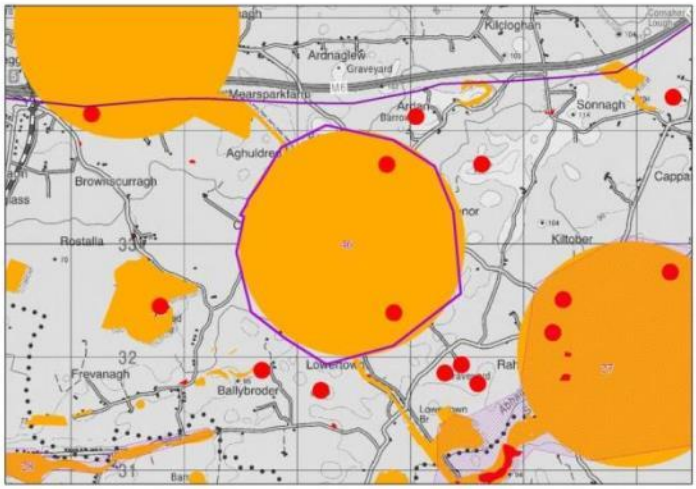
3.45 Area 45



Constraints
Important Habitats, Raised Bog
Forestry
Architectural Conservation Areas

Additional Factors
N/A

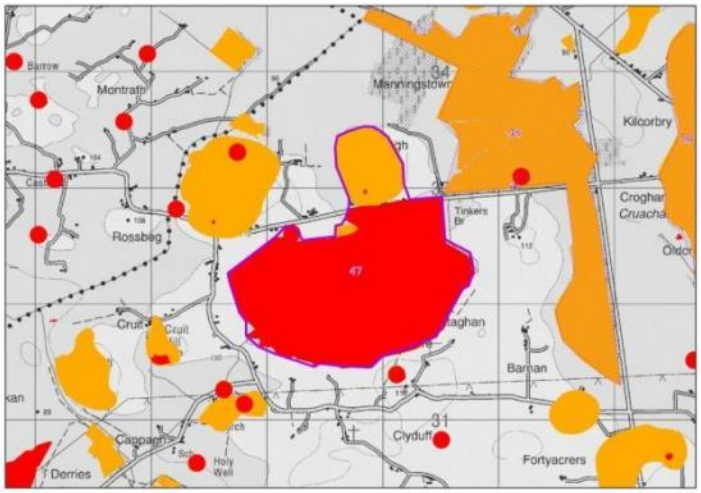
3.46 Area 46



Constraints
pNHA
Geological Heritage Sites

Additional Factors
N/A

3.47 Area 47



Constraints
Nature Preserve
SAC, pNHA, Ramsar
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats,
High Sensitivity Landscape and High Amenity Area
Forestry
Architectural Conservation Areas

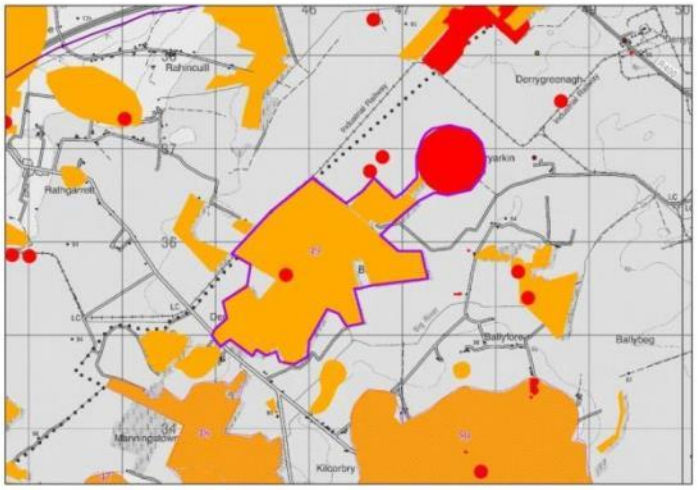
Additional Factors
N/A

3.48 Area 48

Constraints
Forestry
Architectural Conservation Areas

Additional Factors
N/A

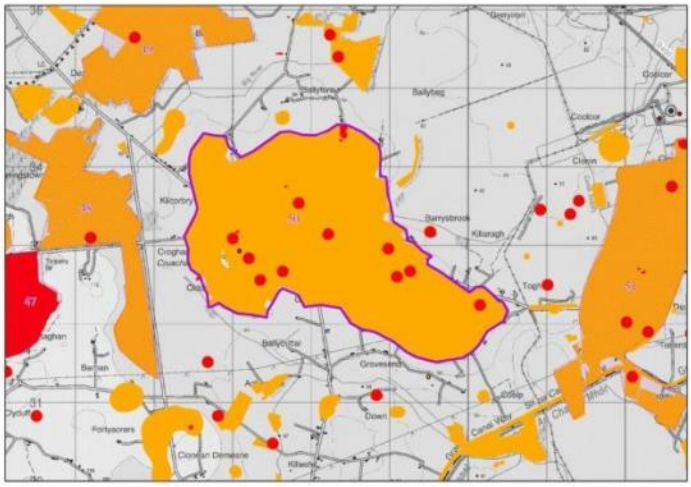
3.49 Area 49



Constraints
Quarries
Forestry
Architectural Conservation Areas

Additional Factors
N/A

3.50 Area 50



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Grassland Habitats
High Sensitivity Landscape and High Amenity Area
Architectural Conservation Areas

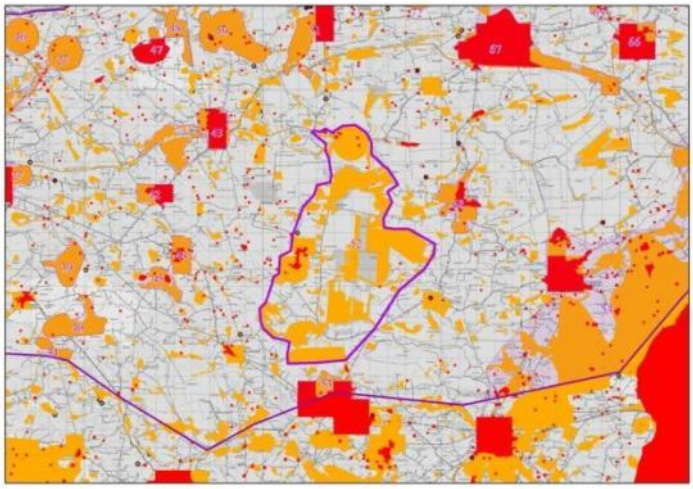
Additional Factors
N/A

3.51 Area 51

Constraints
Settlements
High density buildings
pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
Groundwater Zone of Contribution
Forestry
Architectural Conservation Areas

Additional Factors
N/A

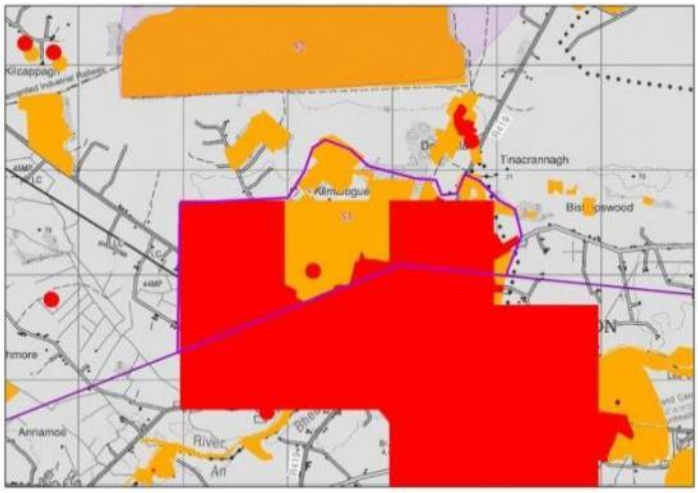
3.52 Area 52



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Karst Features
Important Habitats Grassland, Woodland, IWEBS
Geological Heritage Sites
Forestry
Architectural Conservation Areas
Mapping and Aerial data used to indicate additional forest area to extend Cut and close gap s

Additional Factors
N/A

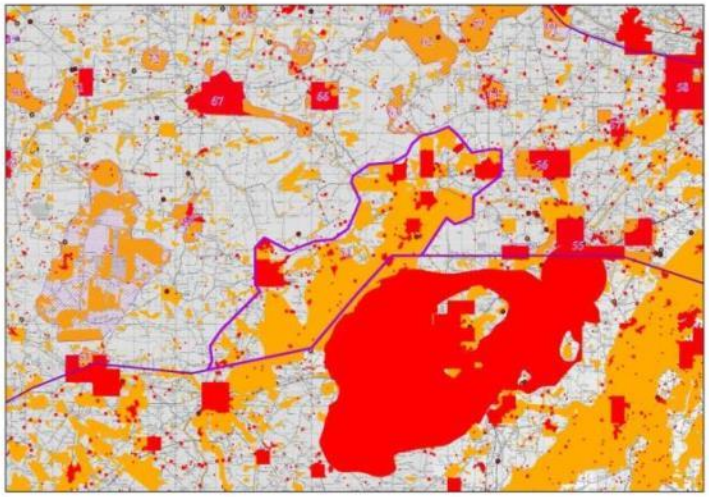
3.53 Area 53



Constraints
Settlements
High density buildings
Forestry

Additional Factors
N/A

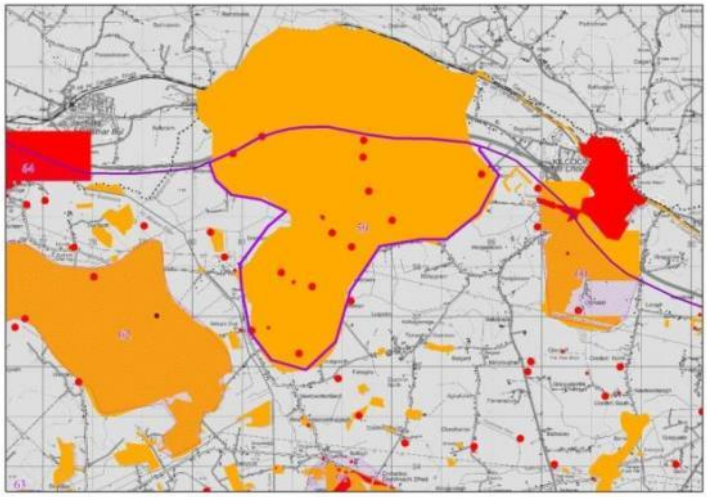
3.54 Area 54



Constraints
Settlements
High and medium density buildings
SAC , pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats
Groundwater Source Protection Area
Geological Heritage Sites
High Sensitivity Landscape
Forestry
Ancient Woodland

Additional Factors
N/A

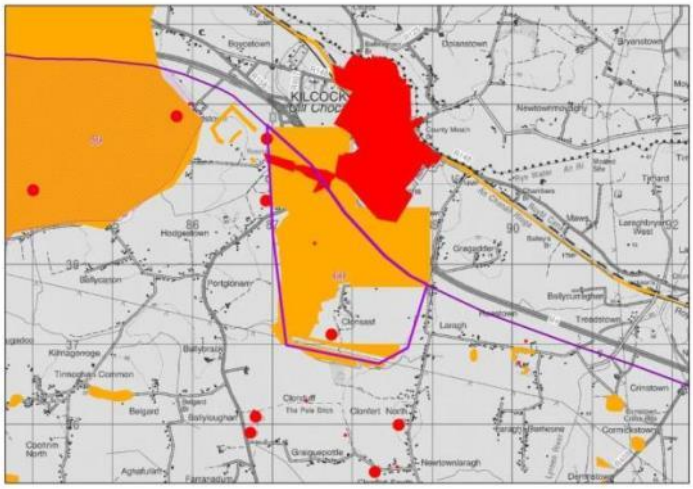
3.55 Area 59



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
High Landscape Character Area
Forestry

Additional Factors
N/A

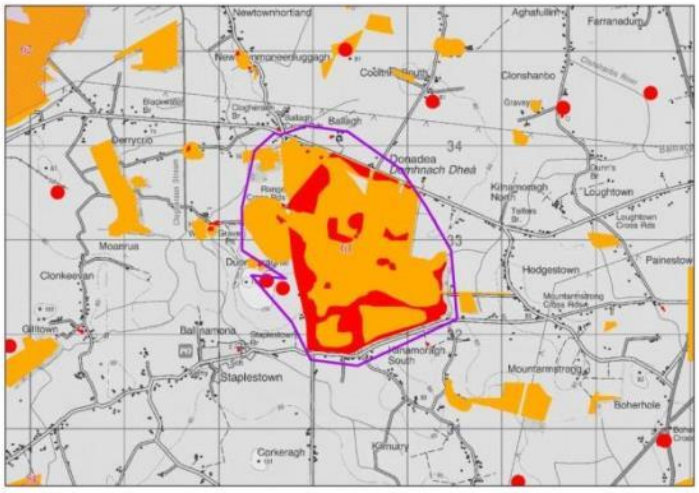
3.56 Area 60



Constraints
Settlements
Medium density buildings
Forestry

Additional Factors
N/A

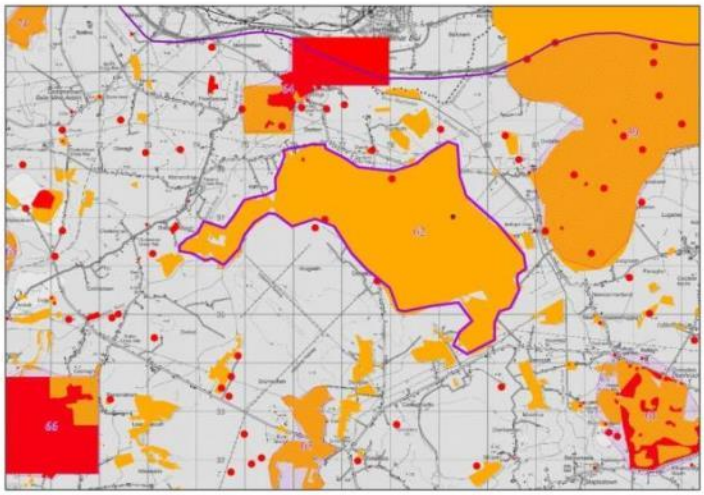
3.57 Area 61



Constraints
pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry
Ancient Woodland

Additional Factors
N/A

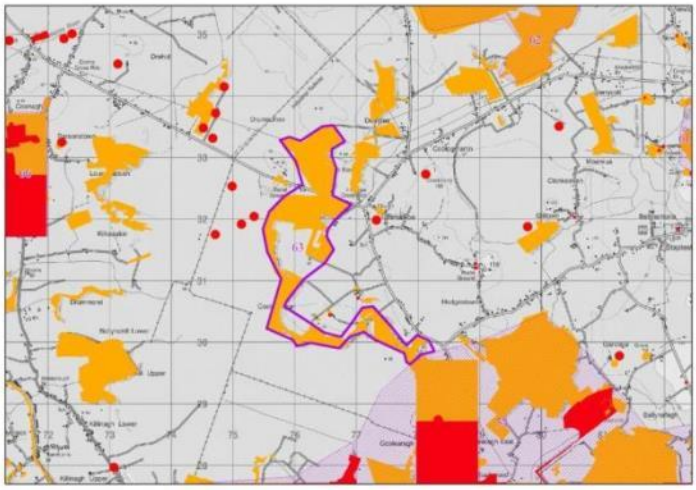
3.58 Area 62



Constraints
Groundwater Extreme Vulnerability
Groundwater Source Protection Area
Forestry

Additional Factors
N/A

3.59 Area 63



Constraints
Forestry

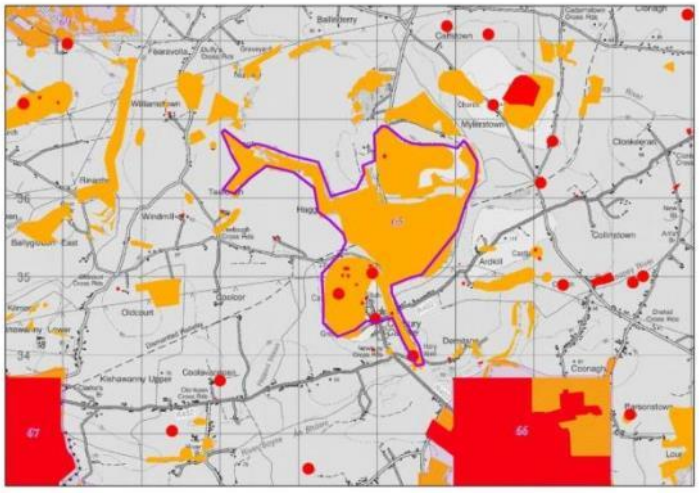
Additional Factors
N/A

3.60 Area 64

Constraints
Settlements
High and medium density buildings
Quarries
Forestry

Additional Factors
N/A

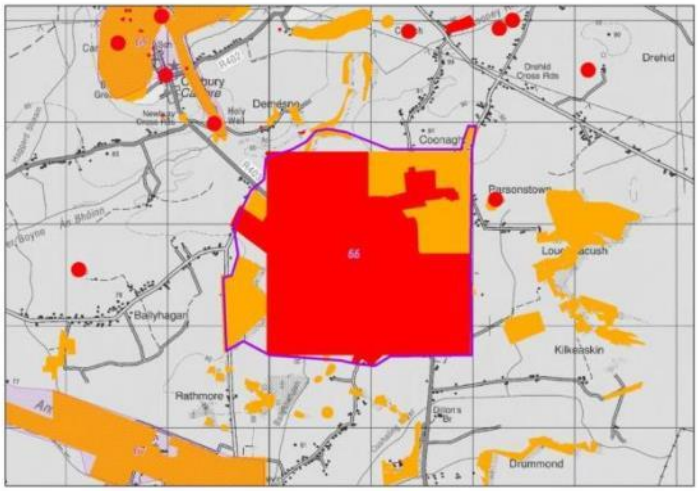
3.61 Area 65



Constraints
NHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland
Geological Heritage Sites
Forestry

Additional Factors
N/A

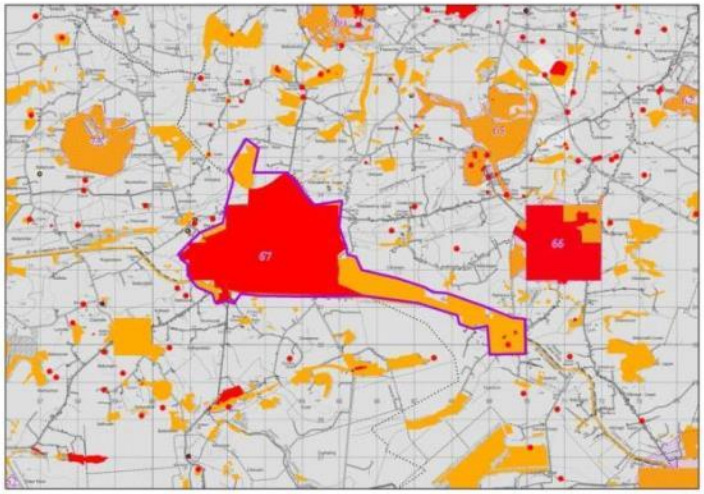
3.62 Area 66



Constraints
Settlements
High and medium density buildings
Forestry

Additional Factors
N/A

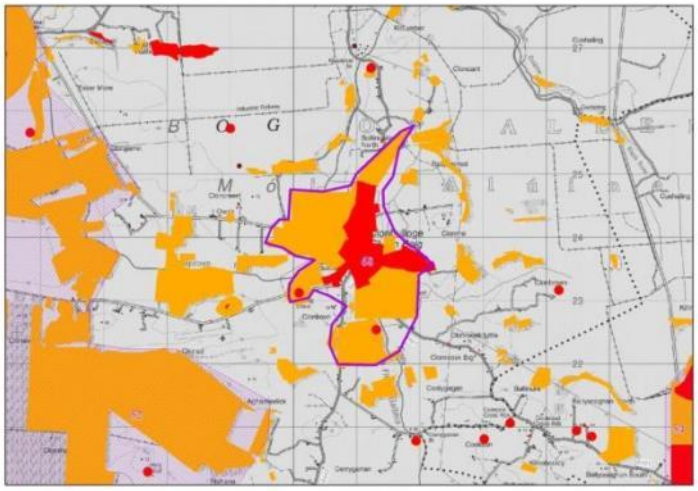
3.63 Area 67



Constraints
Settlements
High density buildings
NHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
Groundwater Zone of Contribution
Forestry

Additional Factors
N/A

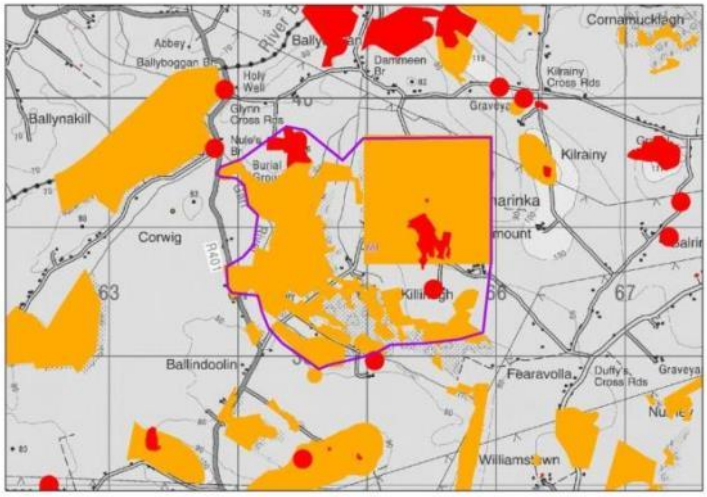
3.64 Area 68



Constraints
Settlements
Medium density buildings
Karst Features
Important Habitats, Grassland
Groundwater Source Protection Area
Groundwater Zone of Contribution
Geological Heritage Sites
Architectural Conservation Areas

Additional Factors
N/A

3.65 Area 69



Constraints
Settlements
Medium density buildings
Quarries
Forestry

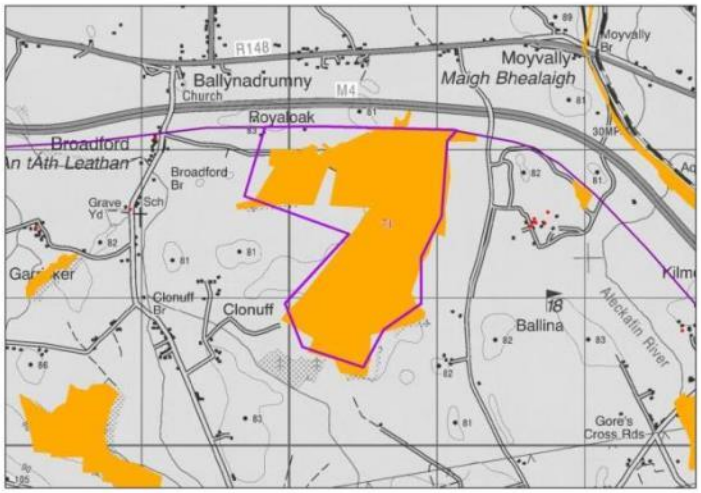
Additional Factors
N/A

3.66 Area 70

Constraints
Forestry

Additional Factors
N/A

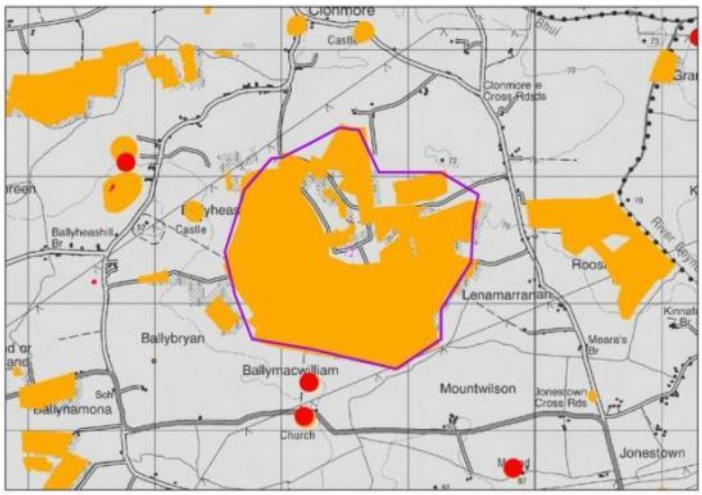
3.67 Area 71



Constraints
pNHA
Important Habitats, Woodland
Forestry

Additional Factors
N/A

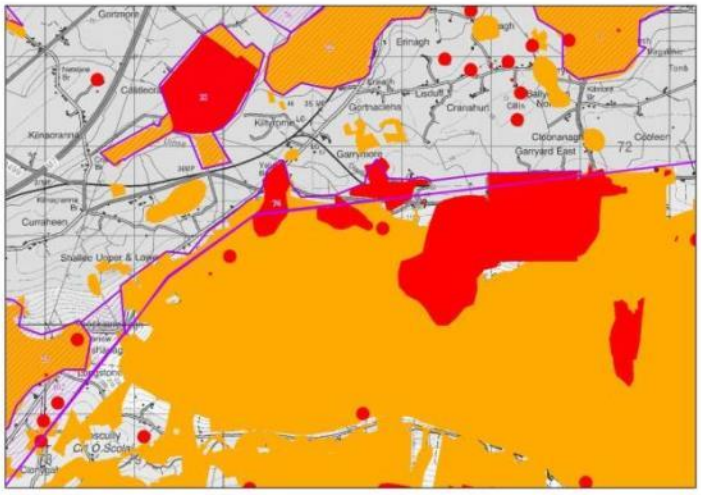
3.68 Area 72



Constraints
NHA
High Sensitivity Landscape
Forestry

Additional Factors
N/A

3.69 Area 74



Constraints
SAC , SPA
Mines
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

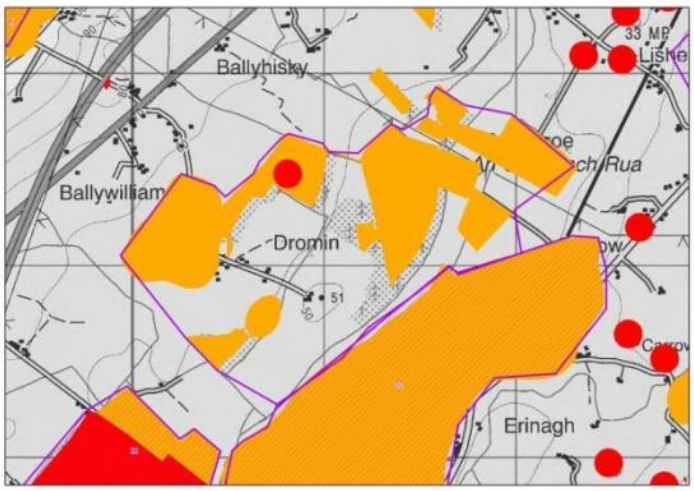
Additional Factors
N/A

3.70 Area 75

Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

Additional Factors
N/A

3.71 Area 76



Constraints
Groundwater Extreme Vulnerability
Forestry

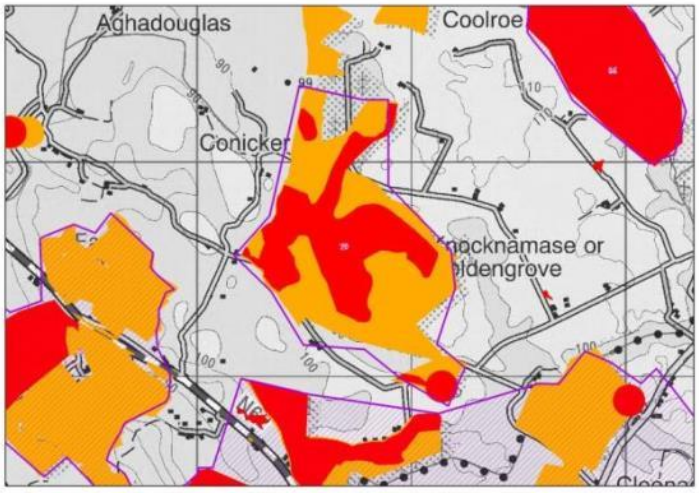
Additional Factors
N/A

3.72 Area 78

Constraints
pNHA
Quarries
Important Habitats - Grassland
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

3.73 Area 79



Constraints
pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
High Sensitivity Landscape and High Amenity Area
Forestry
Ancient Woodland
Architectural Conservation Areas

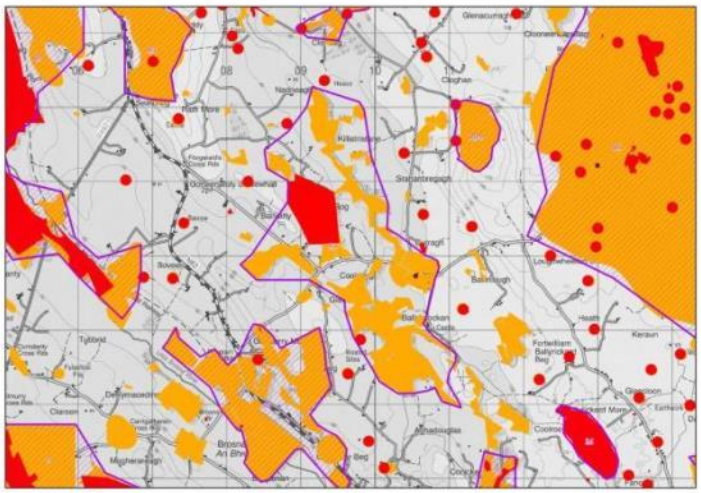
Additional Factors
N/A

3.74 Area 80

Constraints
Geological Heritage Sites
Forestry
Architectural Conservation Areas

Additional Factors
N/A

3.75 Area 83



Constraints
Important Habitats, Bog Woodland and Raised Bog Grassland
Forestry

Additional Factors
N/A

3.76 Area 84

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

3.77 Area 85

Constraints
Important Habitats, Woodland

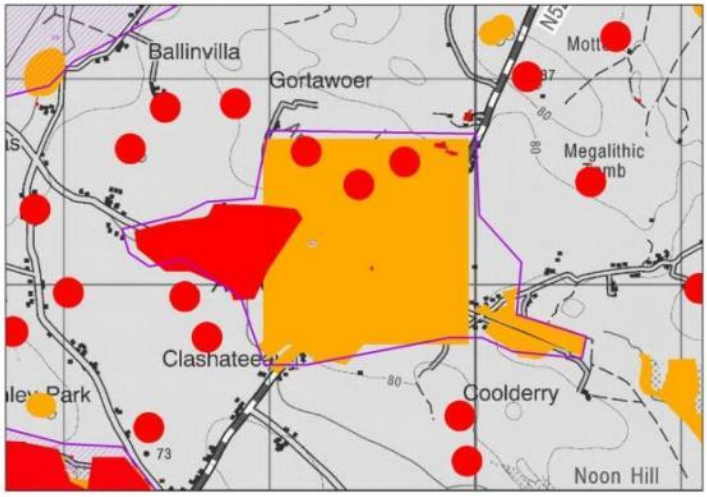
Additional Factors
N/A

3.78 Area 86

Constraints
Important Habitats, Woodland and Fens

Additional Factors
N/A

3.79 Area 87



Constraints
Medium density buildings
Important Habitats, Turloughs and Wetland Birds
Forestry

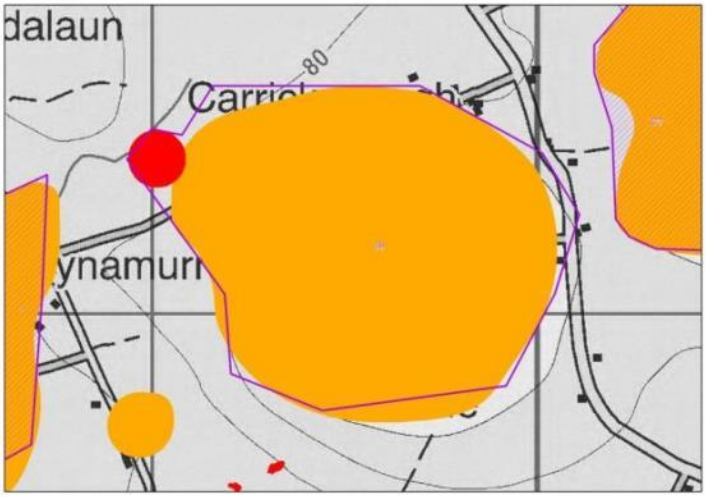
Additional Factors
N/A

3.80 Area 89

Constraints
pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland and Wetland Birds
Forestry

Additional Factors
N/A

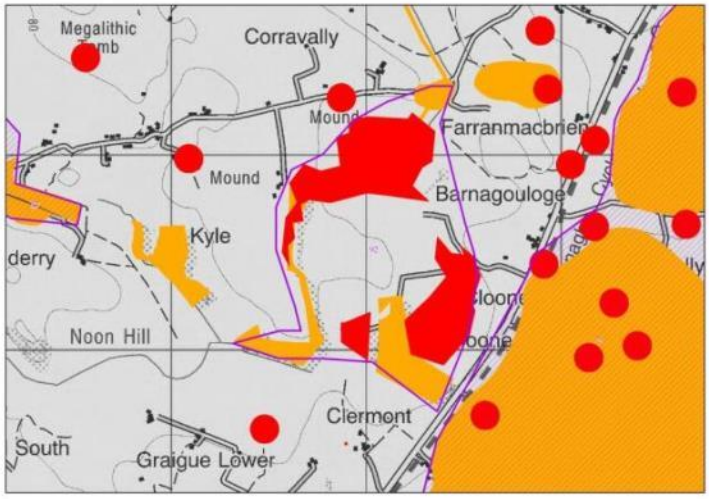
3.81 Area 90



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

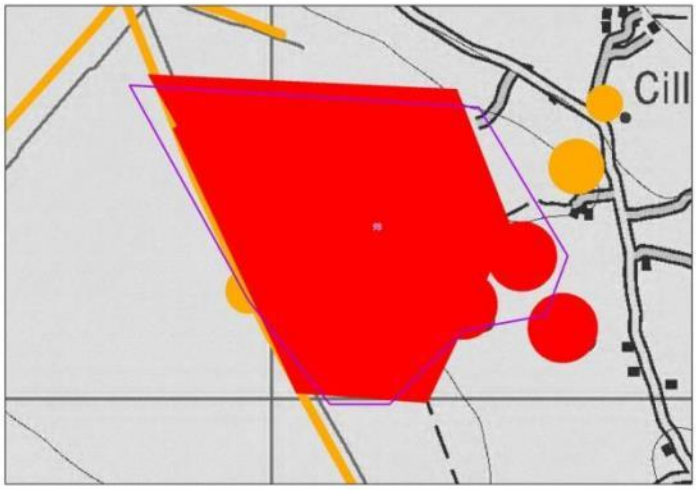
3.82 Area 92



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Woodland Fens

Additional Factors
N/A

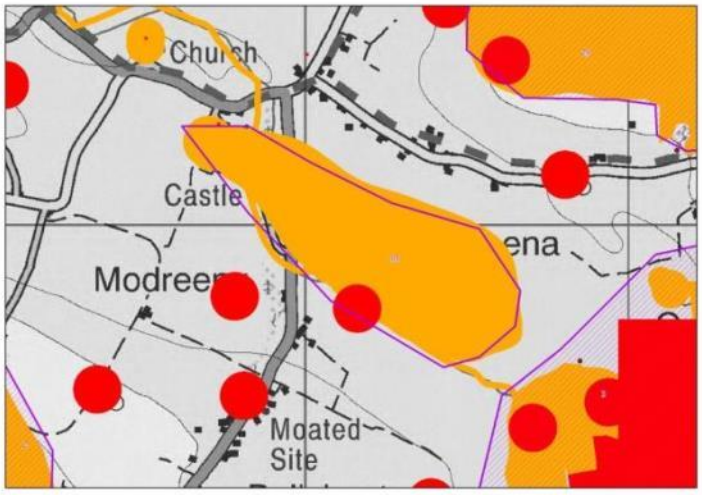
3.83 Area 93



Constraints
Important Habitats important Bird Site

Additional Factors
N/A

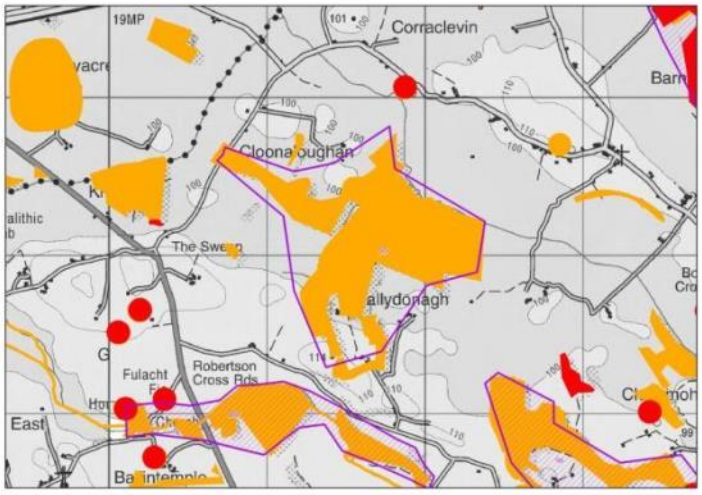
3.84 Area 94



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

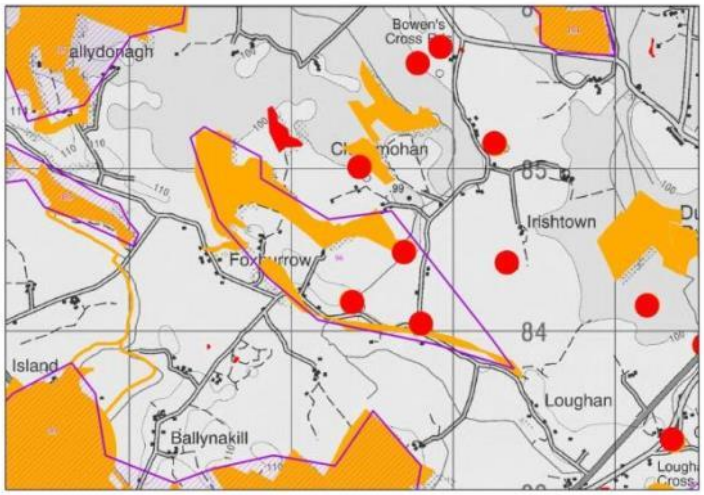
3.85 Area 95



Constraints
Forestry

Additional Factors
N/A

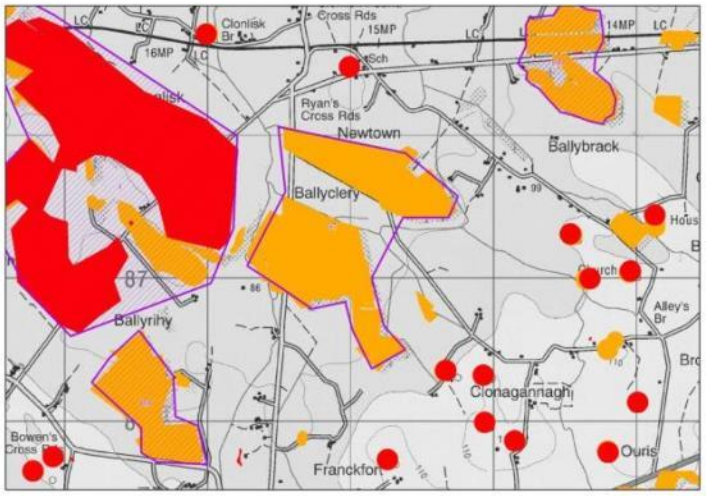
3.86 Area 96



Constraints
Forestry
Architectural Conservation Areas

Additional Factors
Mapping and Aerial data used to indicate additional forest area to extend Cut and close gap

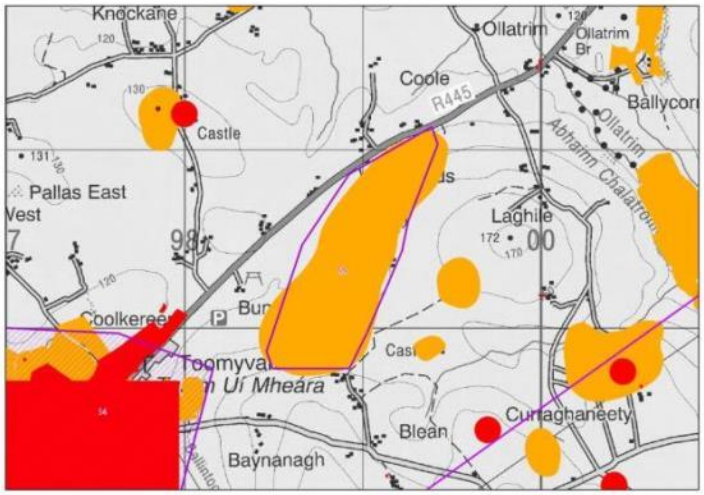
3.87 Area 97



Constraints
Forestry

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

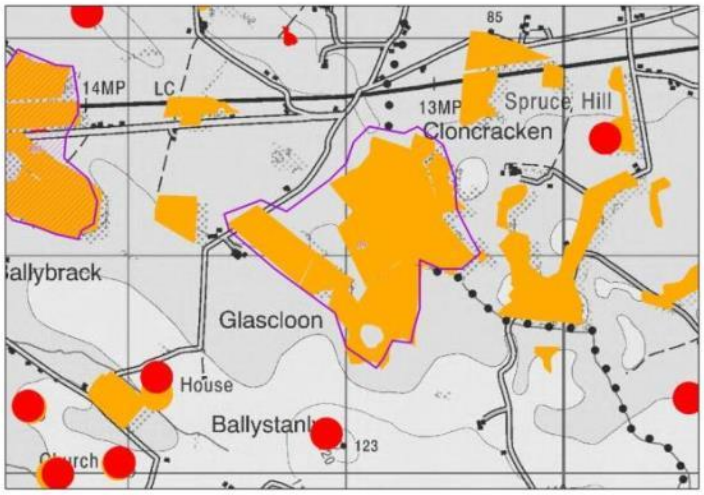
3.88 Area 98



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

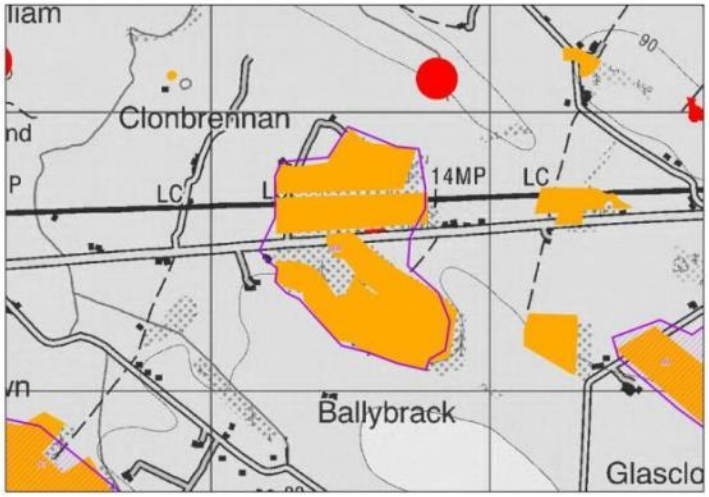
3.89 Area 99



Constraints
Important Habitats, Grasslands
Forestry

Additional Factors
N/A

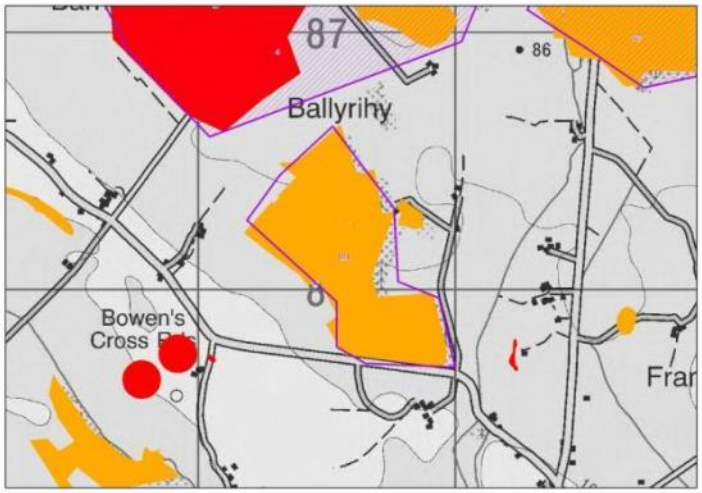
3.90 Area 100



Constraints
Quarries
Forestry

Additional Factors
N/A

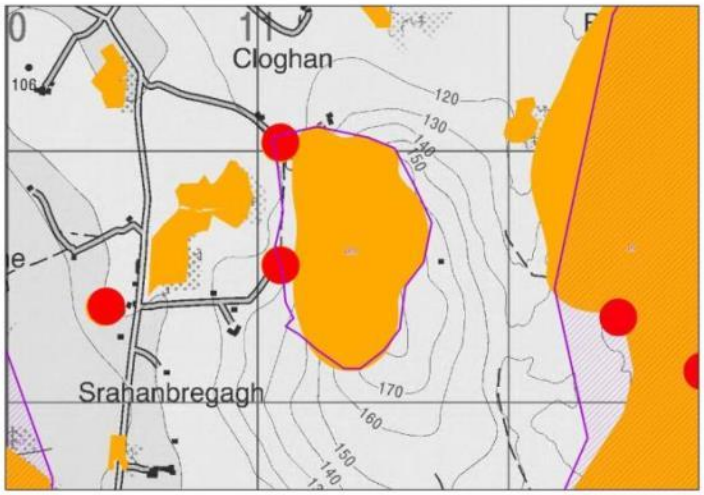
3.91 Area 101



Constraints
Forestry

Additional Factors
N/A

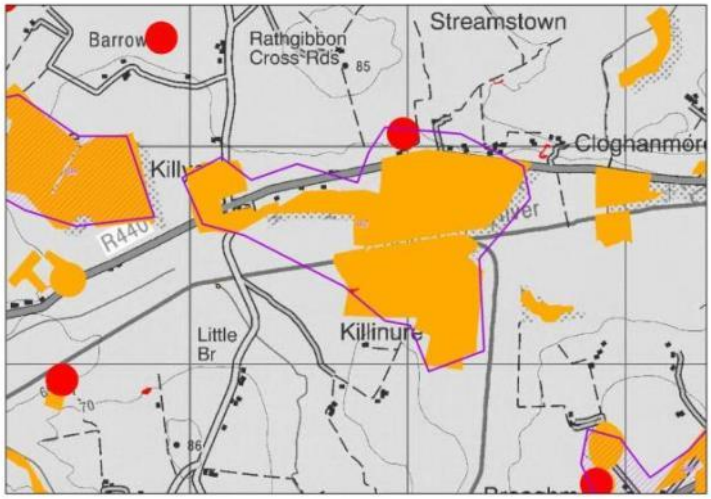
3.92 Area 104



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry
Architectural Conservation Areas

Additional Factors
N/A

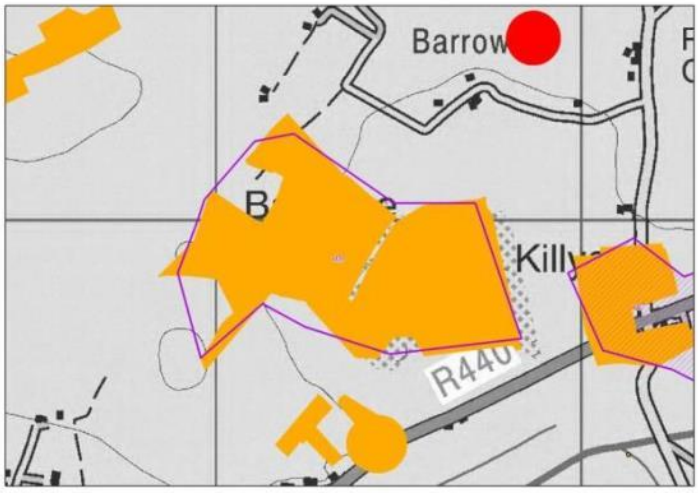
3.93 Area 107



Constraints
Quarries
Forestry

Additional Factors
N/A

3.94 Area 108



Constraints
Forestry

Additional Factors
N/A

3.95 Area 109

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

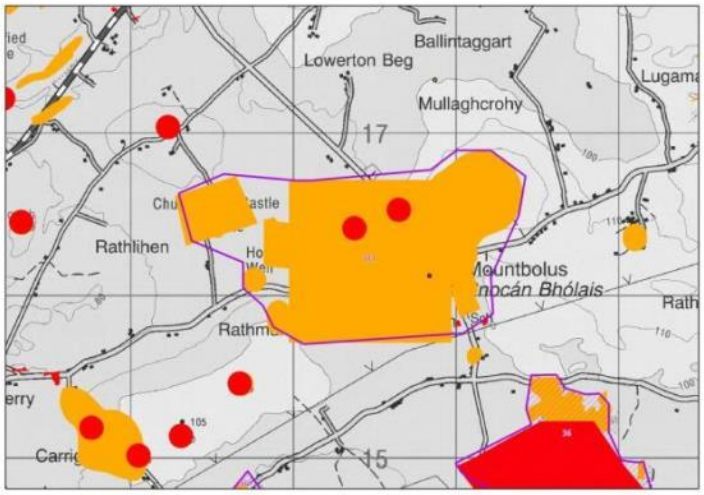
Additional Factors
N/A

3.96 Area 110

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

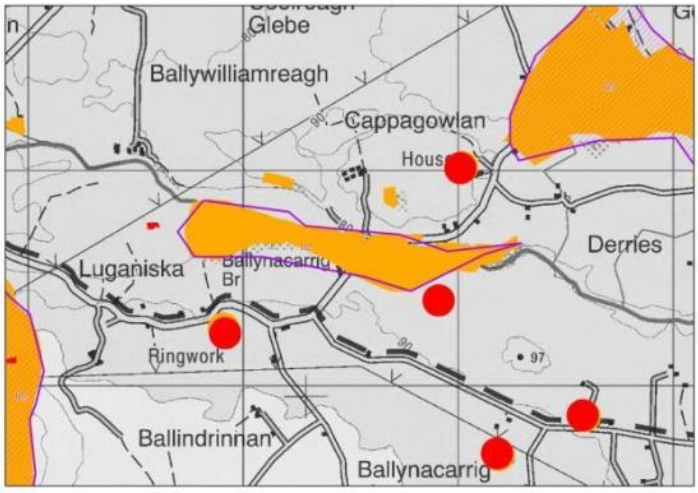
3.97 Area 111



Constraints
medium density buildings

Additional Factors
N/A

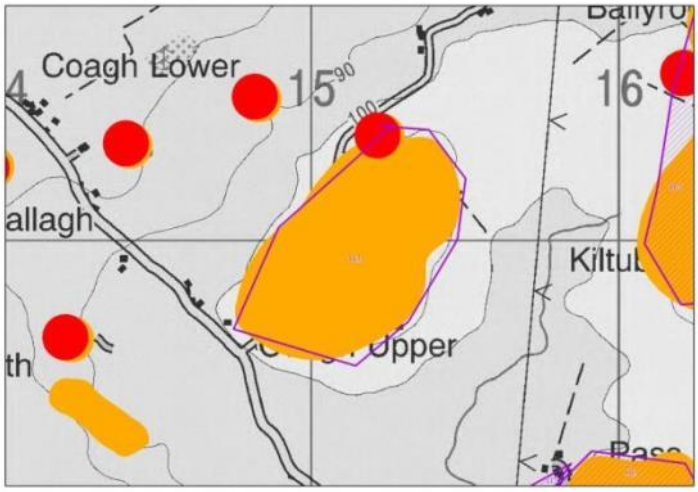
3.98 Area 112



Constraints
Forestry
Architectural Conservation Areas

Additional Factors
N/A

3.99 Area 113



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Architectural Conservation Areas

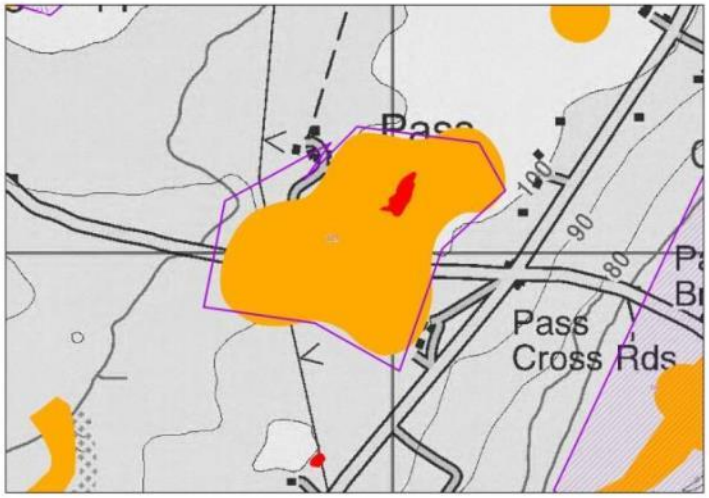
Additional Factors
N/A

3.100 Area 114

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Architectural Conservation Areas

Additional Factors
N/A

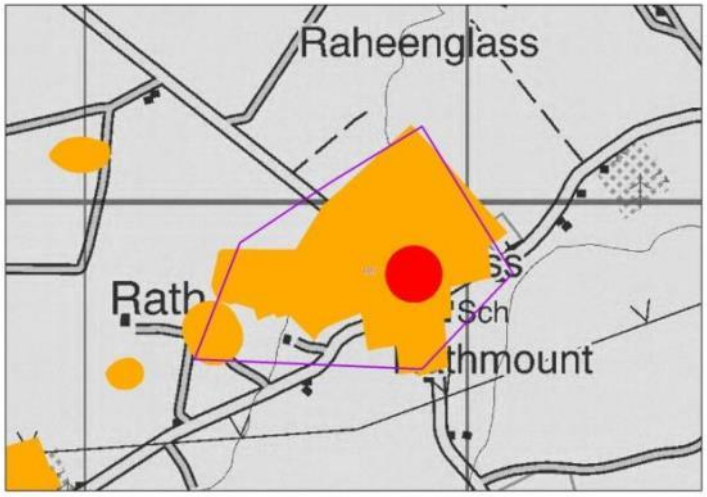
3.101 Area 115



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

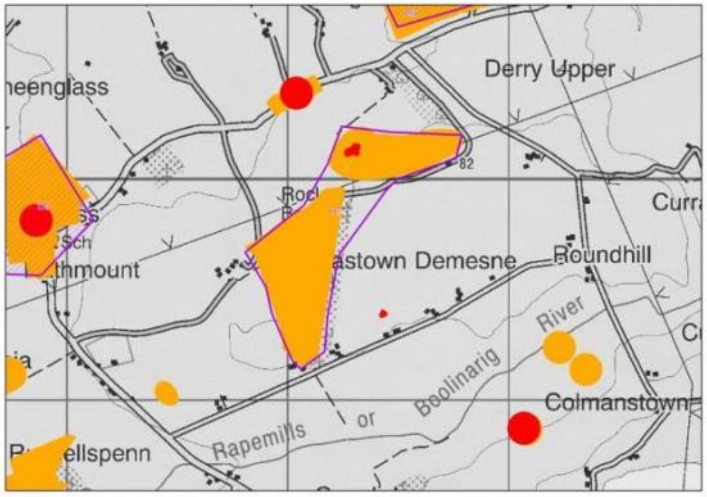
3.102 Area 116



Constraints
Zoned land
National Monuments
Architectural Conservation Areas

Additional Factors
N/A

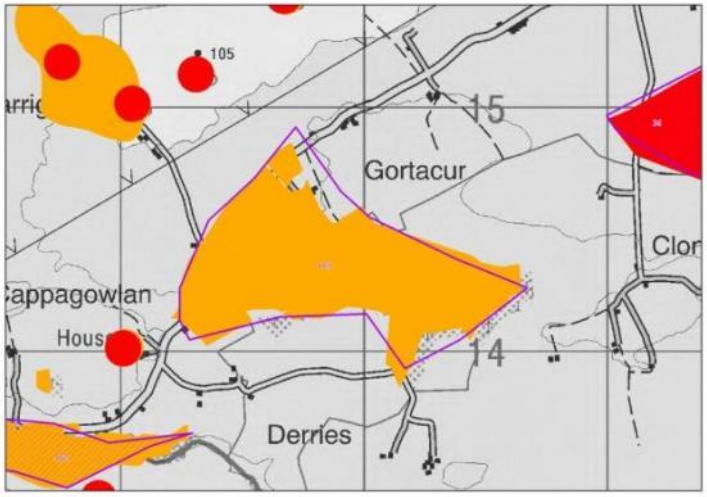
3.103 Area 117



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

Additional Factors
N/A

3.104 Area 119



Constraints
Forestry

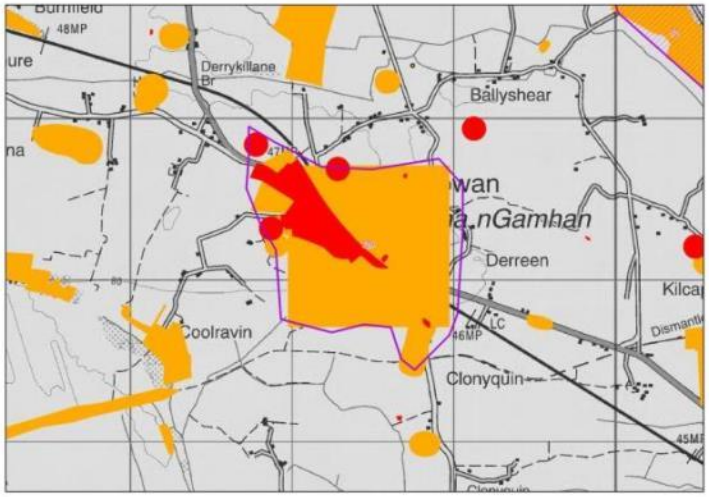
Additional Factors
N/A

3.105 Area 121

Constraints
Forestry

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

3.106 Area 126



Constraints
Settlements
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Architectural Conservation Areas

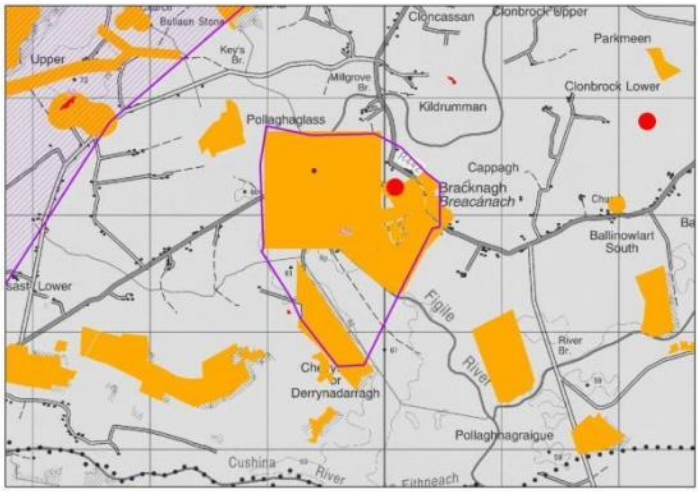
Additional Factors
N/A

3.107 Area 127

Constraints
Forestry

Additional Factors
N/A

3.108 Area 128



Constraints
medium density buildings
Quarries
Architectural Conservation Areas

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

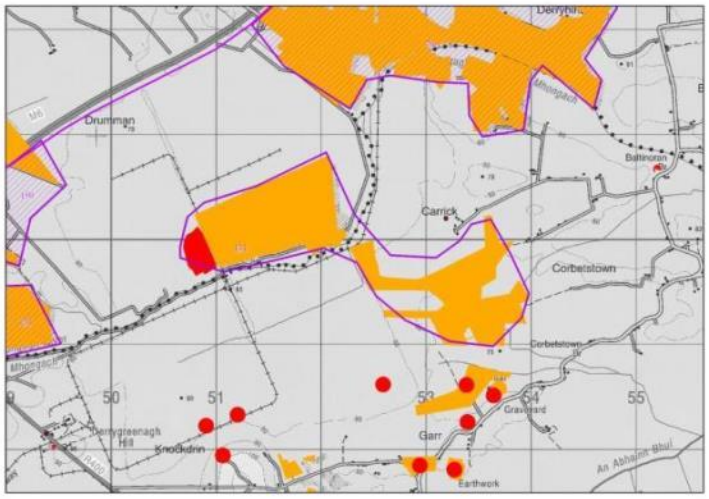
3.109 Area 130

Constraints
Quarries
Forestry

Additional Factors

N/A

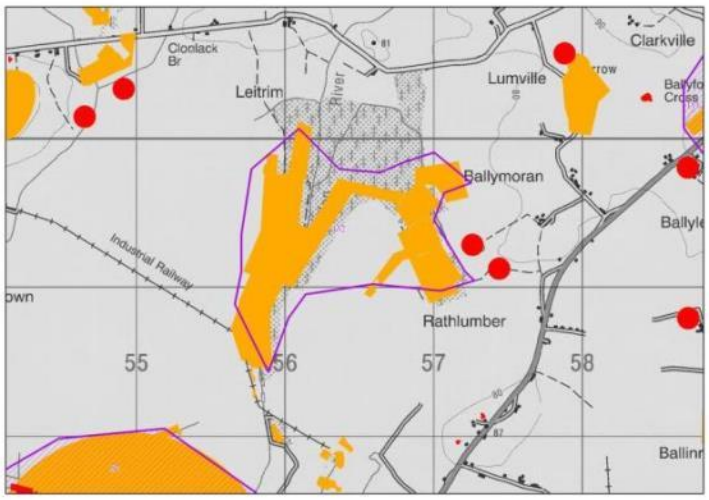
3.110 Area 131



Constraints
Quarries
Forestry

Additional Factors
N/A

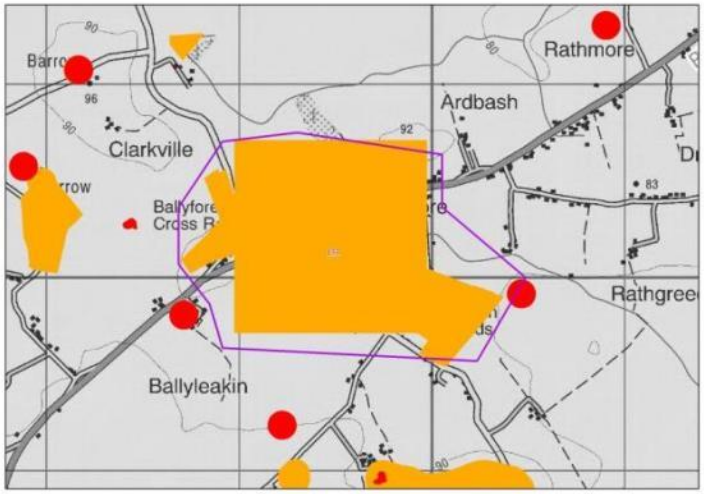
3.111 Area 132



Constraints
Forestry

Additional Factors
N/A

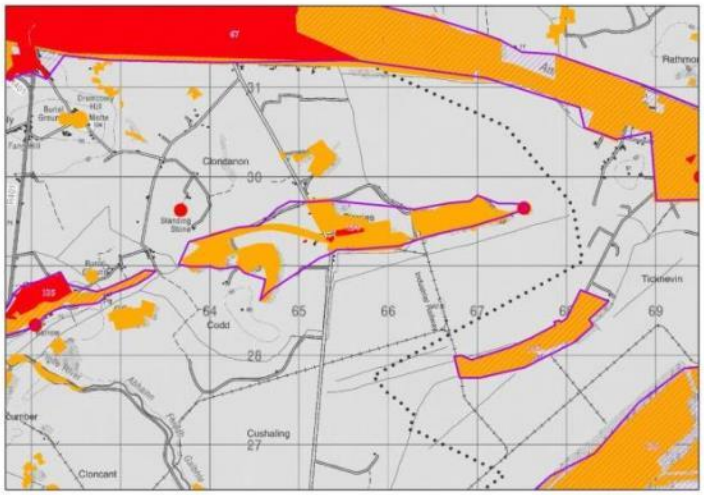
3.112 Area 133



Constraints
medium density buildings
Forestry
Architectural Conservation Areas

Additional Factors
N/A

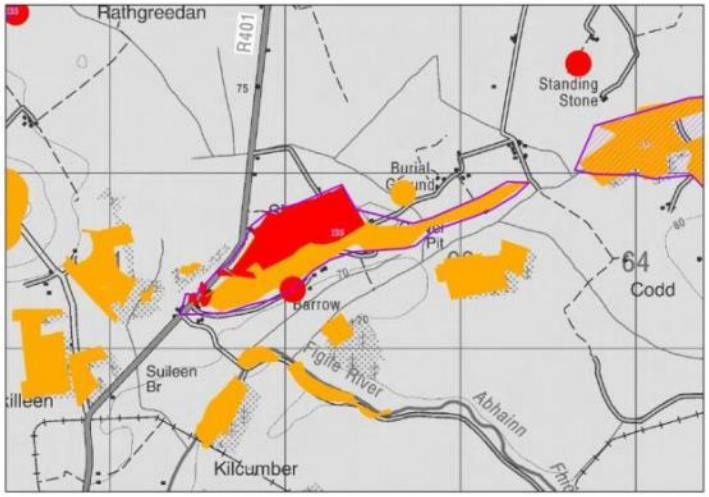
3.113 Area 134



Constraints
SAC, pNHA
Quarries
Forestry

Additional Factors
N/A

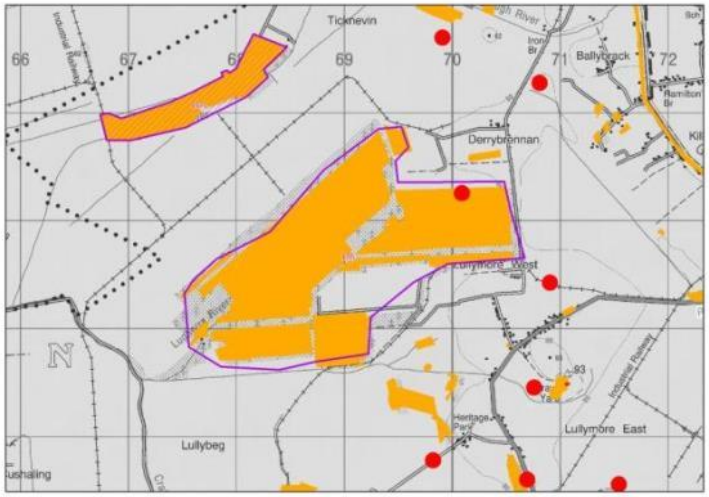
3.114 Area 135



Constraints
Quarries
High Sensitivity Landscape and High Amenity Area
Architectural Conservation Areas

Additional Factors
N/A

3.115 Area 136



Constraints
Forestry

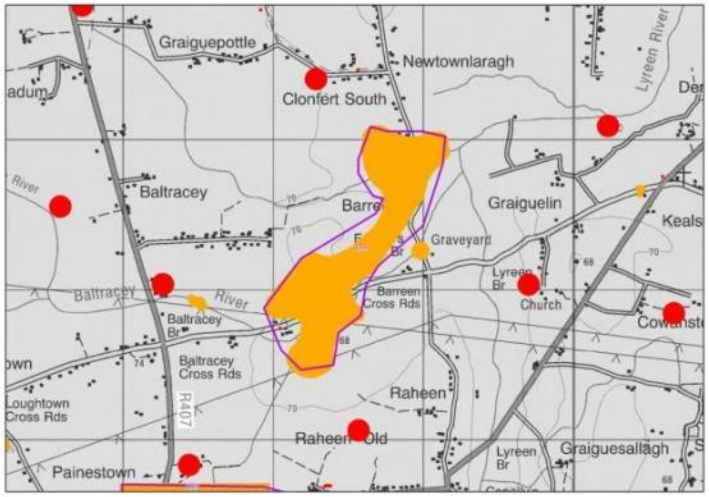
Additional Factors
N/A

3.116 Area 137

Constraints
Settlements
High and medium density buildings
pNHA
Forestry

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from and the direction required to reach the termination points

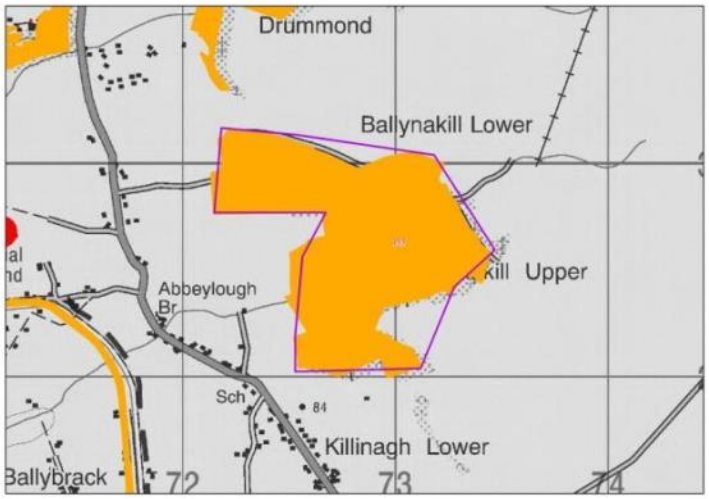
3.117 Area 138



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

3.118 Area 143



Constraints
Forestry

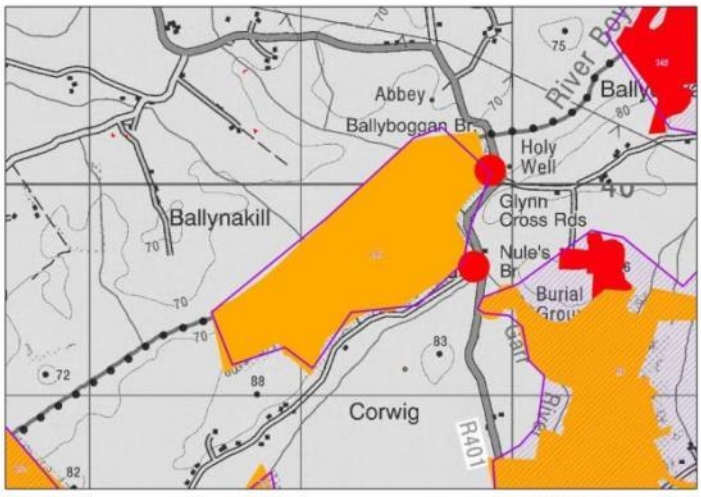
Additional Factors
N/A

3.119 Area 144

Constraints
Forestry

Additional Factors
N/A

3.120 Area 146



Constraints
Forestry

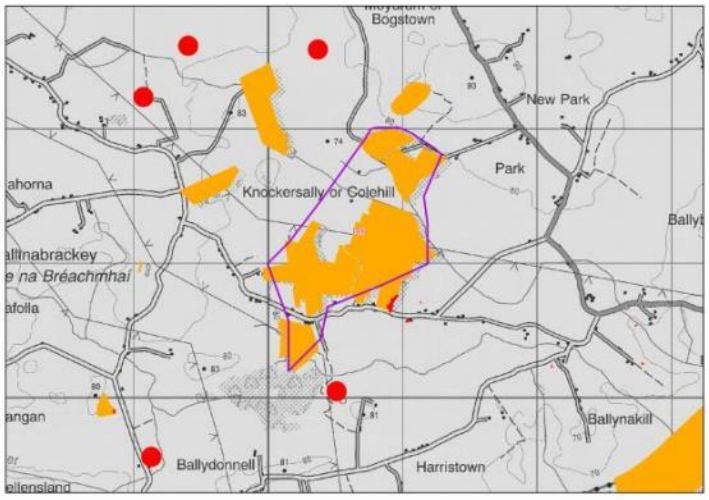
Additional Factors
N/A

3.121 Area 147

Constraints
Forestry

Additional Factors
N/A

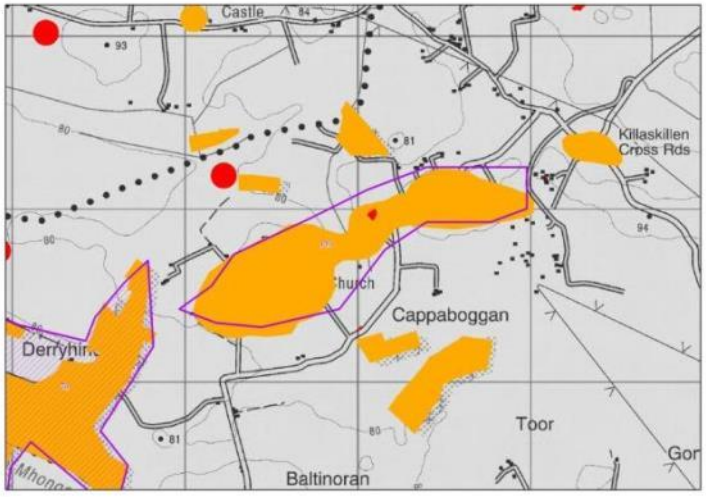
3.122 Area 148



Constraints
Quarries
Groundwater Extreme
Forestry

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

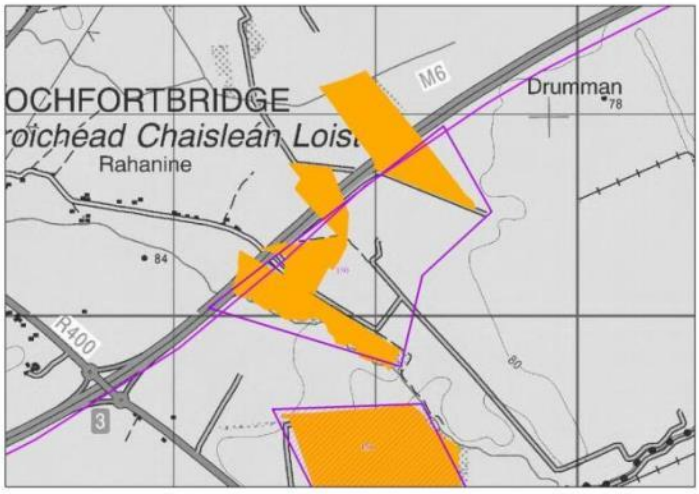
3.123 Area 149



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

3.124 Area 150



Constraints
Forestry

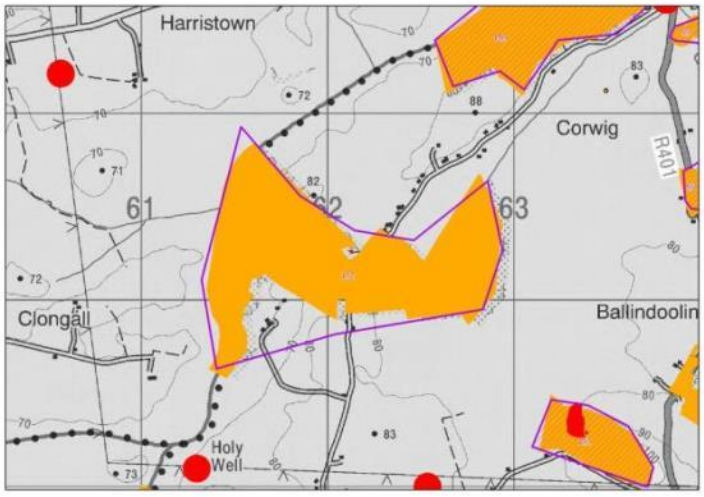
Additional Factors
N/A

3.125 Area 151

Constraints
Forestry

Additional Factors
N/A

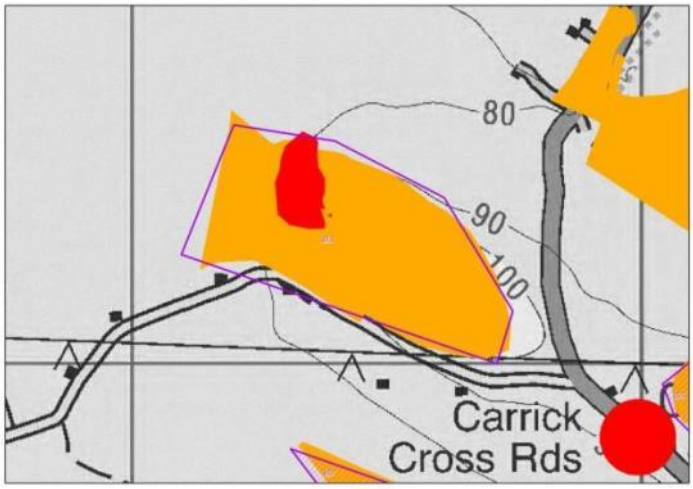
3.126 Area 152



Constraints
Forestry

Additional Factors
N/A

3.127 Area 153



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Geological Heritage Sites

Additional Factors
N/A

3.128 Area 154

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

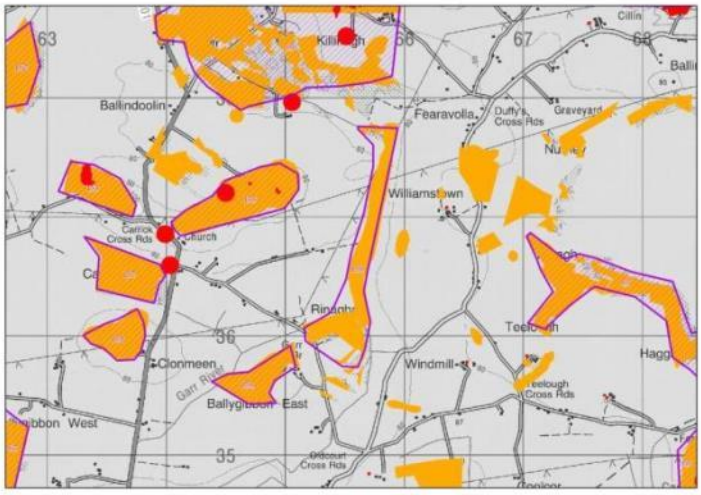
Additional Factors
N/A

3.129 Area 155

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

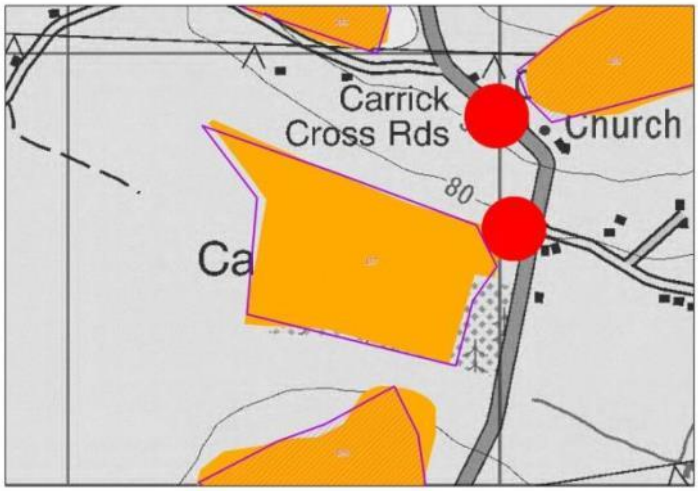
3.130 Area 156



Constraints
Forestry

Additional Factors
N/A

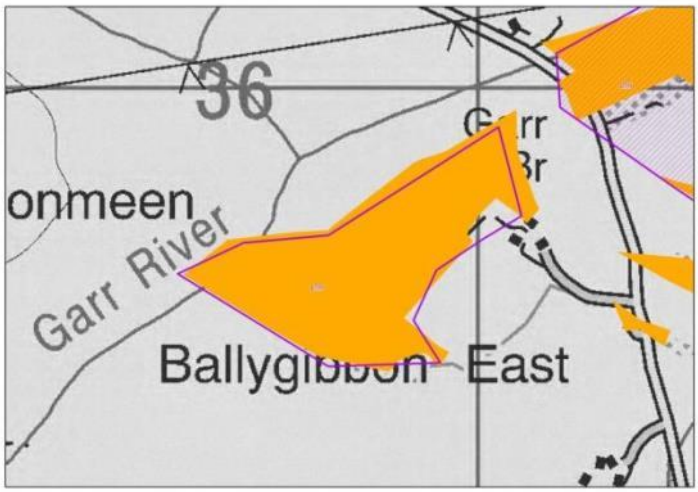
3.131 Area 157



Constraints
Forestry

Additional Factors
N/A

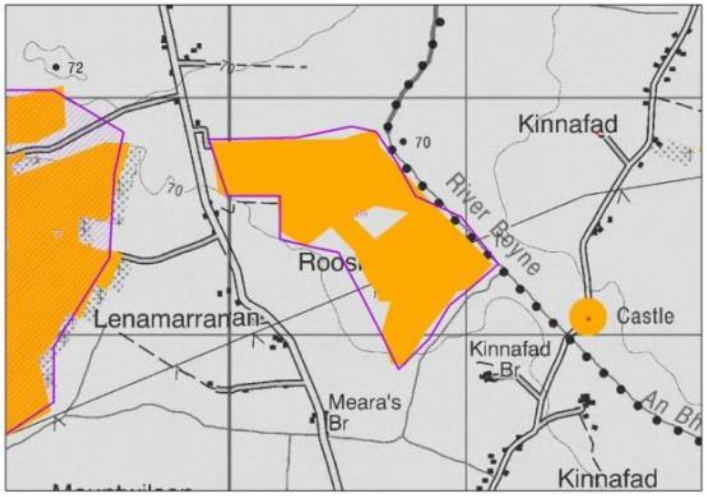
3.132 Area 158



Constraints
Forestry

Additional Factors
N/A

3.133 Area 159



Constraints
Important Habitats, Grasslands

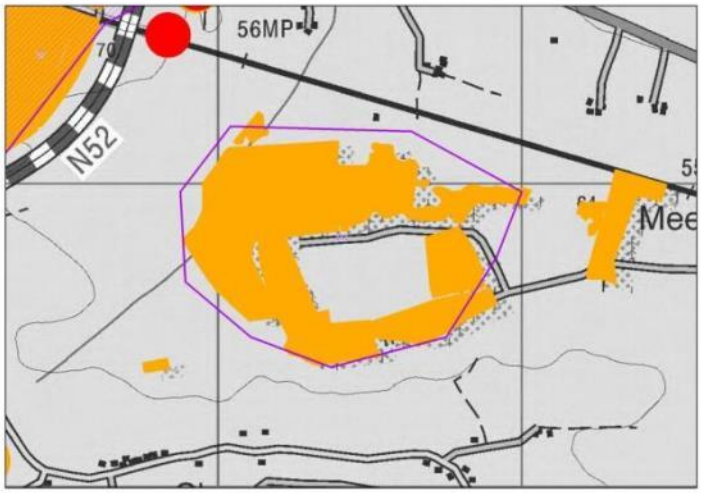
Additional Factors
N/A

3.134 Area 160

Constraints
Important Habitats, Grasslands
Forestry
Native Woodland
Architectural Conservation Areas

Additional Factors
N/A

3.135 Area 161



Constraints
Forestry

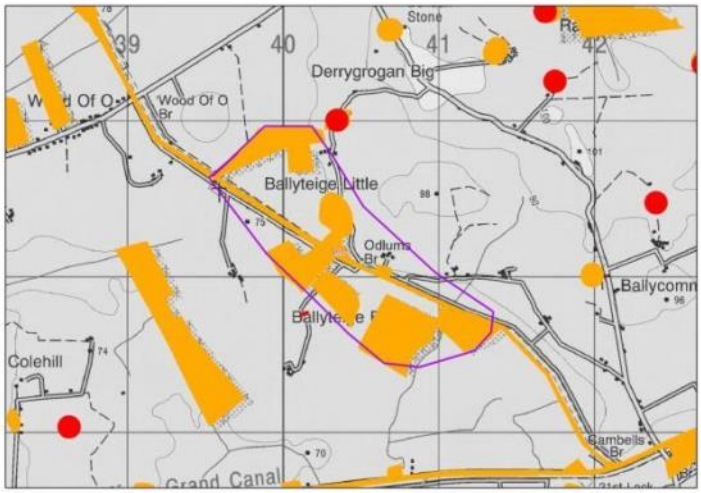
Additional Factors
N/A

3.136 Area 163

Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Groundwater Source Protection Area
Architectural Conservation Areas

Additional Factors
N/A

3.137 Area 164



Constraints
pNHA
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

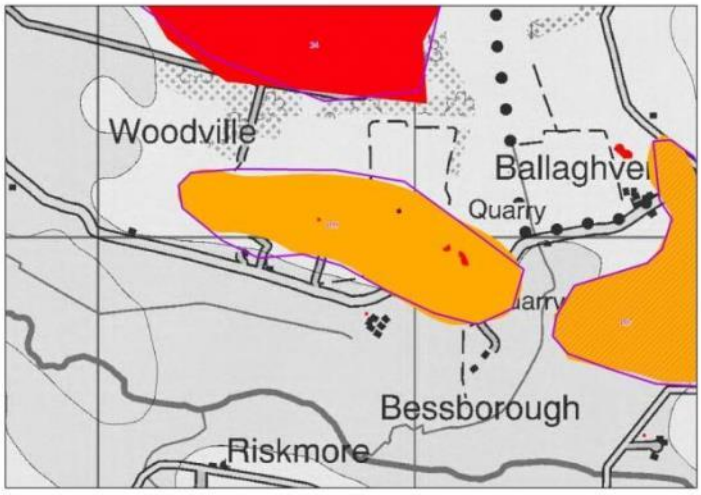
Additional Factors
N/A

3.138 Area 165

Constraints
pNHA
Forestry

Additional Factors
N/A

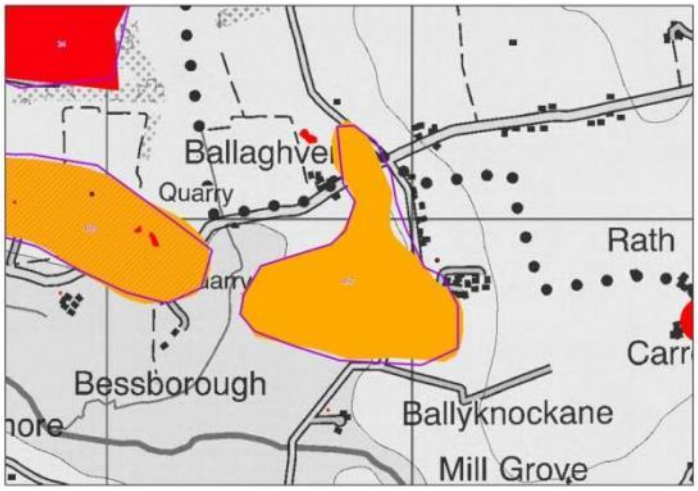
3.139 Area 166



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

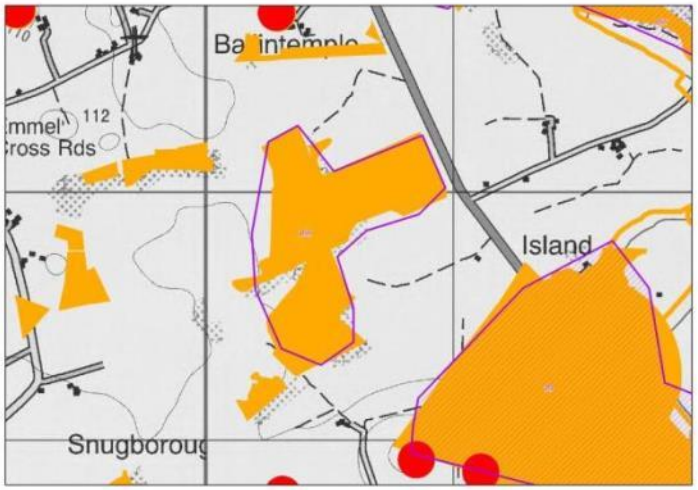
3.140 Area167



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

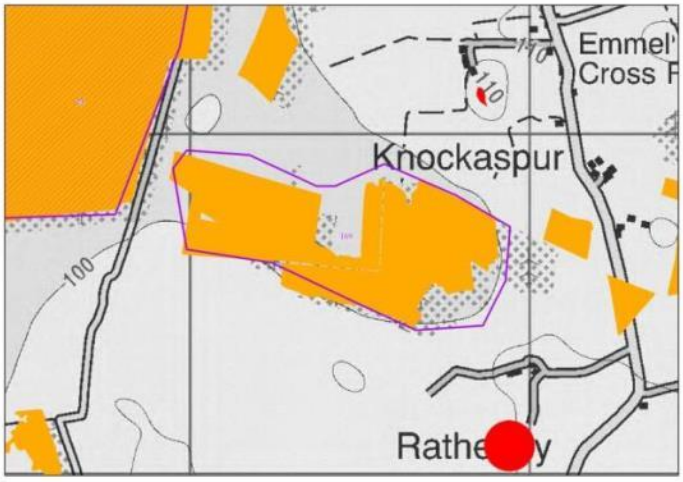
3.141 Area 168



Constraints
pNHA
High Sensitivity Landscape and High Amenity Area
Forestry

Additional Factors
N/A

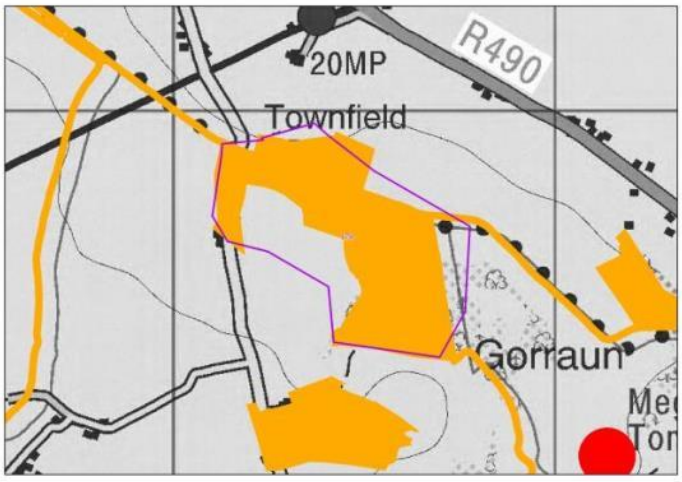
3.142 Area 169



Constraints
Forestry

Additional Factors
N/A

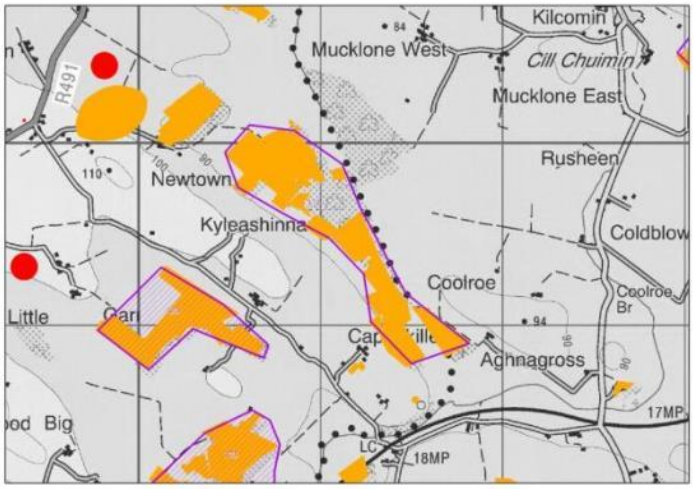
3.143 Area 170



Constraints
Groundwater Rock at or Near surface
Important Habitats Grassland

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

3.144 Area 171



Constraints
Forestry

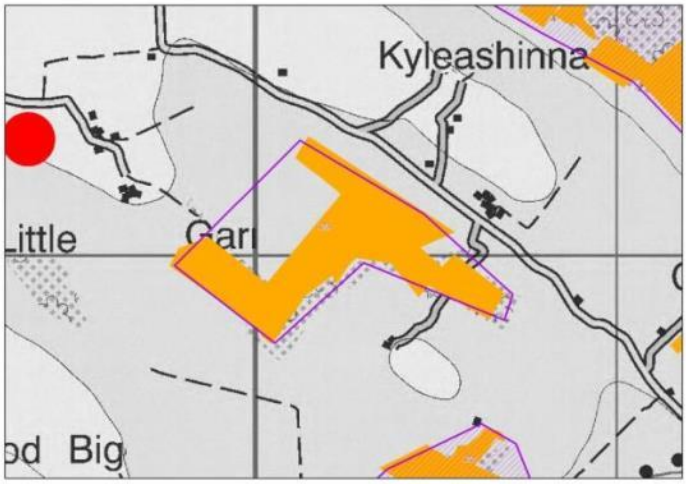
Additional Factors
N/A

3.145 Area 172

Constraints
Forestry

Additional Factors
Constraints grouping also takes into account direction possible corridor will approach from

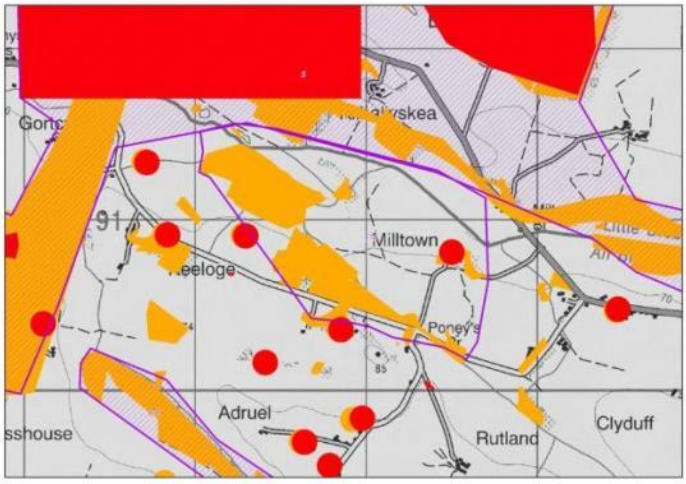
3.146 Area 173



Constraints
Forestry

Additional Factors
N/A

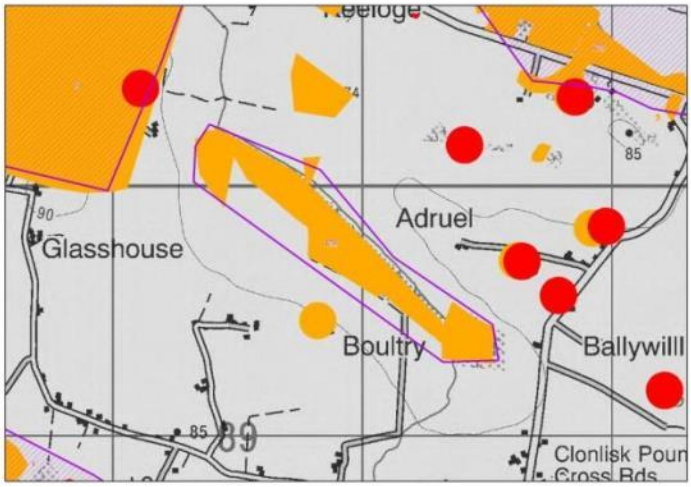
3.147 Area 175



Constraints
Forestry

Additional Factors
N/A

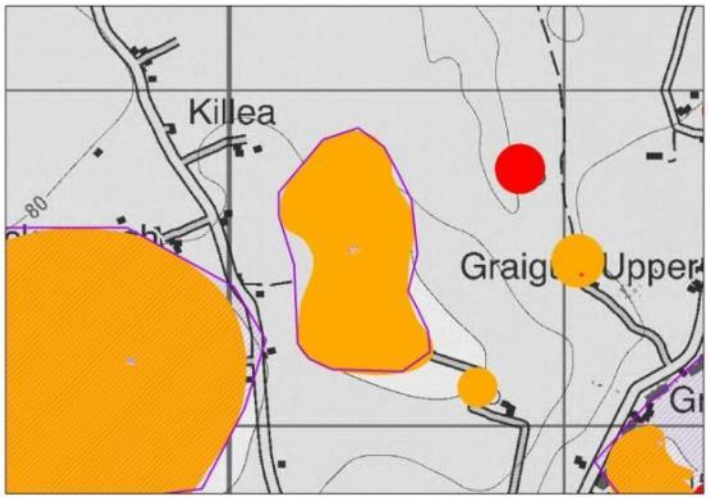
3.148 Area 176



Constraints
Forestry

Additional Factors
N/A

3.149 Area 177



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

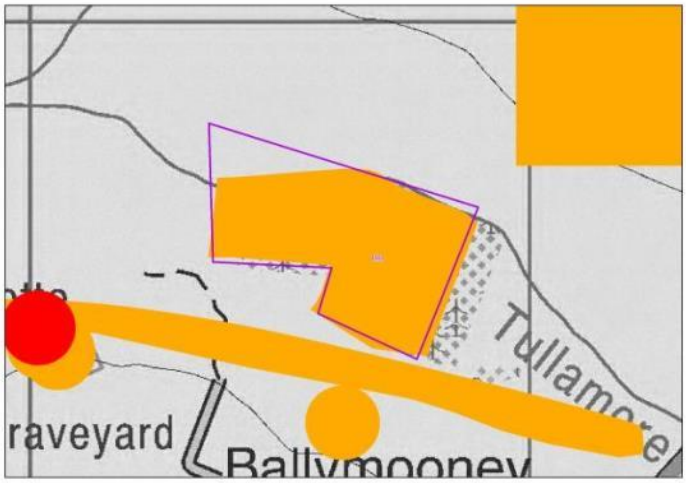
Additional Factors
N/A

3.150 Area 179

Constraints
Forestry

Additional Factors
N/A

3.151 Area 180



Constraints
Forestry

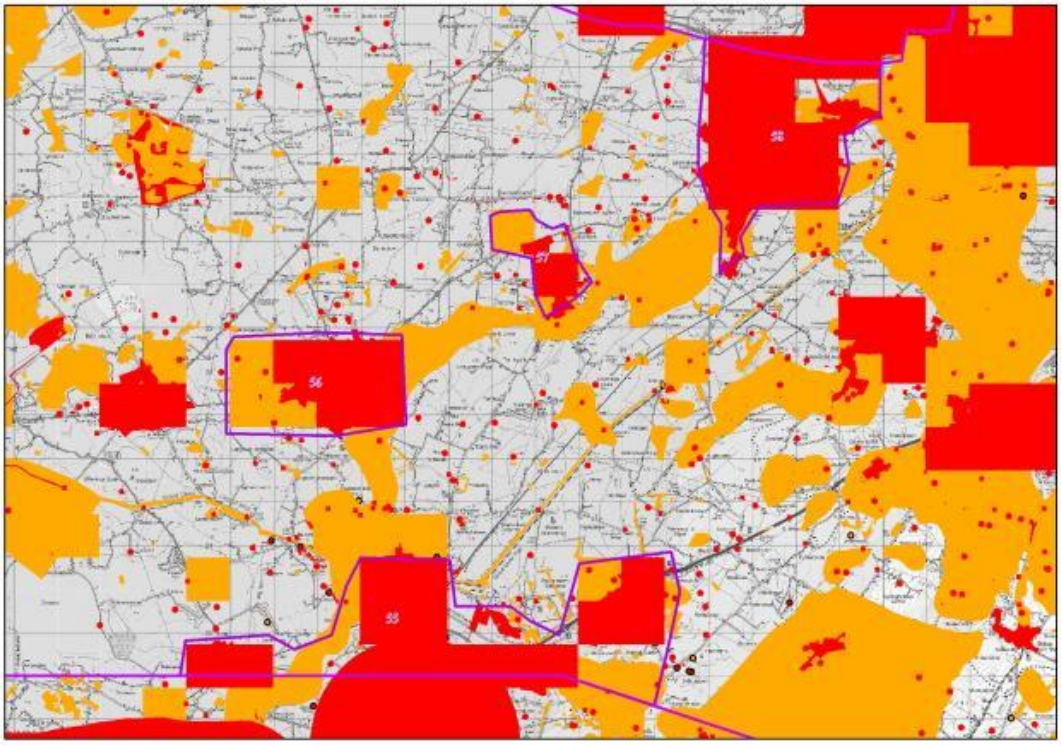
Additional Factors
N/A

3.152 Area 181

Constraints
Forestry

Additional Factors
N/A

3.153 Area 55 - Area 58



The geographical extent of the constraints above affected all potential route corridors through to the terminal reservoir...

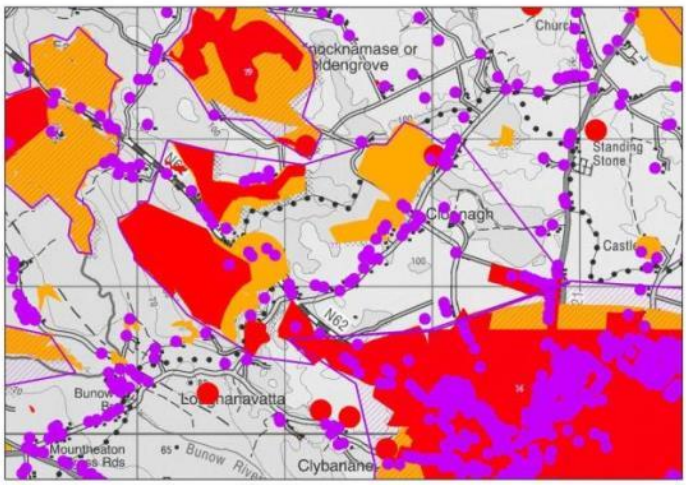
In this instance the “Red” classifications were removed but the “Amber” areas were not excluded from the possible “Preliminary Route Corridors”. The amber constraints within this area are primarily Landscape Character Areas (Local Authorities).

Constraints
Settlements
High and medium density buildings
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Grassland
Forestry
Ancient Woodland

Additional Factors
N/A

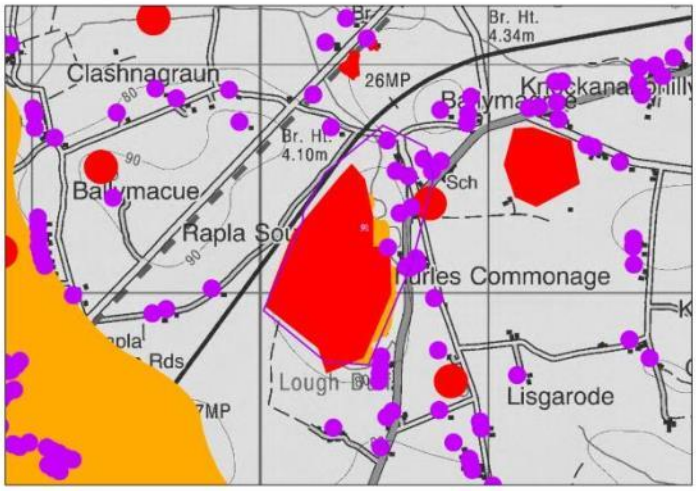
4 Areas Removed from White Space Based on Combination of Constraints and Geodirectory Building Locations

4.1 Area 77



Constraints
Buildings
Settlements
pNHA
Quarries
Geological Heritage Sites
High Sensitivity Landscape
Forestry
Ancient Woodland
Architectural Conservation Areas

4.2 Area 91

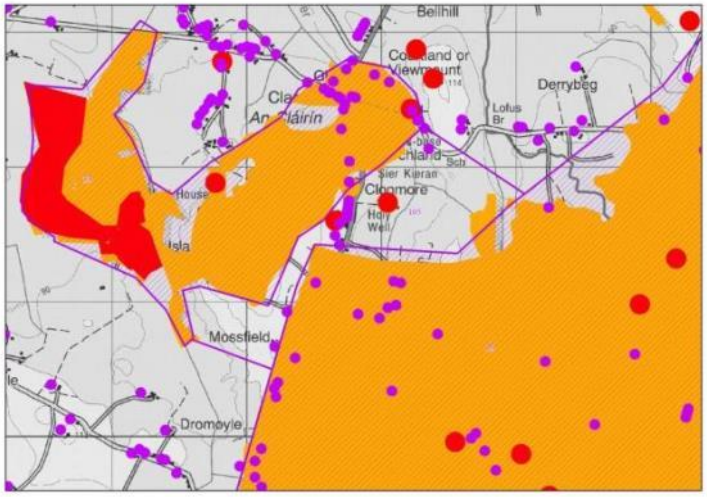


Constraints
Buildings
Important Habitats, Fen
Forestry

4.3 Area 103

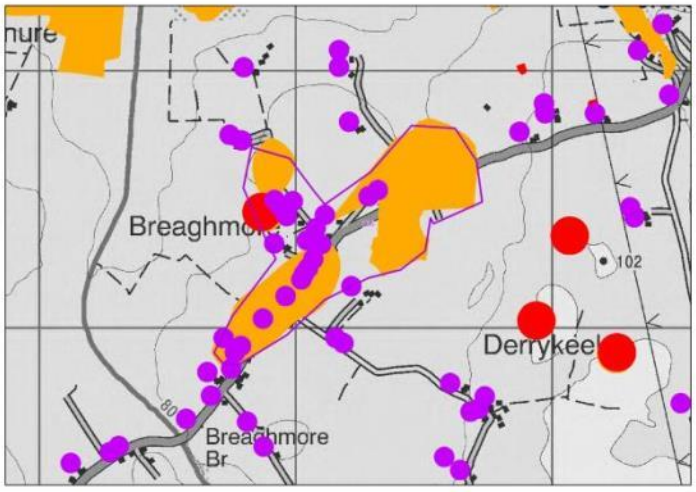
Constraints
Buildings
SAC
Quarries
Npws Habitats,
High Sensitivity Landscape

4.4 Area 105



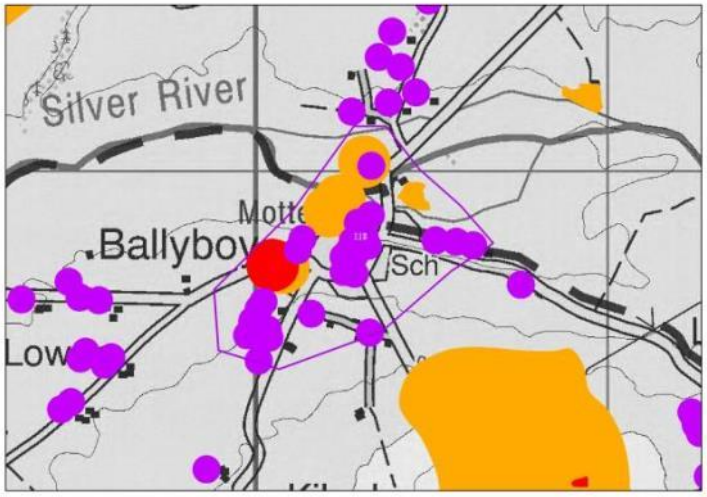
Constraints
Buildings

4.5 Area 106



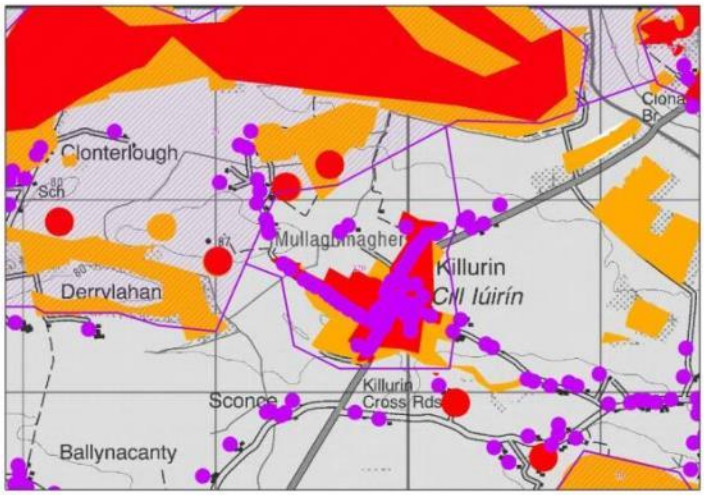
Constraints
Buildings
pNHA
Groundwater Extreme Vulnerability and Rock at or Near surface
High Sensitivity Landscape

4.6 Area 118



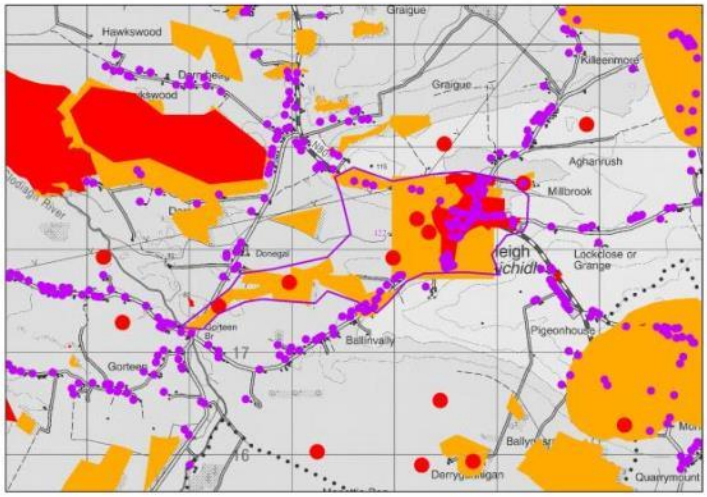
Constraints
Buildings
Zoned land
Forestry
Architectural Conservation Areas

4.7 Area 120



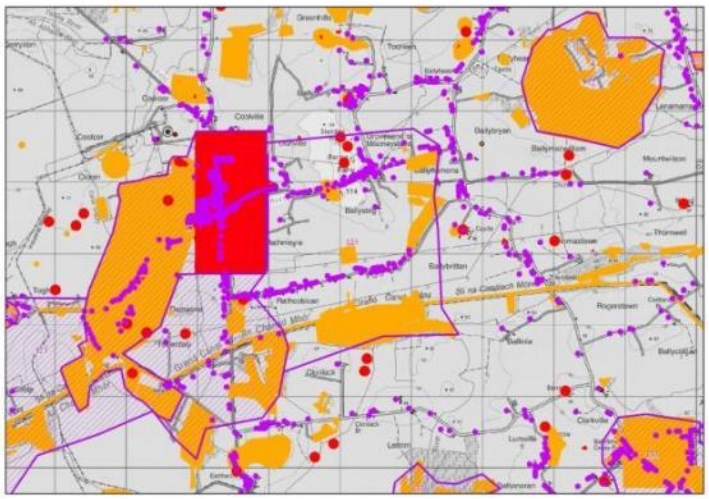
Constraints
Buildings
Settlements
Quarries

4.8 Area 122



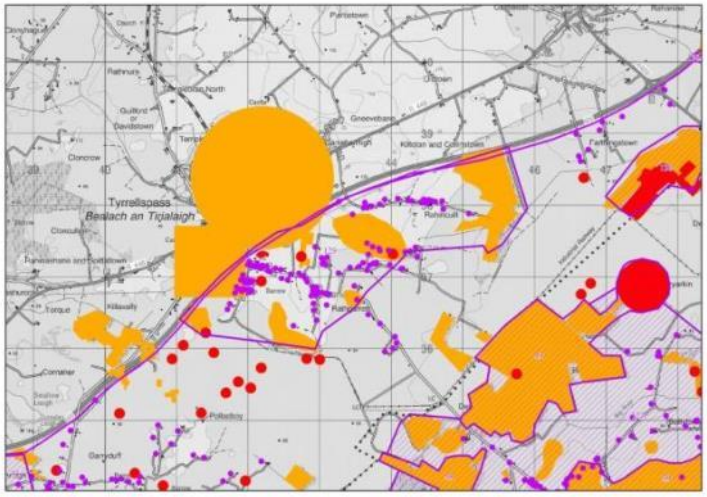
Constraints
Settlements
Medium density buildings
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry
Architectural Conservation Areas

4.9 Area 125



Constraints
Buildings
pNHA
Forestry

4.10 Area 129



Constraints
Buildings
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

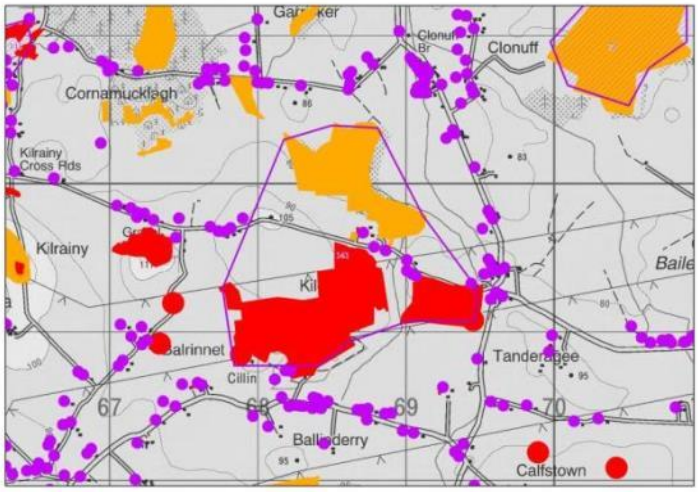
4.11 Area 139

Constraints
Medium Density Buildings
Groundwater Extreme Vulnerability and Rock at or Near surface

4.12 Area 140

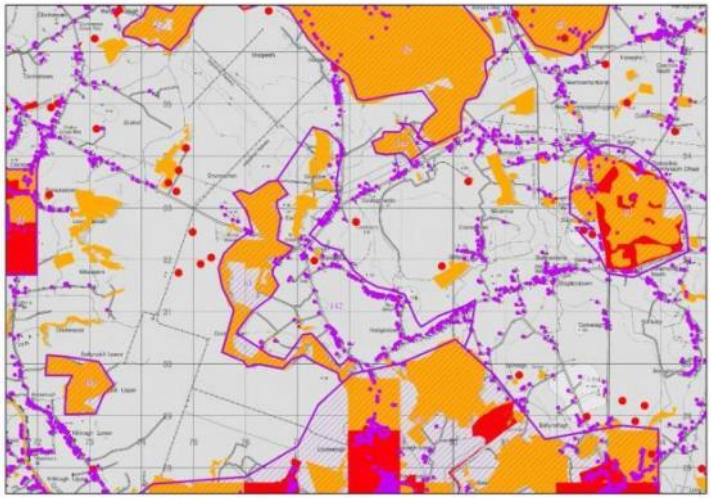
Constraints
Buildings
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry

4.13 Area 141



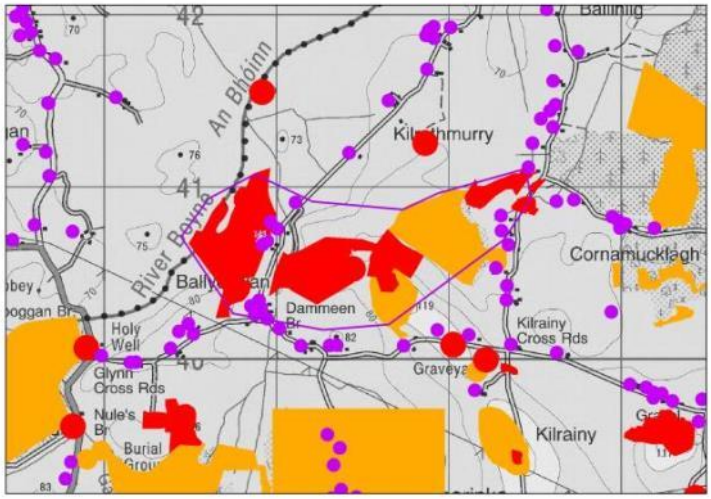
Constraints
Buildings
Quarries
Forestry

4.14 Area 142



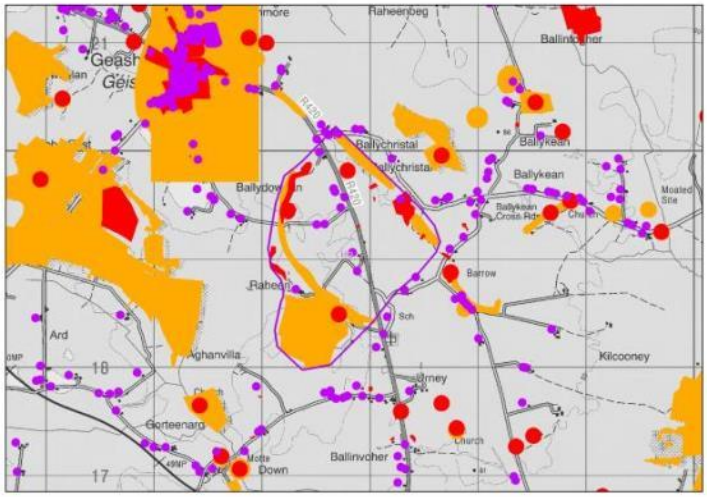
Constraints
Settlements
Quarries

4.15 Area 145



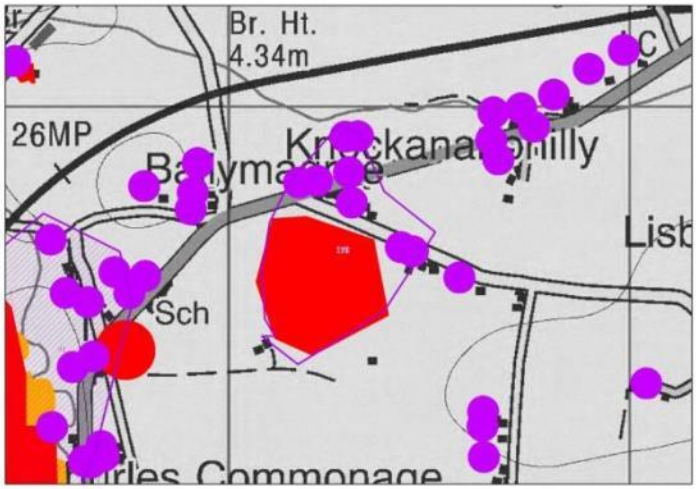
Constraints
Buildings
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Geological Heritage Sites
Forestry

4.16 Area 162



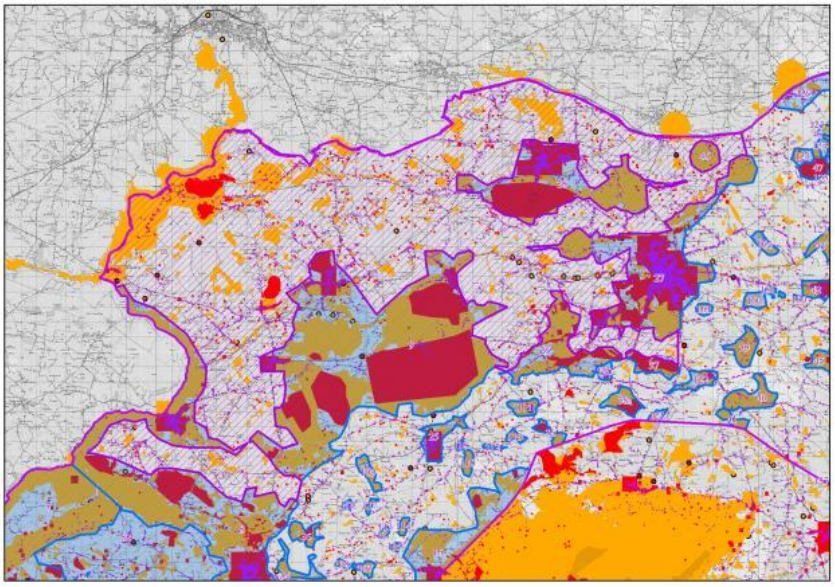
Constraints
Buildings
pNHA
Quarries
Important Habitats, Grasslands
High Sensitivity Landscape and High Amenity Area

4.17 Area 178



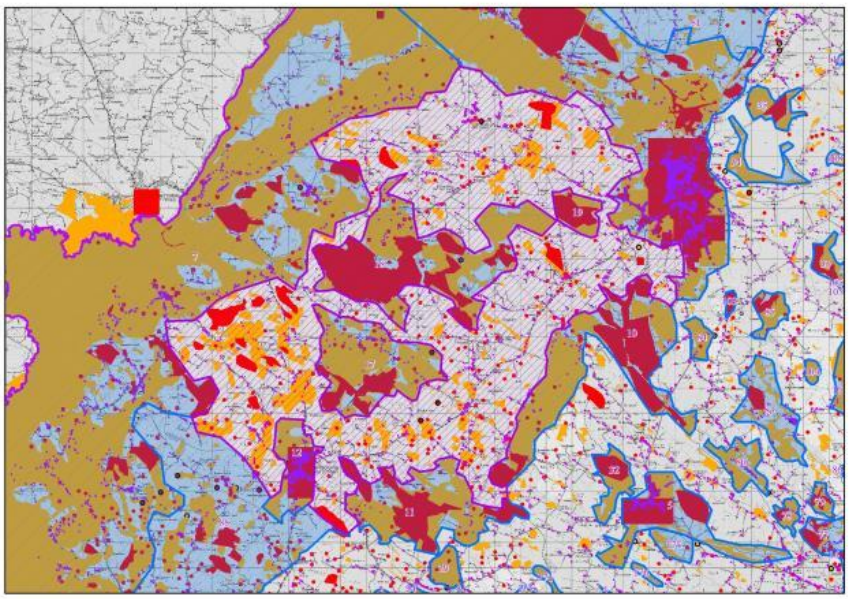
5 Areas Removed From “White Space” Based on Previous Exclusions

5.1 Area 81



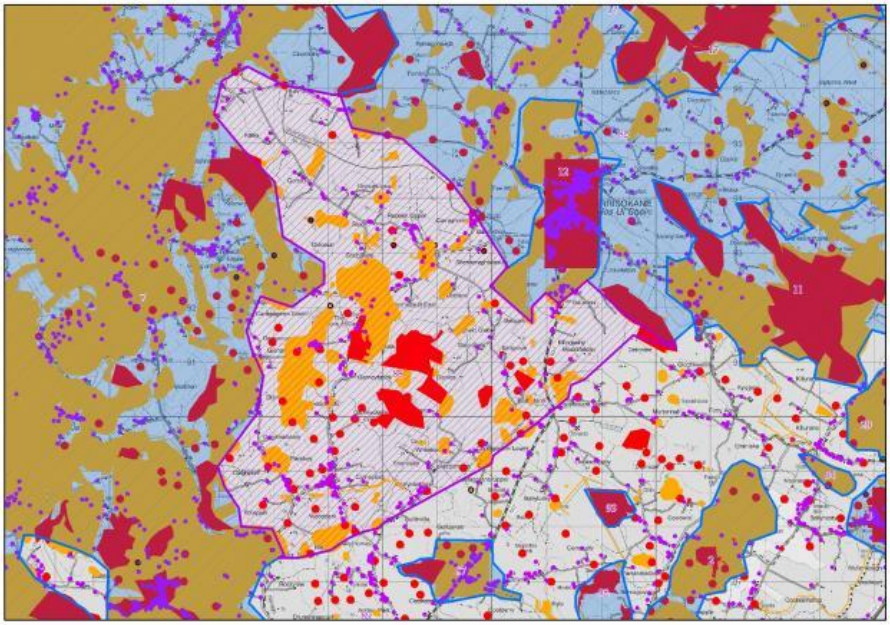
Constraints
Areas 8, 9, 26, 27, 28 and 37 have left the area with no viable entry for a pipeline corridor.

5.2 Area 82



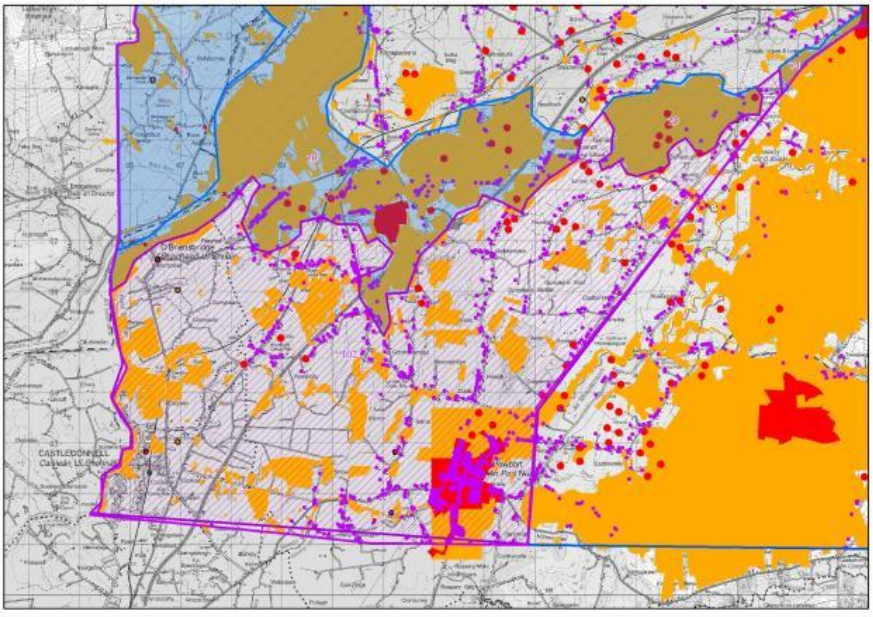
Constraints
Areas 7, 8, 10, 11, 12, 17, 18, 19, and 37 have left the area with no viable entry for a pipeline corridor.

5.3 Area 88



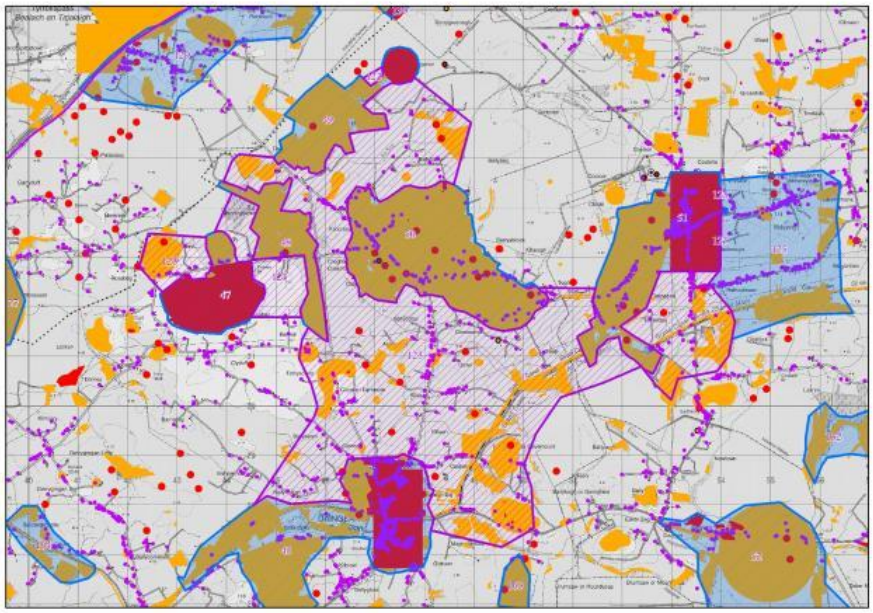
Constraints
Areas 7, 12 and 82 in combination with the geodirectory have left the area with no viable entry for a pipeline corridor.

5.4 Area 102



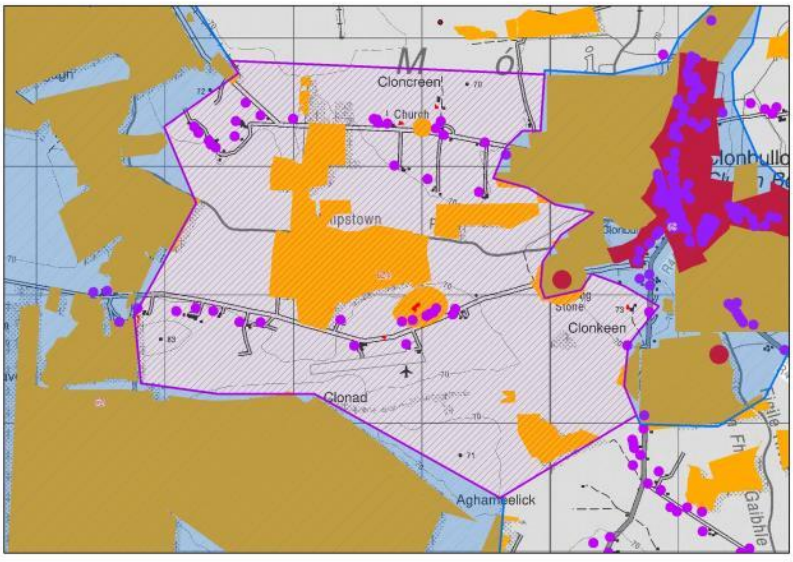
Constraints
Areas 20 and 23 have left the area with no viable entry for a pipeline corridor.

5.5 Area 123



Constraints
Areas 43, 47, 48, 49, 50 and 51 in combination with the geodirectory have left the area with no viable entry for a pipeline corridor.

5.6 Area 124



Constraints
Areas 52 and 68 have left the area with no viable entry for a pipeline corridor.

6 Preliminary Route Corridors

On completion of the GIS desktop study the “White Space” area was reduced in line with an assessment of prescribed constraints.

Figures F2-1 through F2-3 detail the process of refinement from the “White Space” identified in the Options Working Paper to identification of the “Preliminary Route Corridors” to be assessed under future stages of the Project (refer to Appendix B as detailed in the “Site Selection Methodology” report.

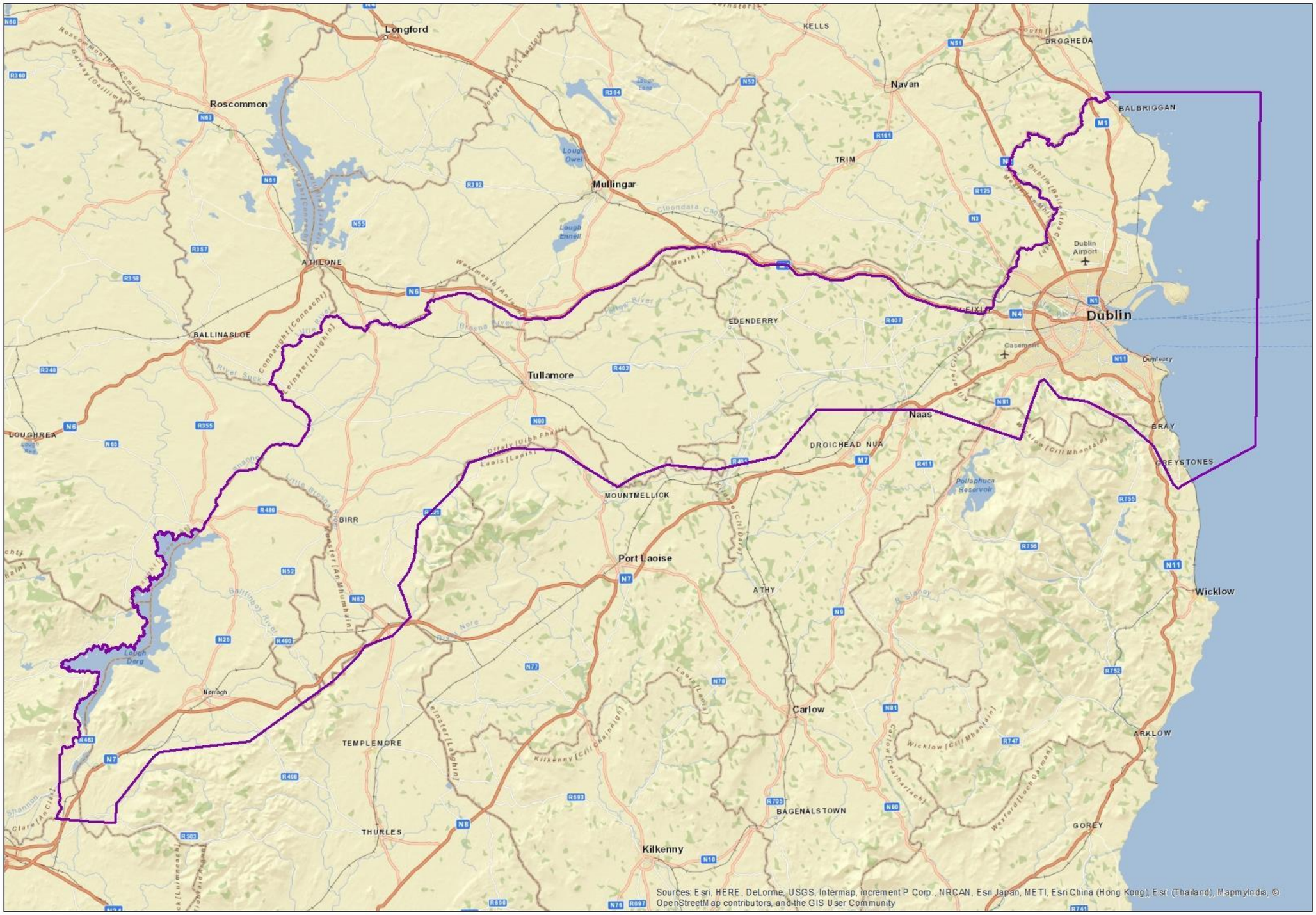


Figure F2 – 2 The "White Space"

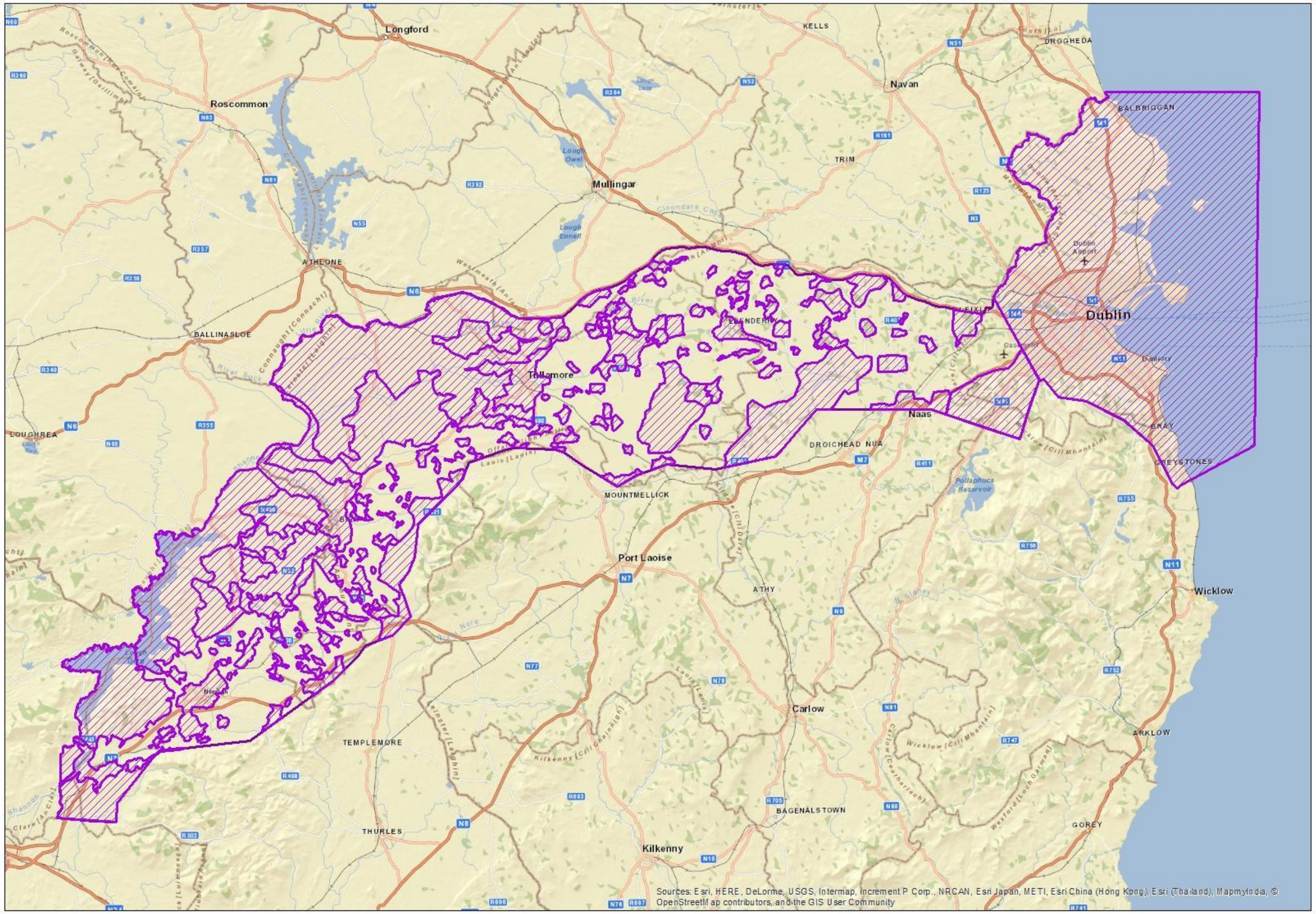


Figure F2 – 3 The "White Space" with further exlusions

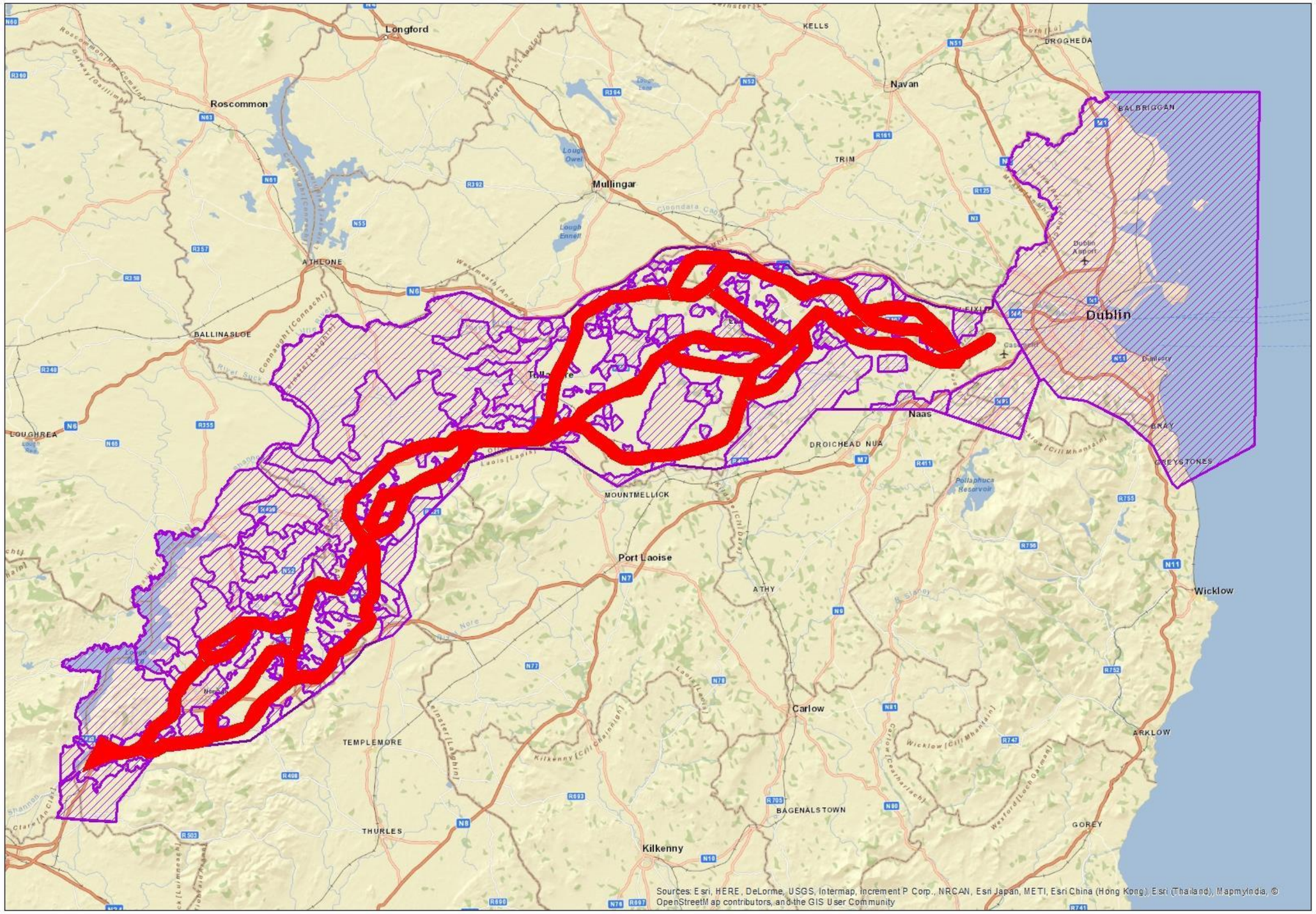


Figure F2 – 3 Routing of Preliminary Route Corridors

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F3: Terrestrial Ecology

October 2015 **F02**

Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F3 – 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F3 – 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F3 is a statement on the specialism Terrestrial Ecology and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To determine effectively the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option H (Desalination)**, each location was assessed under nineteen Ecology sub-criteria, ten of which are assessed in this report Ecology - Terrestrial. The remaining aquatic sub-criteria are assessed (along with overlapping sub-criteria between both terrestrial and aquatic ecology) within the Aquatic Ecology report in Appendix F4. The sub-criteria used for assessment within this report are as follows:

- Potential to impact on European or Natura 2000 Sites (Special Areas of Conservation – SAC and Special Protection Areas - SPA)
- Potential to impact on Natural Heritage Areas (NHA) and proposed Natural Heritage Areas (pNHA)

- Potential impact Annex I listed habitats[1] (designated)
- Potential impact Annex I listed habitats (non-designated)
- Potential to impact high ecological value habitats (semi natural habitats)
- Potential to impact on protected Flora - Flora Protection Order
- Potential to impact on Annex II species[2]
- Potential to Impact on Annex IV species[3] (wherever they occur)
- Potential to impact on the breeding / wintering habitat for Annex I birds species[4] and other qualifying interest bird species
- Potential to impact flora and fauna protected under Wildlife Acts e.g. Birds, Badger

1.2.1 Supporting studies

A desk study exercise of the potential abstraction locations was carried out using the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

The desk study also included review of existing databases including in particular National Parks and Wildlife Service database[5]. This enabled a review of records of rare and protected flora and fauna and a review of European Sites and an assessment of those with links to the proposed development.

The desk study was supported by preliminary field surveys[6] conducted throughout winter 2014 into summer 2015 to identify concentrations of birds and note / validate the presence of potential noteworthy habitats identified during the desk study.

1 The term “Annex I habitats” refers to those listed in Annex I of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as “The Habitats Directive”.

2 The term “Annex II species” refers to those listed in Annex II of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as “The Habitats Directive”.

3 The term “Annex IV species” refers to those listed in Annex IV of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as “The Habitats Directive”.

4 The term “Annex I bird species” refers to those listed in Annex I of the Council Directive 2009/147/EC on the Conservation of Wild Birds, often referred to as “The Birds Directive”.

5 National Parks and Wildlife Service www.npws.ie

6 Further detailed field surveys will be undertaken at subsequent stages of the design process.

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

Considered in the assessment are potential impacts to key ecological receptors including;

- Designated sites (SAC, SPA, NHA and pNHA);
- Protected flora species;
- Birds and other fauna; and
- High value habitats including degraded raised bog, hedgerows and treelines, wetlands and other semi natural habitats.

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only (refer to Preliminary Options Appraisal Report, Section 8).

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F3 – 1 Peamount

Peamount is located in west Co Dublin. Habitats on the site consist of amenity grassland, managed farmland and hedgerows.

The key ecology observations on the Peamount location include;

- The site is not located in European, Natura 2000 or Nationally designated conservation sites and is not linked to any river SAC/ SPA sites. The nature and scale of the proposed development mean possible impacts will be localised and controllable, with standard water pollution controls, during construction / operation.

- No Annex 1 listed (un-designated) habitats are likely to occur on the site as it is managed farmland. The managed nature of habitats at this location means the risk of protected flora being impacted is low.
- Terrestrial habitats of local importance are likely to be located in field boundaries (hedgerows) only. Hedgerows at this location may be utilized by badgers and will be used by breeding birds. A survey is required to establish the exact level of usage. However, the majority of land at this location is managed farmland and hedgerows can be avoided or impact upon them minimised. Landscaping with native woody species is appropriate mitigation to reduce hedgerow loss if this occurs.
- The managed nature of habitats at this location means the risk of disturbing Annex II listed species on the Habitats Directive, specifically Otter and Freshwater Crayfish (recorded in the area), is low. No rivers (otter and Crayfish habitat) occur on the site.
- The managed nature of habitats at this location means the risk of disturbing Annex IV listed species on the Habitats Directive, including bat species, is low. Typical roost sites such as old buildings will be avoided.
- The location is not important for wintering birds and other Annex 1 listed bird species are unlikely to use the site e.g. Kingfisher (riparian species).

In summary, the key considerations regarding terrestrial ecology are hedgerows/ treeline and disturbance to breeding birds and possibly protected fauna including badgers.

The matrix of multi criteria analysis below considers in detail potential ecological receptors relevant for the proposed development.

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Biodiversity, Flora & Fauna	**Low:** This location is not of significant ecological value.
Potential to impact on Natura 2000 Sites	**Very Low:** The proposed site is well removed from Natura 2000 sites and is not linked to any river SAC/ SPA sites.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Very Low:** The proposed site is well removed from NHA and pNHA sites.
Potential impact Annex I listed habitats (designated)	**Very Low: None.** The site is not located in Annex 1 habitats within a designated site.
Potential impact Annex I listed habitats (non-designated)	**Very Low:** It is unlikely that non-designated Annex 1 habitats exist at this location.
Potential to impact high ecological value habitats (semi natural habitats)	**Low:** Hedgerows at this location have local biodiversity value. The majority of land at this location is managed farmland and hedgerows. Hedgerows can be avoided or impact to them minimised.
Potential to impact on protected Flora - Flora Protection Order	**Low:** The managed nature of habitats at this location means the risk of protected flora being impacted is low.
Potential to impact on Annex II species	**Very Low:** The managed nature of habitats at this location means the risk of disturbing Annex II listed species is very low.
Potential to Impact on Annex IV species (wherever they occur)	**Low:** The managed nature of habitats at this location means the risk of disturbing Annex IV listed species is low.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Very Low:** The location is not important for wintering birds and other Annex 1 listed bird species.

Criteria	Location 1 - Peamount
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Low:** Hedgerows at this location have may be utilized by badgers and will be used by breeding birds.
Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***
Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***
Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***
Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***
Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***
Potential to impact marine/coastal birds	**Very Low:** The location is not important for birds and other Annex I listed bird species.
Potential to impact marine mammals	***See Aquatic Ecological Assessment***

Table F3 – 2 Summary of the MCA for Lough Derg/Parteen Basin

2.4 Comparative Discussion

As detailed above, European and Nationally designated sites are avoided at the Peamount terminal point reservoir site and the risks to other ecological constraints are considered low or very low. The location of Peamount, in managed farmland with hedgerows, means terrestrial ecology constraints are limited as managed farmland is of low conservation value.

The key habitats to consider at this location are field boundaries (hedgerows and tree lines) where protected fauna (birds and mammals) are most likely to occur and in this regard a full survey will be required to inform appropriate mitigation.

Possible impacts can be reduced by appropriate landscaping with native woodland species.

No significant ecological constraints exist at this location.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors for a pipeline transferring water from Parteen to Peamount was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference, the principal options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F3 – 2.

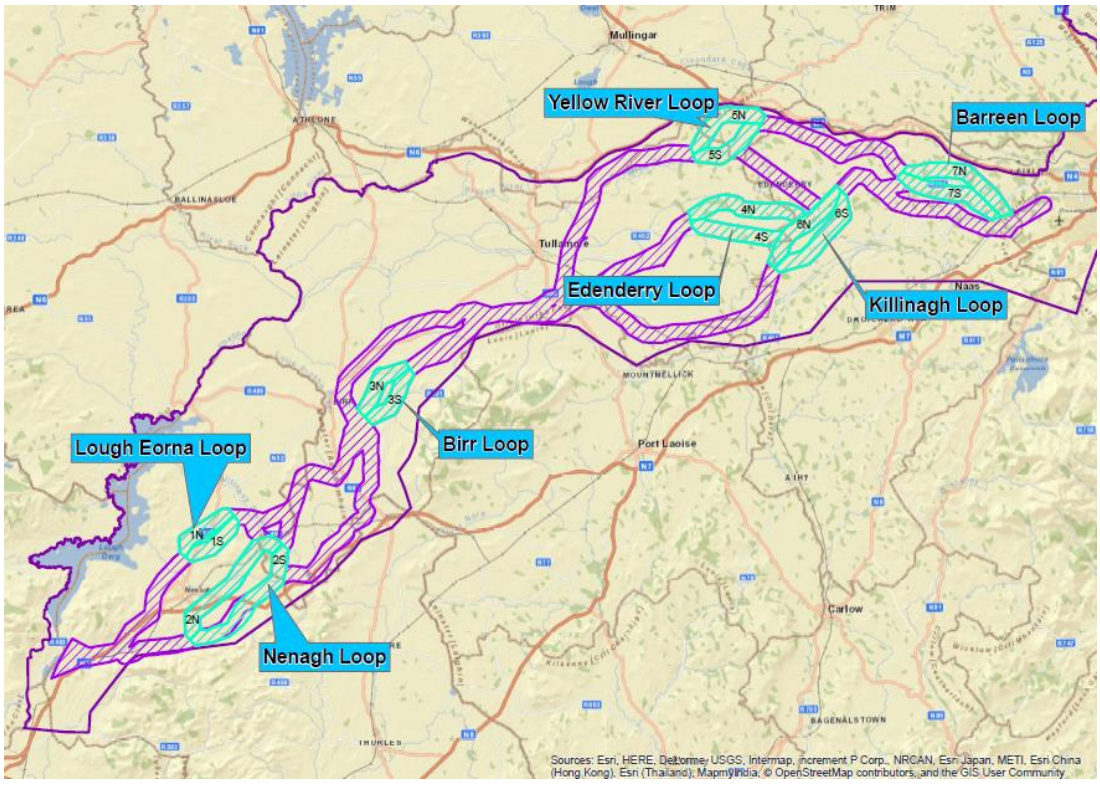


Figure F3 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison, an assessment of ‘loops’ only was initially conducted to identify the sub-option which was the least constrained.

An extensive range of data sources were reviewed to inform this assessment including;

- National Parks and Wildlife Services (NPWS)[7] data on European (SAC and SPA) and nationally (pNHA and NHA) designated sites;
- Review of Ordnance Survey maps, aerial photography and other available GIS datasets (sub-soils, contour mapping etc.) to assist in identifying habitats and features of potential ecological interest;
- A review of detailed aerial imagery including Bing Map, NPWS mapviewer and Google Earth;
- Review of EPA water quality data and river catchment water quality information (Water Framework Directive);
- Review rare and protected species records including relevant information sources for protected flora, bats, Otter, birds and Badger (including the National Biodiversity Data Centre records);
- A review of relevant ecological reports and literature and associated datasets. This included reference to ecology survey datasets (wetlands, woodlands and grasslands) compiled by National Parks and Wildlife Services and Tipperary County Council.

Site visits were conducted throughout winter 2014 into summer 2015 to identify concentrations of birds and note / validate potential noteworthy habitats, in particular wetlands, bogs and turloughs, in the study area. A specific ‘windscreen survey’ was conducted in August 2015 along the route of the corridor options to assess potentially habitats such as esker grasslands, bog condition and semi natural grasslands within view of public roads.

[7] http://www.npws.ie/

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

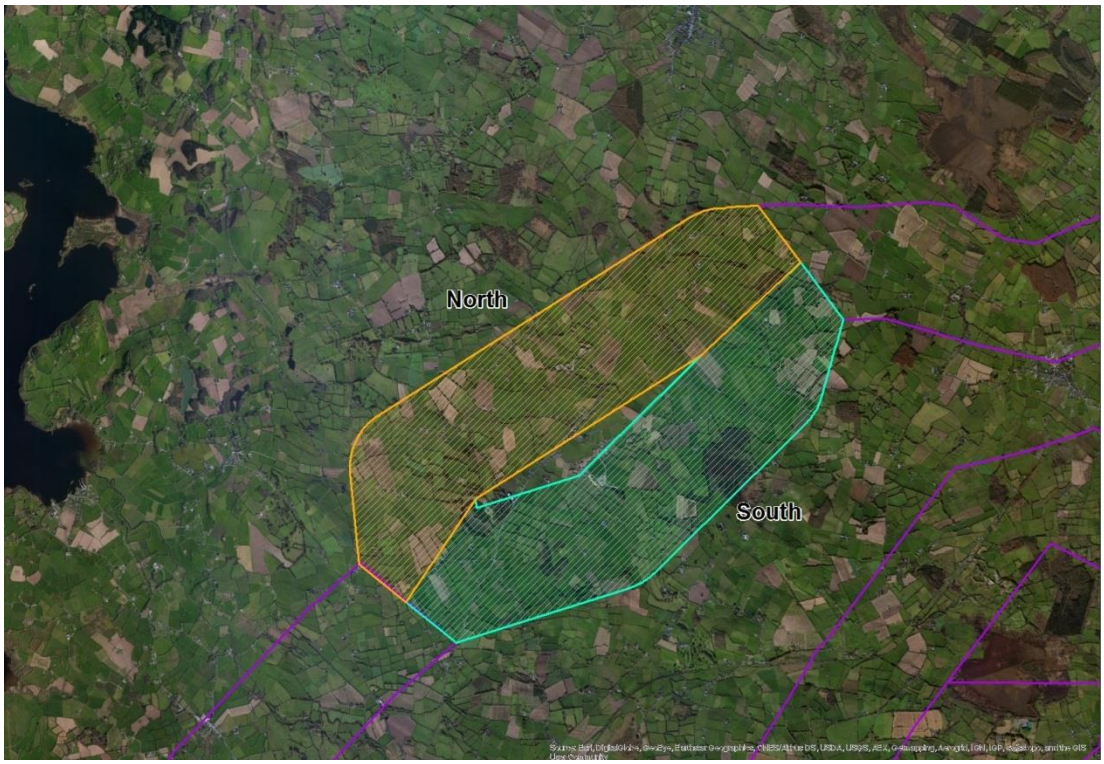


Figure F3 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

This route passes predominantly through managed farmland with boundary hedgerows. Impacts will arise along this route to hedgerows and potential breeding sites of protected fauna (birds, badger and possibly bats).

In addition there will be potential risks to distinct ecological sites within this branch as follows;

- The important ecological sites at Lough Eorna (fen/ wetland), and Ardcrony Turlough. These are sensitive groundwater fed wetland habitats and are additionally important winter and breeding bird sites.
- A number of potential esker grassland features are apparent which would warrant further survey to evaluate their importance.
- Also noteworthy are discrete, relatively small areas of semi natural woodland, scrub or possible overgrown drained fens which can be avoided.

These discrete areas detailed above can be avoided at route design stage.

Overall, moderate adverse impacts are predicted, in a worst case scenario, along this branch, even allowing for mitigation measures. These impacts will principally arise through direct hedgerow impacts and risks of disturbance to Annex II and IV

species, breeding birds and protected mammals (e.g. badgers). In addition this option presents risks of impact to Lough Eorna and Ardcrony Turlough.

4.1.2 Southern Branch

As with the Northern Branch, the Southern Branch passes predominantly through managed farmland with boundary hedgerows and will have similar impacts to hedgerows and potential breeding sites of protected fauna (birds, badger and possibly bats).

In addition there will be potential risks to distinct ecological sites within this branch as follows;

- A turlough / winter bird site occurs at Coolderry/ Ballylusky occur.
- Relatively small areas of bog woodland and semi natural woodland.

However a pipeline routed along this branch could be designed to avoid these discrete areas.

Moderate adverse impacts may be caused, in a worst case scenario, by routing a pipeline through this branch even with mitigation. These impacts will principally arise though hydrological impacts to a turlough, direct hedgerow impacts, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.1.3 Comparative Discussion

The northern branch of the Lough Eorna Loop is considered to have more sensitive habitats (wetlands) than the southern branch, although these habitats can be avoided. The southern branch is preferred from a terrestrial ecology standpoint.

4.2 The Nenagh Loop

4.2.1 Northern Branch

The northern branch of the Nenagh Loop passes predominantly through managed farmland with boundary hedgerows. Again, impacts of pipeline construction along this route will arise to hedgerows and potential breeding sites of protected fauna (birds, badger and possibly bats).

In addition there will be potential risks to distinct ecological sites within this branch as follows;

- Discrete areas of fen (one area), upland semi natural woodland, riparian habitats, scrub and three areas of forestry occur in this branch.
- The Nenagh, Ollatrim amd Ballintotty Rivers are crossed.

The first group of sites can be avoided by routing of the pipeline within this branch. The three rivers will need to be crossed but direct impacts can be avoided with appropriate mitigation measures.

Moderate adverse impacts can be expected, in a worst case scenario, even with mitigation, from a pipeline constructed in this branch. The impacts will principally arise though risks to identified fen and woodlands, direct impacts to hedgerows, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

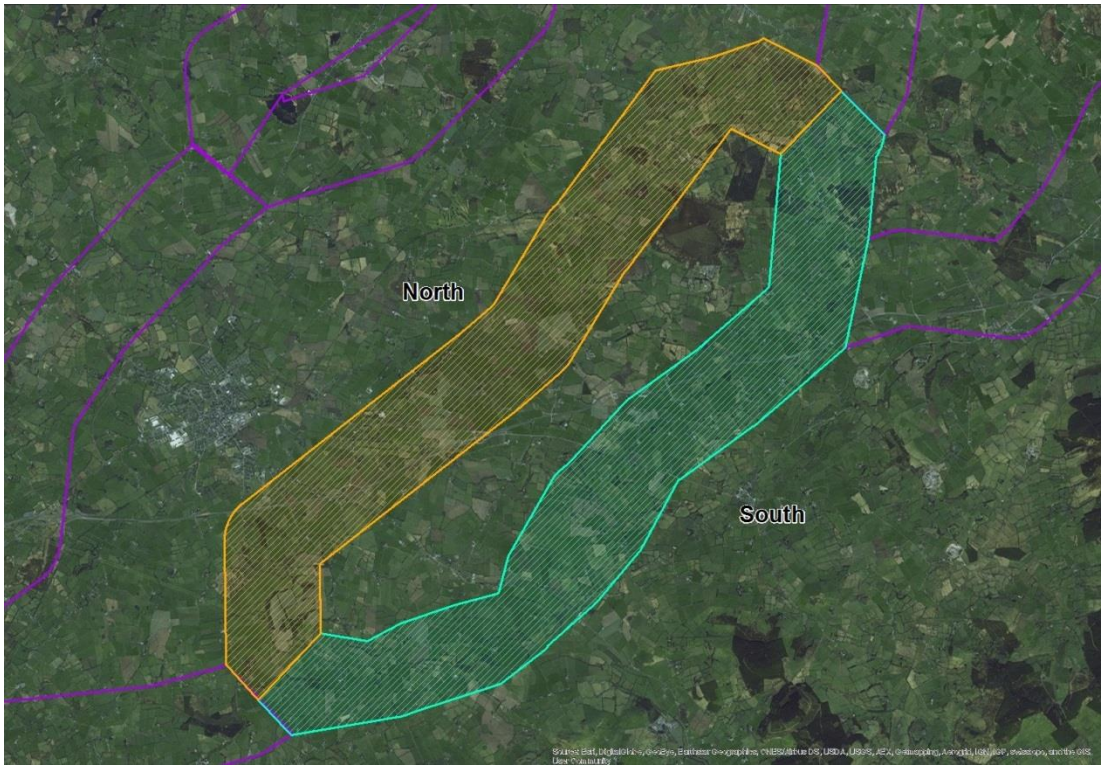


Figure F3 – 4 The Nenagh Loop

4.2.2 Southern Branch

The southern branch route is similar to that of the northern branch, as it passes predominantly through managed farmland with boundary hedgerows. Impacts will arise to hedgerows and potential breeding sites of protected fauna (birds, badger and possibly bats).

In addition there will be potential risks to distinct ecological sites within this branch as follows;

- Two areas of degraded bog/ semi natural woodland occur at the north of the branch.
- The Nenagh, Ollatrim amd Ballintotty Rivers are crossed.

The degraded bog and semi natural woodland can be avoided by the final pipeline route. The river crossings cannot be avoided but direct impacts on these rivers can be avoided.

Moderate/ low adverse impacts of a pipeline constructed within this branch will principally arise though risks to identified bog and woodlands, direct impacts to hedgerows, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.2.3 Comparative Discussion

The southern branch of the Nenagh Loop is considered slightly less sensitive than the northern branch. The southern branch is preferred from a terrestrial ecology standpoint.

4.3 The Birr Loop

Figure F3 – 5 The Birr Loop

4.3.1 Northern Branch

This route passes predominantly through managed farmland with boundary hedgerows.

A small area of bog woodland/ cutover bog within this branch can be avoided. Two rivers, Rapemills and Camcor, would however require crossing.

In a worst case scenario, even with mitigation measures, moderate/ low adverse impacts would be caused by routing a pipeline through this branch. These impacts would principally arise through direct impacts to hedgerows, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.3.2 Southern Branch

Like the northern branch, the southern branch passes predominantly through managed farmland with boundary hedgerows. Two crossings of the Camcor River would be required if a pipe were constructed along this branch.

Moderate/ low adverse impacts are predicted, in a worst case scenario, with mitigation, from a pipeline routed through this branch, principally through direct impacts to hedgerows, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.3.3 Comparative Discussion

Based on this assessment no significant ecological constraints are likely to arise in either branch which cannot be dealt with by appropriate design and mitigation. No options are preferred from a terrestrial ecology standpoint.

4.4 The Edenderry Loop

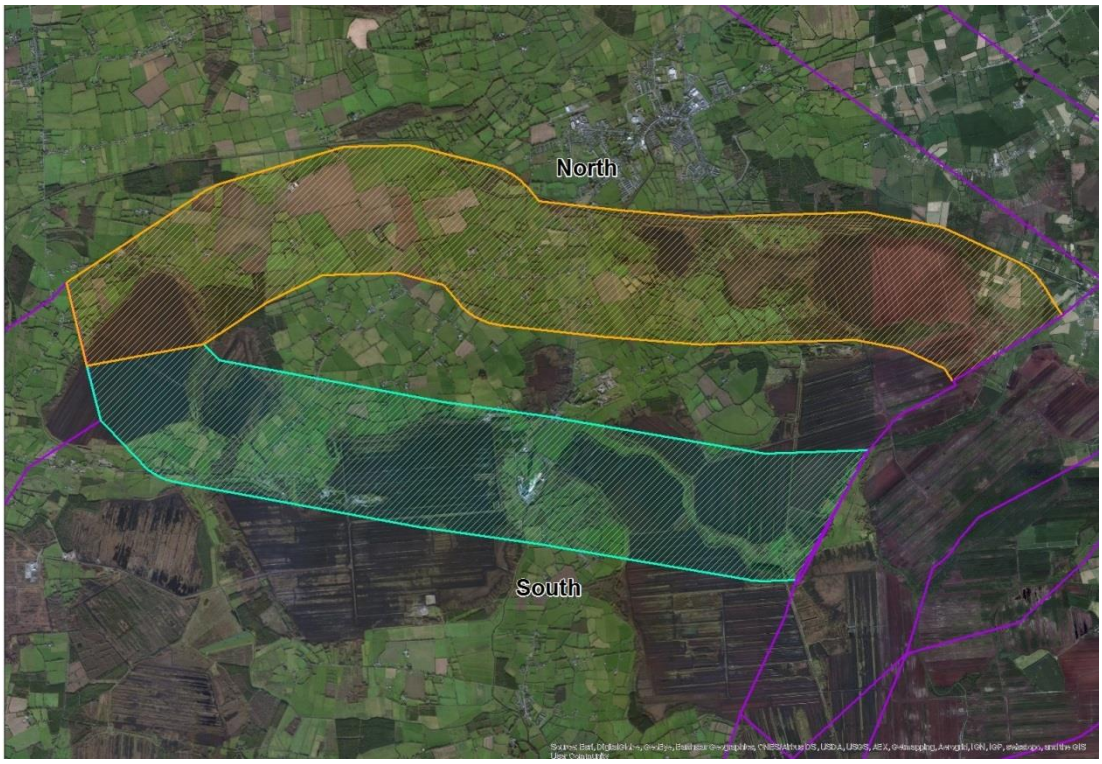


Figure F3 – 6 The Edenderry Loop

4.4.1 Northern Branch

This route passes through managed farmland with boundary hedgerows and extensive areas of Bord na Mona cutover bog with fringing remnant bog habitats (raised bog and bog woodland).

Much of the cutover bog is not currently cut for peat and includes extensive areas of developing woodland and wetland, and semi natural woodland fringe. One extensive block of remnant raised bog is crossed. This loop partially includes Long Derries SAC (Site code 000925) and Grand Canal pNHA (Site Code 002104).

Moderate/ high impacts are predicted in a worst case scenario with mitigation. This will principally arise through direct impacts to high value remnant raised bog habitat (Annex 1 – priority habitat), Long Derries SAC, hedgerow impacts, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

This is a constrained area ecologically and careful line design, informed by field surveys, is required before a full assessment could be provided.

4.4.2 Southern Branch

This branch crosses extensive Bord na Mona cutover bog with fringing remnant bog habitats (raised bog and bog woodland). Much of this is not currently cut for peat and includes extensive areas of developing woodland and wetland, and semi natural woodland fringe.

A pipeline constructed along this branch would generate moderate adverse impacts, in a worst case scenario, even allowing for mitigation. These would principally arise through direct impacts to bog and hedgerow habitats, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.4.3 Comparative Discussion

The northern branch of the Edenderry Loop is more constrained than the southern branch. The southern branch is much preferred from a terrestrial ecology standpoint.

4.5 The Yellow River Loop

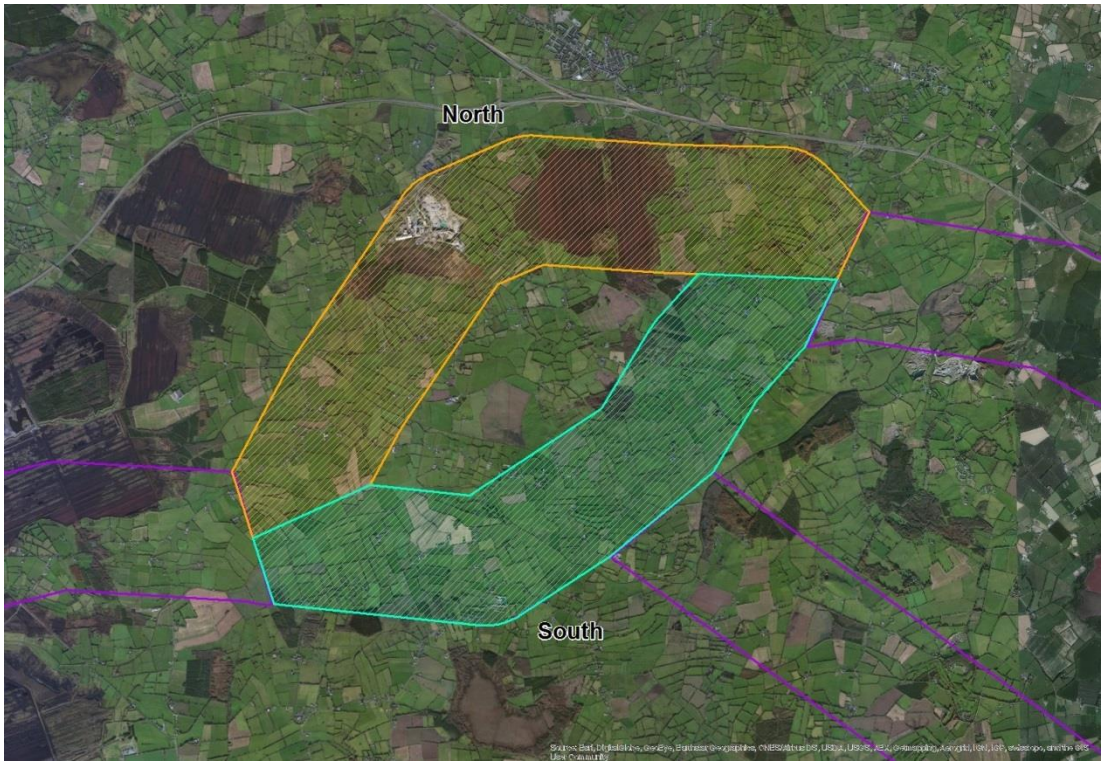


Figure F3 – 7 The Yellow River Loop

4.5.1 Northern Branch

This branch of the Yellow River Loop is dominated by managed farmland/ hedgerows. An extensive area of actively cut bog with fringe remnant bog habitats is crossed as is the Castlejordan River.

Moderate/ low adverse impacts are predicted along this branch in a worst case scenario, with mitigation. The impacts would principally be direct impacts to hedgerows and bog fringe habitats, indirect impacts to rivers and risks of

disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.5.2 Southern Branch

The southern branch is also dominated by managed farmland / hedgerows and the branch crosses the Yellow river.

In a worst case scenario, with mitigation, moderate/ low adverse impacts would be generated by a pipeline routed along this branch. . These would principally arise through direct impacts to hedgerows, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.5.3 Comparative Discussion

The southern branch of the Yellow River Loop is slightly less constrained than the northern branch. The southern branch is preferred from a terrestrial ecology standpoint.

4.6 The Killinagh Loop

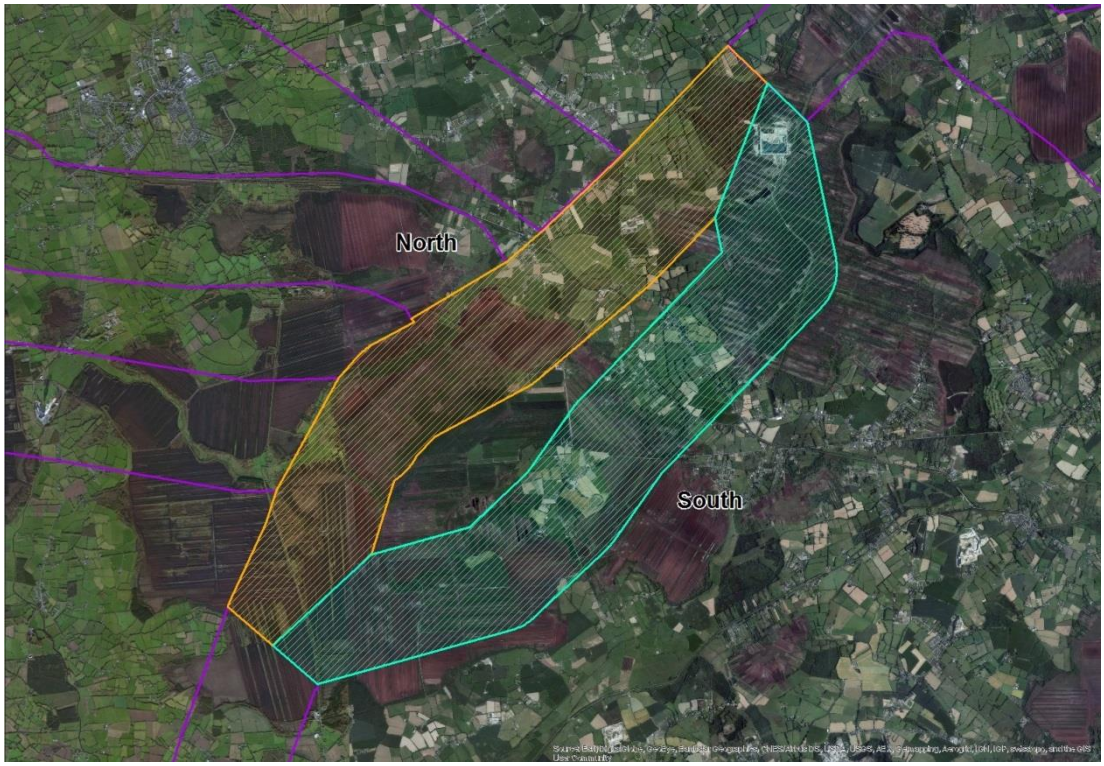


Figure F3 – 8 The Killinagh Loop

4.6.1 Northern Branch

This branch crosses extensive areas of cutover bog with remnant raised bog managed by Bord na Mona. Much of the cutover bog has not been cut recently and is developing as wetlands and semi natural woodland habitat. Extensive areas of former cutover bog have been planted with forestry plantations.

Moderate adverse impacts are predicted along this branch in a worst case scenario, with mitigation, principally through direct impacts to bog habitats, hedgerows indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.6.2 Southern Branch

The southern branch crosses much the same terrain as the northern branch with extensive areas of cutover bog with remnant raised bog managed by Bord na Mona. Again much of the cutover Bog has not been cut recently and is developing into wetland and semi natural woodland habitats. Extensive areas of former cutover bog have been planted with forestry plantations.

This branch includes more extensive areas of relatively higher value bog and woodland habitats compared to the northern branch.

Use of this branch would result in moderate/ high adverse impacts, in a worst case scenario, even with mitigation, principally through direct impacts to bog habitats, hedgerows, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.6.3 Comparative Discussion

In the Killinagh Loop, the northern branch route is slightly less constrained than the southern as it crosses less high value bog habitat. The northern branch is preferred from a terrestrial ecology standpoint.

4.7 The Barreen Loop

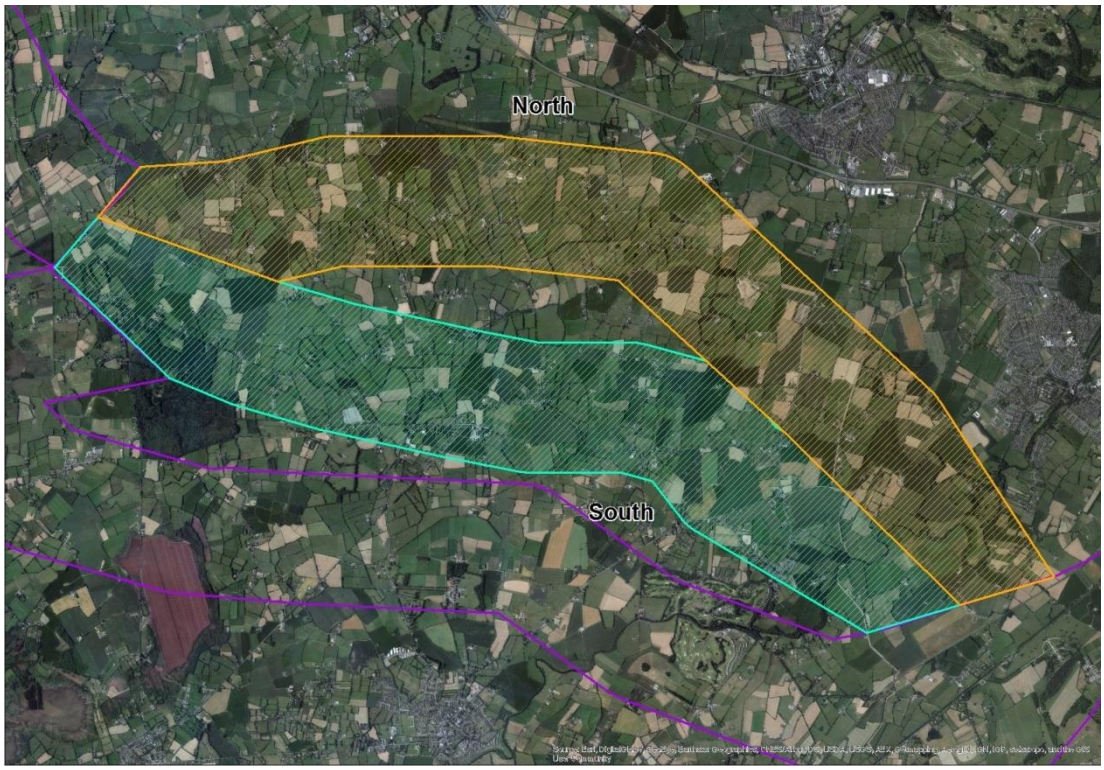


Figure F3 – 9 The Barreen Loop

4.7.1 Northern Branch

This branch of the Barreen Loop is dominated by managed farmland with hedgerows. One crossing of the River Liffey would be required be a pipeline routed along this branch.

Moderate/ low adverse impacts are predicted in a worst case scenario, allowing for mitigation measures, largely through direct impacts to hedgerows, indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.7.2 Southern Branch

The southern branch is similar in nature to the northern branch, being dominated by managed farmland with hedgerows and including one crossing of the River Liffey.

Similar moderate/ low adverse impacts to those described for the northern branch can be expected including through direct impacts to hedgerows indirect impacts to rivers, and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

4.7.3 Comparative Discussion

Based on this assessment, no significant ecological constraints are likely to arise in either branch of the Barreen Loop. No options are preferred from a terrestrial ecology standpoint.

The Matrix of Multi Criteria analysis below summarises the assessment of all loop/branch options. Key terrestrial ecology constraints (discussed above) in each category are identified which are additional to hedgerow impacts and disturbance to faunal sites.

4.8 Matrix of Multi Criteria Analysis

Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Mid-range impacts: Lough Eorna Ardcrony Turlough	**Mid-range impacts:** turlough / bird site at Coolderry/ Ballylusky, Bog woodland and semi natural woodland	**Mid-range impacts:** fen (south), woodland riparian, scrub, forestry (3 areas)	**Low impacts:** Discrete degraded bog – (north), semi natural woodland (north)	**Low impacts:** Discrete areas bog woodland / cutover bog Rapemills and Camcor rivers require crossing	**Low impacts:** Camcor River requires two crossings	**High impacts:** Partially includes Long Derries SAC & Grand Canal pNHA Extensive cutover bog and developing and fringing semi natural habitats One extensive block remnant raised bog	**Mid-range impacts:** Extensive cutover bog and developing and fringing semi natural habitats	**Low impact:** Discrete cutover bog, fringing semi natural habitats	**Low impact:** Hedgerows	**Mid-range impacts**: Remnant raised bog, Extensive cutover bog and developing and fringing semi natural habitats	**High impacts:** Remnant raised bog. Extensive cutover bog and developing and fringing semi natural habitats	**Mid-range impacts**: River Liffey	**Mid-range impacts**: River Liffey

Table F3 – 3 Summary of the MCA for Corridor sub-options or "Loops"

5 Preliminary Route Corridor A

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F3 – 10 below.

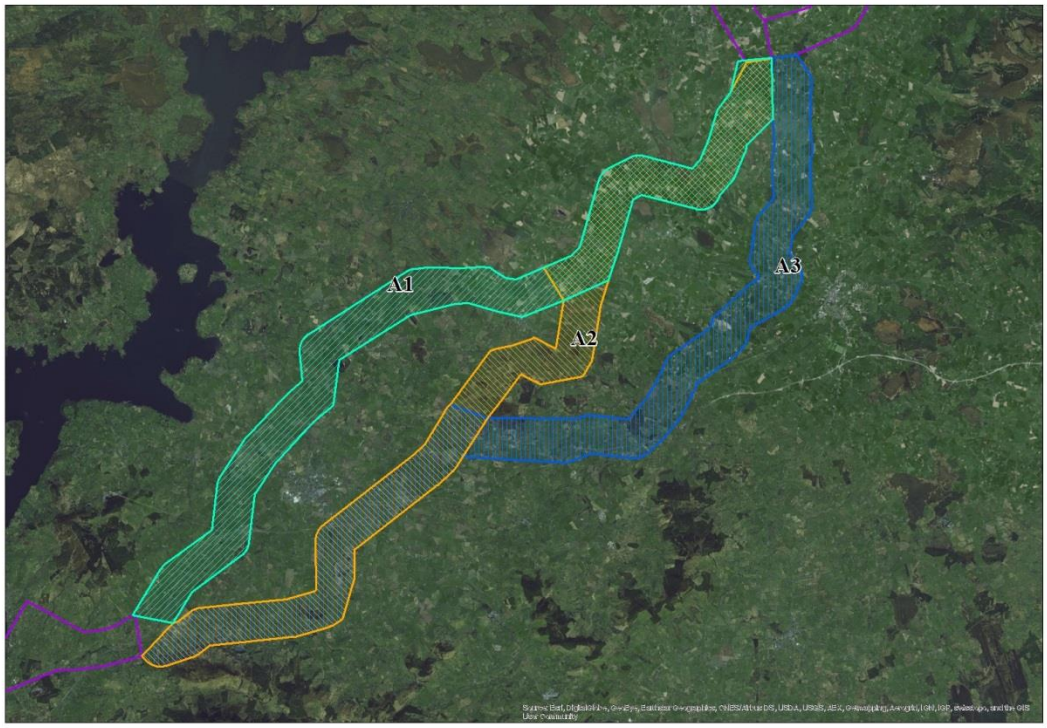


Figure F3 – 10 Preliminary Route Corridors and Loops

All corridor options pass through a predominantly low lying agricultural landscape. Natura 2000 sites and National (proposed) national heritage areas were avoided as far as possible in the development of all route corridor options. The key terrestrial ecology features along these options are hedgerows, remnant raised bog, semi natural grasslands (in particular associated with eskers), rivers and habitats on cutover bogs. Other features which will require more site specific survey at route design stage include possible turloughs, springs, fens and other wetlands. The key ecological features along each of the route corridor sub-options A1, A2 and A3 are summarised as follows.

5.2 Route Corridor A1

The key ecology observations on Route Corridor A1 include;

- There are no SAC/ SPA or NHA within this corridor
- Willsbrook Esker pNHA and Cangort Bog pNHA are at the edge of the corridor, but can be avoided.
- This option is within the River Shannon catchment (Lower River Shannon cSAC) hence the Lower River Shannon SAC is linked to possible impacts from a proposed development..
- Crossings are required of the Rivers Brosna, Ollatrim, Ballintotty and Nenagh.
- This option includes Ardcrony Turlough which is a sensitive groundwater fed wetland/ turlough and bird site.
- Hedgerows and drainage ditches will be directly impacted. This is the shortest option at 47.4 km. Impacts to hedgerows, ditches and associated habitats are therefore likely to be lowest compared to other corridors.
- There is a high potential for localised disturbance to birds and protected mammals in hedgerows affected.

Moderate adverse impacts are predicted along Route Corridor A1 in a worst case scenario allowing for mitigation. This will arise through direct impacts to hedgerows, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

5.3 Route Corridor A2

The key ecology observations on Route Corridor A2 include;

- There are no SAC/ SPA, NHA or pNHA within this corridor
- This option is within the River Shannon catchment (Lower River Shannon cSAC) hence the Lower River Shannon SAC is linked to possible impacts from a proposed development..
- Crossings along Corridor A2 are required at the Rivers Brosna, Ollatrim, Ballintotty and Nenagh.
- Hedgerows and other locally important habitats will be directly impacted. At 49.6km, Route Corridor A2 is the second longest option being considered. In this regard impacts to hedgerows and associated habitats can be expected to be proportionately greater than for other options, with the exception of Route Corridor A3.
- There is a high potential for localised disturbance to birds and protected mammals.

Moderate impacts are predicted along Route Corridor A2, in a worst case scenario, allowing for mitigation. This will arise through direct impacts to hedgerows, along with indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

5.4 Route Corridor A3

The key ecology observations on Route Corridor A3 include;

- This option includes Lisduff fen SAC which is groundwater fed wetland habitat sensitive to possible drainage effects of a trenched pipeline. While this SAC is avoidable this corridor presents the greatest risk to this site of all corridors under consideration.
- No SPA or NHA sites occur within this corridor

- Mount Saint Joseph pNHA woodland strip stretches over half the width of the corridor at the River Brosna crossing,
- Drumakeenan, Eagle Hill and Perry's Mill (3 areas) pNHA are within the corridor. These are sensitive, species rich grassland and fen habitats with potential for protected flora.
- This option is within the River Shannon catchment (Lower River Shannon cSAC) hence the Lower River Shannon SAC is linked to possible impacts from a proposed development..
- Crossings are required of the Rivers Brosna (2), Ollatrim, Ballintotty and Nenagh.
- Hedgerows and other locally important habitats will be directly impacted. This is the longest option at 52km so will likely have greatest impacts on hedgerows.
- There is a high potential for localised disturbance to birds and protected mammals.
- Peatland habitats within this corridor are avoidable.

Moderate/ high adverse impacts are predicted along Route Corridor A3 allowing for mitigation. These will largely be through impacts to pNHA areas detailed, Lisduff Fen SAC, rivers, bog habitats, hedgerows and protected flora and risks of disturbance to Annex II and IV faunal species, breeding birds and protected mammals (e.g. badgers).

The Matrix of Multi Criteria analysis below summarises the assessment of the Route Corridors A1, A2 and A3. Key terrestrial ecology constraints in each category are identified (discussed above) which are additional to hedgerow impacts and disturbance to faunal sites.

5.5 Matrix of Multi Criteria Analysis

Criteria	Corridor A1	Corridor A2	Corridor A3
Biodiversity, Flora & Fauna (Terrestrial)	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats.	**Mid-range Impact:** River Brosna and Nenagh River crossings. Peatland habitats at greater risk than A1.	**High Impact:** Lisduff fen SAC pNHA sites River Brosna and Nenagh River crossings Peatland habitats.
Potential to impact on Natura 2000 Sites	**Mid-range Impact:** Lisduff fen SAC < 2km Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.	**Mid-range Impact:** Lisduff fen SAC < 2km Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.	**High Impact:** Lisduff Fen SAC (sensitive groundwater fed) within corridor, Downstream Lower River Shannon SAC - crossings rovers Nenagh and Little Brosna.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Mid-range Impact:** Willsbrook Esker pNHA (effectively avoided), Edge Cangort Bog NHA	**Mid-range Impact:** Edge Cangort Bog NHA	**High Impact:** Mount st Joseph pNHA woodland strip > half corridor at Brosna River crossing, Drumakeenan, Eagle Hill and Perrys Mill (3 areas) within corridor
Potential impact Annex I listed habitats (designated)	**Mid-range Impact:** While well removed residual uncertainty regarding risk to habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC	**Mid-range Impact:** While well removed residual uncertainty regarding risk to habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC	**High Impact:** Potential to impact habitats at Lisduff Fen SAC; • Petrifying springs with tufa formation (Cratoneurion) [7220] • Alkaline fens [7230] Indirect adverse effects possible to downstream Annex 1 listed aquatic habitats in Lower River Shannon SAC
Potential impact Annex I listed habitats (non-designated)	**Mid-range Impact:** Annex 1 listed habitats potential at River Brosna callows, Ardcrony Turlough and Lough Eorna	**Mid-range Impact:** Annex 1 listed habitats potential at River Brosna callows	**High Impact:** Annex 1 listed habitats potential at River Brosna callows and at Eagle Hill

Criteria	Corridor A1	Corridor A2	Corridor A3
Potential to impact high ecological value habitats (semi natural habitats)	**High Impact:** Rivers Brosna and callows unavoidable, Hedgerows, scrub, stream crossings, Nenagh River, 3 fragments degraded bog	**High Impact:** Rivers Brosna, Ollatrim, and Kilmastulla - unavoidable, Wetlands near Silvermines, Ballinaboy river, fen south Nenagh, Raised bog **and** semi natural woodland at Kyleashinnaun.	**High Impact:** Rivers Brosna, Ollatrim, and Kilmastulla unavoidable. Wetlands near Silvermines, Ballinaboy rivers, fen south Nenagh Raised bog and semi natural woodland at Kyleashinnaun.raised bog, extensive wetland west Dunkerrin, wetland north River brosna
Potential to impact on protected Flora - Flora Protection Order	**Mid-range Impact:** Potential at Little Brosna callows	**Mid-range Impact:** Potential at Little Brosna callows	**High Impact:** Potential at River Brosna area and at fen and calcareous grassland around Mount st Joseph pNHA
Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at Little Brosna, Nenagh River and other stream crossings
Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 47.4km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 49.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 52km crossed and associated access routes
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Mid-range Impact:** Ardcrony turlough and River Brosna callows	**Low impact:** River Brosna Callows	**Moderate/ Low impacts:** River Brosna Callows
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 47.4km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 49.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 52km crossed and associated access routes

Table F3 – 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

Route corridor option A1 is the preferred option as it is the shortest option and thereby would involve the least hedgerow clearance and associated disturbance impacts to fauna. This option also presents no risk to Drumakeenan, Eagle Hill and Perrys Mill pNHA and the least risk (with A2) to Lisduff Fen SAC

Route Corridor option A2 is second in preference as it is the second longest option.

Route Corridor option A3 is the least preferred option as it is the longest option and presents the greatest risk to Lisduff Fen SAC and Drumakeenan, Eagle Hill and Perrys Mill pNHA

6 Preliminary Route Corridor B

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F3 – 11 below.

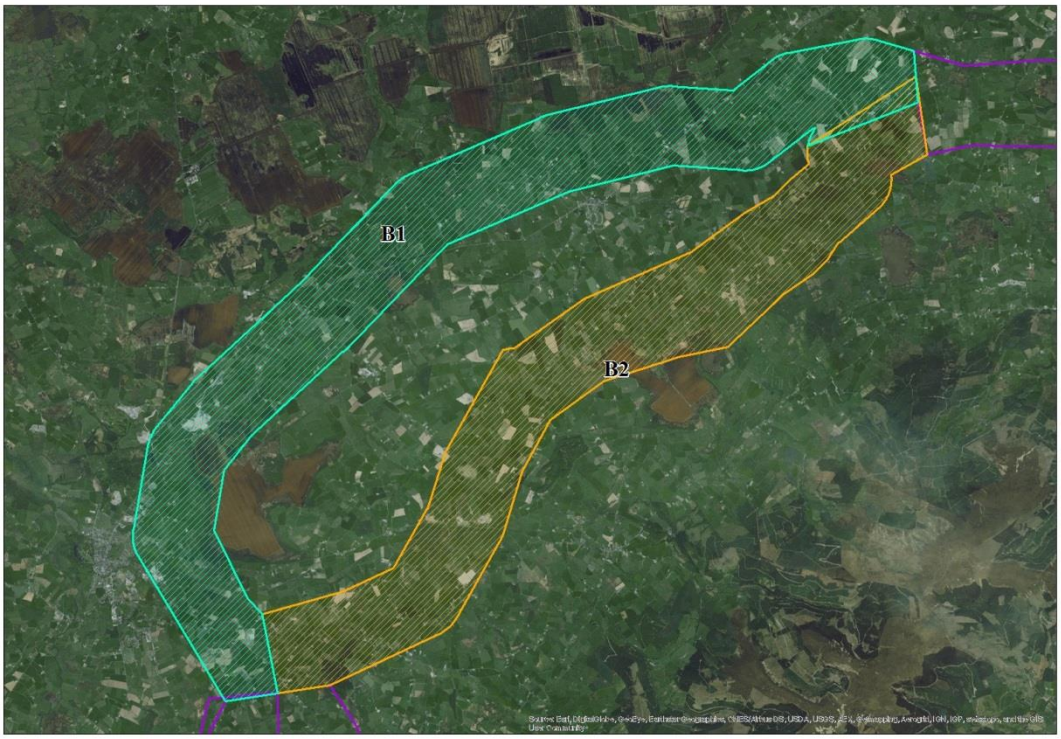


Figure F3 – 11 Preliminary Route Corridors and Loops

Both corridor options pass through a predominantly low lying agricultural landscape. Natura 2000 sites and National (proposed) national heritage areas were avoided as far as possible in the development of all route corridor options. The key terrestrial ecology features along these options are hedgerows, rivers and habitats on cutover bogs. The key ecological features along each of the route corridor sub-options B1 and B2 are summarised as follows;

6.2 Route Corridor B1

The key ecology observations on Route Corridor B1 include;

- No SAC/ SPA or NHA occur within this corridor. Natura 2000 sites are considered to be at low risk from this route as they are well removed from Corridor B1.
- This corridor includes the edge of Woodville woods pNHA, but this is avoidable,
- This corridor also includes the edge of Lough Coura pNHA but again this is avoidable,
- The corridor includes a crossing of the River Camcor,

- This route is relatively close (<1km) to the Boora Parklands (cutaway bog and reclaimed farmland), an important area nationally for scarce breeding birds (Grey Partridge and wader species), and wintering wildfowl.
- A distinct area of raised bog is crossed by the corridor in the townland of Barnaboy near the Boora parklands area,
- Hedgerows and drainage ditches will be directly impacted. At approximately 27.7km, Route Corridor B1 is the longest option for the Preliminary Route Corridor BC. Therefore more hedgerows and other locally important habitats will be affected along Corridor B1 when compared to other options.
- There will be a high potential for localised disturbance to birds and protected mammals at hedgerows and wooded areas crossed along the corridor and required access routes during construction.

Moderate adverse impacts will likely arise along this corridor , even following mitigation measures, principally through direct impacts to bog and hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

6.3 Route Corridor B2

The key ecology observations on Route Corridor B2 include;

- No SAC/ SPA, NHA or pNHA occur within this corridor. Natura 2000 sites are therefore considered to be at low risk as they are well removed from the corridor.
- Raised bog occurs within the corridor at the townland of Gortacur but is avoidable as it extends across approximately 1/4 of the route corridor width only.
- Ecological features are generally relatively scarce along this route outside of hedgerows and modified rivers crossed (affected by past drainage works).
- Hedgerows and drainage ditches will be directly impacted by a pipeline along this route. Route Corridor B2 is the shortest option for Preliminary Route Corridor BC at approximately 21.9km. It is therefore likely to have the least impact on hedgerows and associated fauna.
- There will be a high potential for localised disturbance to birds and protected mammals along the corridor and required access routes during construction..

Moderate adverse impacts are predicted along Route Corridor B2, in a worst case scenario and with mitigation measures in place. The impacts will principally arise through direct impacts to bog and hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridors B1 and B2. Key terrestrial ecology constraints in each category are identified (discussed above) which are additional to hedgerow impacts and disturbance to faunal sites.

6.4 Matrix of Multi Criteria Analysis

Criteria	Corridor B1	Corridor B2
Biodiversity, Flora & Fauna (Terrestrial)	**Mid-range Impact:** Camcor River, Woodville woods pNHA (avoidable), Lough Coura pNHA (edge only very avoidable), remnant raised bog (Boora), scarce breeding birds (Grey Partridge - Boora area)	**Mid-range Impact:** Raised bog (1/4) at Gortacur
Potential to impact on Natura 2000 Sites	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Low Impact:** Lough Coura pNHA (edge only)	**Very Low Impact:** Well removed from sites
Potential impact Annex I listed habitats (designated)	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.	**Very Low Impact:** No direct impacts will occur. Very low (risk) indirect impacts potential through pollutants into River Brosna linked to Lower River Shannon SAC.
Potential impact Annex I listed habitats (non-designated)	**Mid-range Impact:** Potential for unidentified areas of Annex 1 habitat in semi natural bog woodland and semi natural grassland	**Mid-range Impact:** Raised bog at Gortacur 1/3 corridor – avoidable Potential for unidentified areas of Annex 1 habitat in semi natural bog woodland and semi natural grassland
Potential to impact high ecological value habitats (semi natural habitats)	**Mid-range Impact:** Hedgerows, streams and semi natural bog habitats	**Mid-range Impact:** Hedgerows and stream crossings
Potential to impact on protected Flora - Flora Protection Order	**Low Impact**: Areas of semi natural grassland may occur with associated protected flora	**Low Impact**: Areas of semi natural grassland may occur with associated protected flora

Criteria	Corridor B1	Corridor B2
Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings
Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 27.7km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 21.9km crossed and associated access routes
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Low Impact:** Known Important bird sites are avoided Studies are required in particular around Boora Bog to determine bird distribution.	**Low Impact**: Known Important bird sites are avoided Studies are required in to determine bird distribution.
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 27.7km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 21.9km crossed and associated access routes

Table F3 – 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

Route corridor option B2 is the preferred option as it is the shortest option resulting in the least hedgerow clearance and associated disturbance impacts to fauna.

Route option B2 also presents less risk, compared to B1, to identified ecological sites and receptors including Woodville woods pNHA, Lough Coura pNHA, remnant raised bog (near Lough Boora) and scarce breeding birds and wintering birds at the Boora parklands area.

7 Preliminary Route Corridor C

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F3 – 12 below.

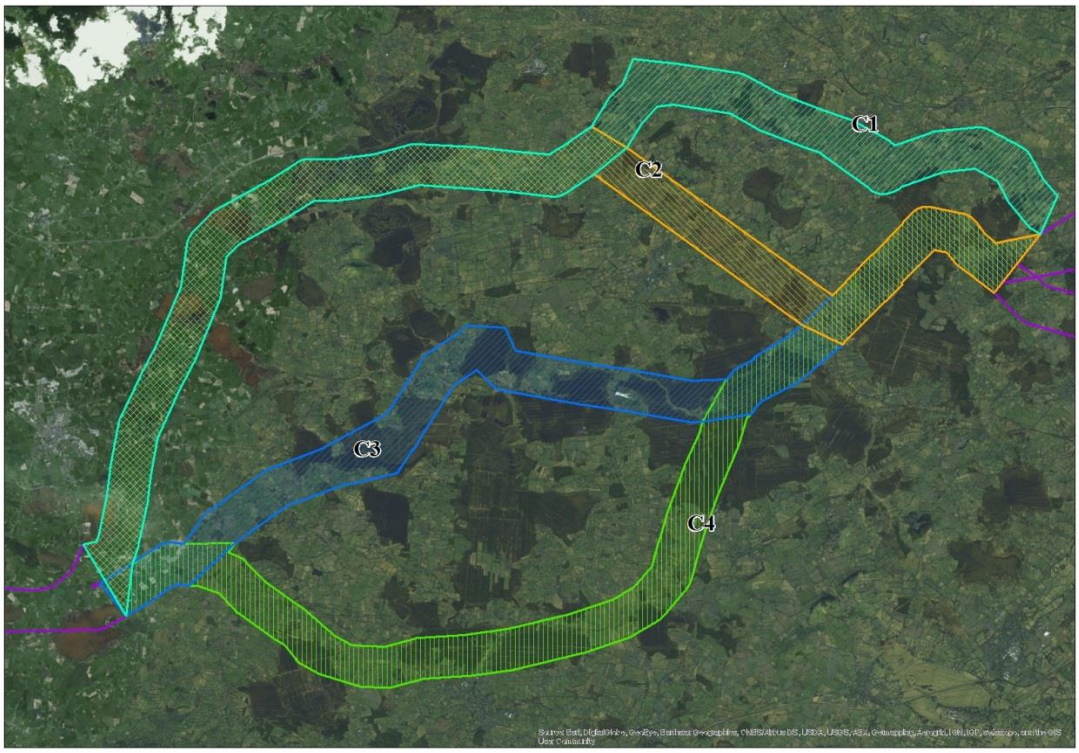


Figure F3 – 12 Preliminary Route Corridors and Loops

These corridor options pass through a mixed landscape which includes predominantly farmland but also extensive areas of cutaway bogs. Natura 2000 sites and National (proposed) national heritage areas were avoided as far as possible in the development of all route corridor options. The key terrestrial ecology features along these options are remnant raised bogs, extensive developing habitats on cutaway bogs, bog fringe semi natural woodland, hedgerows and rivers. The key ecological features along each of the route corridor sub-options C1, C2, C3 and C4 are summarised as follows;

7.2 Route Corridor C1

The key ecology observations on Route Corridor C1 include;

- No SAC/ SPA, NHA or pNHA occur within this corridor.
- This corridor crosses through the River Boyne catchment (linked to the River Boyne and Blackwater SAC/SPA). This is an important salmonid and lamprey river (Annex II species). The corridor also crosses a tributary of the Rivers Boyne and Blackwater.
- Two crossings of the Grand Canal are required along this corridor
- Various river crossings are required along the corridor, including Rivers Boyne, Blackwater, and Brosna.

- Extensive tracts of Bord na Mona re-vegetating cutaway bog and developing wetlands are crossed by this corridor ,
- Remnants areas of raised bog and other bog habitats are also crossed.
- Hedgerows and drainage ditches will be directly impacted. Route Corridor C1 is the longest option for Preliminary Route Corridor CD, being approximately 62.6km in length. Therefore more hedgerows and other locally important habitats will be affected compared to other Route Corridor options.
- There is a high potential for localised disturbance to birds and protected mammals.
- Route Corridor C1 crosses less cutover bog than the other options considered.

Moderate/ high adverse impacts are predicted in a worst case scenario with mitigation. This will principally arise through direct impacts to bog and hedgerow habitats, risks to the River Boyne and Blackwater SAC/ SPA (salmonid waters), and risks of disturbance to Annex II and IV species (including salmon), breeding birds and protected mammals (e.g. badgers).

7.3 Route Corridor C2

The key ecology observations on Route Corridor C2 include;

- No SAC/ SPA, NHA or pNHA occur within this corridor
- This corridor crosses through the River Boyne catchment and the River Boyne itself (linked to the River Boyne and Blackwater SAC/SPA). This catchment is an important salmonid and lamprey river (Annex II species).
- The corridor crosses the Grand Canal at two locations.
- Various river crossings are required including the Rivers Boyne and Brosna.
- The corridor crosses extensive tracts of Bord na Mona re-vegetating cutaway bog and developing wetlands.
- Remnant areas of raised bog and other bog habitats are also crossed.
- Hedgerows and drainage ditches will be directly impacted. Route Corridor C2 is the second longest of the Preliminary Route Corridor CD options, at approximately 61.8km. Therefore this is likely the second worst option regarding impacts to hedgerows and other locally important habitats.
- There is a high potential for localised disturbance to birds and protected mammals.

Moderate/ high adverse impacts are predicted along this corridor, even with mitigation, in a worst case scenario. These will principally arise through direct impacts to bog and hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species (including salmon), breeding birds and protected mammals (e.g. badgers).

7.4 Route Corridor C3

The key ecology observations on Route Corridor C3 include;

- There is no SAC/ SPA, NHA or pNHA occur within this corridor.
- This corridor crosses predominantly through the River Barrow catchment, a less sensitive catchment for salmonids than the Boyne.
- As with Route Corridors C1 and C2, Corridor C3 crosses the Grand Canal at two locations
- Various river crossings are required including the River Figile.

- Extensive tracts of Bord na Mona re-vegetating cutaway bog and developing wetlands are crossed. This route C3 crosses more cutaway bog than C1, C2 or C4.
- Remnants areas of raised bog and other bog habitats are crossed.
- Hedgerows and drainage ditches will be directly impacted. Measuring approximately 52.0km in length, Route Corridor C3 is the shortest of the Preliminary Route Corridor CD options considered. . Therefore fewer hedgerows and other locally important habitats will be affected compared to other options.
- There is a high potential for localised disturbance to birds and protected mammals.
- This Route Corridor option crosses less cutover bog than other options.

Moderate/ high adverse impacts can be expected along Route Corridor C3, in a worst case scenario, following mitigation. These impacts will largely be through direct impacts to bog and hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

7.5 Route Corridor C4

The key ecology observations on Route Corridor C4 include;

- There is no SAC/ SPA, NHA or pNHA within this corridor.
- As with Route Corridor C3, this corridor crosses predominantly through the River Barrow catchment, a less sensitive catchment for salmonids than the River Boyne and Blackwater catchment.
- Various river crossings are required along Route Corridor C4, including the rivers Boyne and Brosna.
- Extensive tracts of Bord na Mona re-vegetating cutaway bog and developing wetlands are crossed,
- Remnant areas of raised bog and other bog habitats are also crossed by this corridor.
- Hedgerows and drainage ditches will be directly impacted. Route Corridor C4 is the third longest option at approximately 56.9km. There is therefore a high potential for localised disturbance to birds and protected mammals.

Moderate/ high adverse impacts are predicted along Route Corridor C4 in a worst case scenario following mitigation measures. These impacts will principally arise through direct impacts to bog and hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor C1, C2, C3 and C4 options. Key terrestrial ecology constraints in each category are identified (discussed above) which are additional to hedgerow impacts and disturbance to faunal sites.

7.6 Matrix of Multi Criteria Analysis

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Biodiversity, Flora & Fauna (Terrestrial)	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA (2 crossings) various river crossings are linked to the River Boyne and Barrow SAC/ SPA	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA (2 crossings), various river crossings (linked Boyne SAC and Barrow SAC - TBC)	**High Impacts:** Extensive re-vegetating cutaway bog and remnant raised bog crossed,, Grand Canal pNHA crossing, various river crossings (linked River Barrow SAC)	**High Impacts:** Key issue is extensive revegetating cutaway bog and remnant raised bog crossed, Grand Canal pNHA, various river crossings (linked River Barrow SAC)
Potential to impact on Natura 2000 Sites	**High Impacts:** No direct impacts. Potential Moderate/ highindirect impacts to River Boyne and Blackwater SAC/SPA	**High Impacts:** No direct impacts. Potential Moderate / high indirect impacts to River Boyne and Blackwater SAC/SPA	**Mid-range Impact:** No direct impacts. Potential Moderate indirect impacts to River Barrow and River Nore SAC	**Mid-range Impact:** No direct impacts. Potential Moderate indirect impacts to River Barrow and River Nore SAC
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Mid-range Impact:** Grand Canal pNHA (2 crossings), Ballina Bog pNHA (edge)	**Mid-range Impact:** Grand Canal pNHA (2 crossings) , Ballina Bog pNHA (edge)	**Mid-range Impact:** Grand Canal pNHA	**Mid-range Impact:** Grand Canal pNHA
Potential impact Annex I listed habitats (designated)	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats	**Very Low Impact:** No direct impacts. Low potential for downstream effects to aquatic habitats
Potential impact Annex I listed habitats (non-designated)	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats and remnant degraded bog are potential Annex 1 habitats

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to impact high ecological value habitats (semi natural habitats)	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats	**High Impact:** Extensive bog fringing woodland habitats, developing wetlands and remnant degraded bog are potential Annex 1 habitats
Potential to impact on protected Flora - Flora Protection Order	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats	**Mid-range Impact:** Potential protected flora on Cutover bog and remnant bog habitats
Potential to impact on Annex II species	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers	**Mid-range Impact:** Otter, *Vertigo* snails and Freshwater crayfish in wetlands and rivers
Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed	**Mid-range Impact:** Bats roosts in mature treelines and Otters at streams crossed
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs	**Mid-range Impact:** wintering and breeding birds on cutover bogs
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 62.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 61.8km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 52km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 56.9km crossed and associated access routes

Table F3 – 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

All options will give rise to potentially moderate / high ecological impacts and the matrix table indicates that C1 and C2 in particular will present a greater risk to the River Boyne and Blackwater SAC.

A more detailed consideration of the detail which informed these impacts allows **Route corridor option C3 to be selected as the preferred option**.

C3 is preferred because;

1. It is the shortest option hence fewer locally important habitats will be impacted compared to Route Corridors C1, C2 and C4.
2. This option also likely presents the least risk to sensitive salmonid spawning areas in the River Boyne and Blackwater river SAC catchment compared to other options.

C4 is the second most favourable option followed by C2. C1 is the least preferred option being the longest and the one presenting the greatest risk to the River Boyne and Blackwater SACs.

All options highlight potentially high adverse impacts. In this regard the selected option will require careful line design and mitigation so as to minimise impacts to important habitats and sensitive bird areas on cutaway bog habitats.

8 Preliminary Route Corridor D

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F3 – 13 below.

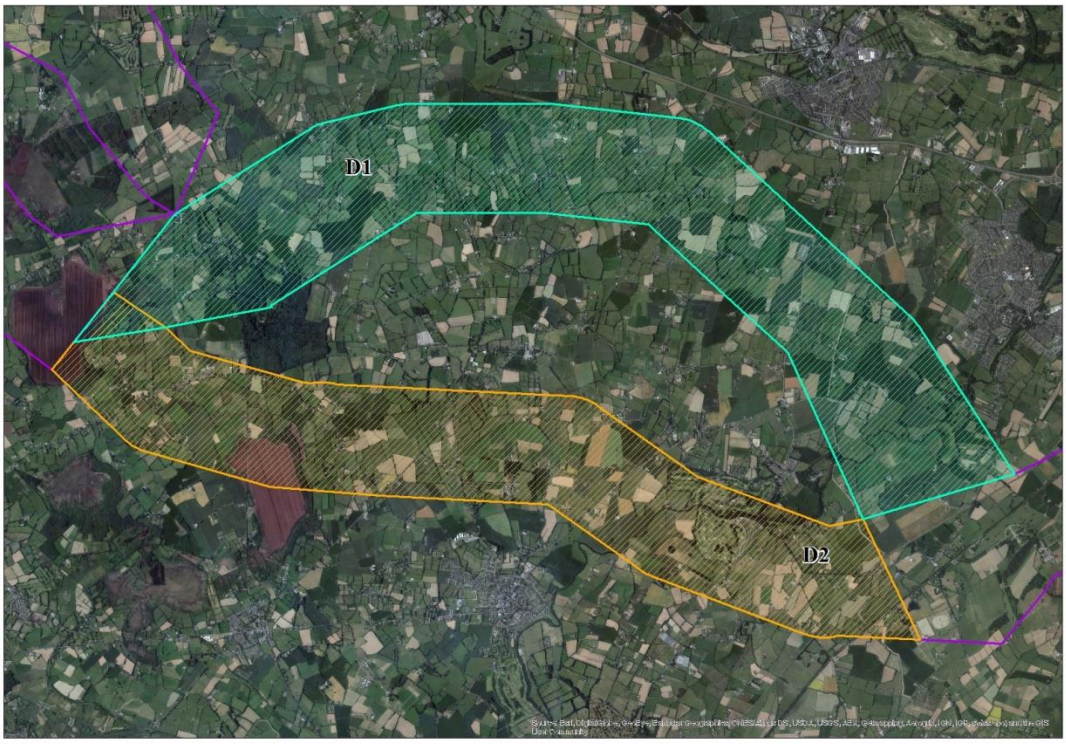


Figure F3 – 13 Preliminary Route Corridors and Loops

These corridor options pass through a predominantly farmland landscape. Natura 2000 sites and National (proposed) national heritage areas were avoided as far as possible in the development of all route corridor options. The key terrestrial ecology features along these options are hedgerows and rivers. The key ecological features along each of the route corridor sub-options D1 and D2 are summarised for as follows;

8.2 Route Corridor D1

The key ecology observations on Route Corridor D1 include;

- No SAC/ SPA or NHA occur within this corridor. The Lyreen River is linked to the Rye water SAC downstream
- Donadea Wood pNHA is partly included in the corridor and avoidable.
- This corridor crosses predominantly through the River Liffey catchment and salmon potentially breed in non-designated tributaries which are also crossed by this corridor.
- Various river crossings are encountered along the corridor, including the River Liffey and Lyreen.
- This route crosses predominantly farmland with boundary hedgerows.

- Hedgerows and drainage ditches will be directly impacted. Route Corridor D1, at approximately 16.6km, is longer than Route Corridor D2 and will therefore be more likely to cause disturbance to hedgerows and ditches and a consequent localised disturbance to birds and protected mammals.

Moderate adverse impacts will be created along this corridor, principally through direct impacts to hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species, breeding birds and protected mammals (e.g. badgers).

8.3 Route Corridor D2

The key ecology observations on Route Corridor D2 include;

- No SAC/ SPA or NHA occur within this corridor. This route appears not to be linked to SAC rivers downstream.
- Donadea Wood pNHA is partly included in the corridor but is avoidable.
- Corridor D2 crosses predominantly through the River Liffey catchment and salmon breed in non-designated tributaries which are crossed by the corridor. The Morell (tributary) is an important salmon breeding stream.
- Various river crossings are required along this corridor, including the River Liffey and tributaries.
- This route crosses predominantly farmland with boundary hedgerows.
- The corridor crosses one area of cutaway bog with fringing remnant habitats.
- Hedgerows and drainage ditches will be directly impacted along this route. Route Corridor D2 is approximately 0.8km shorter than D1, so can be expected to have a slightly lesser impact on hedgerows. There remains however a high potential for localised disturbance to birds and protected mammals.

Moderate adverse impacts will principally arise along Route Corridor D2, following mitigation measures, through direct impacts to hedgerow habitats, indirect impacts to rivers and risks of disturbance to Annex II and IV species (including salmon), breeding birds and protected mammals (e.g. badgers).

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor D1 and D2 options. Key terrestrial ecology constraints in each category are identified (discussed above) which are additional to hedgerow impacts and disturbance to faunal sites.

8.4 Matrix of Multi Criteria Analysis

Criteria	Corridor D1	Corridor D2
Biodiversity, Flora & Fauna (Terrestrial)	**Mid-range Impact:** River Liffey and other river crossings. Donadea Wood pNHA	**Mid-range Impact:** River Liffey and other river crossings. Donadea Wood pNHA
Potential to impact on Natura 2000 Sites	**Low Impact:** Lyreen River crossed is linked to the Rye Water SAC Natura 2000 sites are well removed from this corridor.	**Low Impact:** Natura 2000 sites are well removed from this corridor.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Low Impact:** Donadea Wood pNHA is avoidable	**Low Impact:** Donadea Wood pNHA
Potential impact Annex I listed habitats (designated)	**Very Low Impact:** Designated Annex 1 habitats are not at significant risk	**Very Low Impact:** Designated Annex 1 habitats are not at significant risk
Potential impact Annex I listed habitats (non-designated)	**Low Impact:** The study area consists of managed farmland with low risk of encountering Annex 1 undesignated habitats	**Low Impact:** The study area consists of managed farmland with low risk of encountering Annex 1 undesignated habitats
Potential to impact high ecological value habitats (semi natural habitats)	**Mid-range Impact:** Hedgerows and river crossings	**Mid-range Impact:** Hedgerows and river crossings
Potential to impact on protected Flora - Flora Protection Order	**Low Impact:** Semi natural habitats with potential for protected flora are rare in the study area	**Low Impact:** Semi natural habitats with potential for protected flora are rare in the study area
Potential to impact on Annex II species	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings	**Mid-range Impact:** Potential for disturbance to Otters and Freshwater Crayfish at river/ stream crossings
Potential to Impact on Annex IV species (wherever they occur)	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 16.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to bat species where hedgerows directly impacted along 15.8km crossed and associated access routes
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Low Impact:** Known Important bird sites are avoided Studies are required in particular around Boora Bog to determine bird distribution.	**Low Impact:** Known Important bird sites are avoided Studies are required in to determine bird distribution.
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 16.6km crossed and associated access routes	**Mid-range Impact:** Risk of disturbance to birds, badgers and bat species where hedgerows directly impacted along 15.8km crossed and associated access routes

Table F3 – 7 Summary of the MCA for Route Corridors DE

8.5 Comparative Discussion

D2 is the preferred option for Preliminary Route Corridor DE, as it presents less risk to the Rye Water SAC. In addition, as it is shorter, less hedgerow impacts and associated disturbance to fauna would be expected to arise.

Careful line design and mitigation is required if D2 is selected around protection of salmonid river habitats.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F4: Aquatic Ecology

October 2015 **F02**

Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F4 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F4 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F4 is a statement on the specialism Aquatic Ecology and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To determine effectively the least constrained abstraction location from the identified options, each location was assessed under nineteen Ecology sub-criteria, eleven of which are assessed in the aquatic ecology report, as listed below.

- Potential to impact on European Sites (Natura 2000) - Special Areas of Conservation (SAC) and Special Protection Areas (SPA)*
- Potential impact Annex I listed habitats[1] (designated)
- Potential impact Annex I listed habitats (non-designated)
- Potential to impact high ecological value habitats (semi natural habitats)

1 The term "Annex I habitats" refers to those listed in Annex I of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as "The Habitats Directive".

- Potential to impact on protected Flora - Flora Protection Order
- Potential to impact on Annex II species[2]
- Potential to Impact on Annex IV species[3] (wherever they occur)
- Potential to impact on Salmonid habitat - protected under SI Reg
- Potential to impact on Freshwater Pearl Mussels - protected under SI Reg
- Potential to impact upon high quality aquatic habitat for protected aquatic species[4].
- Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.

Assessments were carried out as desk based studies using data held in-house, data on the National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland (IFI) and EPA web sites.

Each loop option and route corridor was assessed by examining it for the numbers, lengths and sizes of rivers that it crosses, each river's conservation status, the ecological status of the river (as noted by the EPA) and the river's importance as a fishery, using data on the IFI website. A further criterion as to whether the water body is an upland small river that joins with similar low order streams was also used to differentiate the levels of potential impact within the loops or route options. When loop or route options had the same level of constraints, no differentiation was made between them.

1.2.1 Five categories of impact

Five categories of impact were used to categorise any impacts identified for the locations, each of which was then assigned a colour coding.

These were:

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 The term "Annex II species" refers to those listed in Annex II of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as "The Habitats Directive".

3 The term "Annex IV species" refers to those listed in Annex IV of the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, often referred to as "The Habitats Directive".

4 The European Eel is considered a critically endangered species on a European-wide basis and this sensitivity applies to all corridor and route options (King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland).

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F4 – 1 Peamount

As there are no water courses in the vicinity of the Peamount location, there can be no direct impacts on aquatic ecology.

2.3 Matrix of Multi Criteria Analysis

Criterion	Peamount

Criterion	Peamount
Potential to impact on Natura 2000 Sites (European sites)	**Very low potential impact:** No Natura sites within the area.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Very low potential impact:** No NHAs within the area.
Potential impact Annex I listed habitats (designated)	**Very low potential impact:** No Natura sites within the area.
Potential impact Annex I listed habitats (non-designated)	**Very low potential impact:** No non-designated aquatic Annex I habitats within the area.
Potential to impact high ecological value habitats (semi natural habitats)	**Very low potential impact:** No high ecological aquatic habitats within the area.
Potential to impact on protected Flora - Flora Protection Order	**Very low potential impact:** No protected floral or faunal species within the area.
Potential to impact on Annex II species	**Very low potential impact:** No Annex II species within the area.
Potential to Impact on Annex IV species (wherever they occur)	**Very low potential impact:** No Annex IV species within the area.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See Terrestrial section*
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See Terrestrial section*
Potential to impact on salmonid habitat - protected under SI Reg	**Very low potential impact:** No salmonid habitats within the area.
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	**No potential impact:** No Freshwater Pearl Mussels within the area.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very low potential impact:** No high quality aquatic habitats for protected aquatic species within the area.
Potential to impact on coastal zone habitats (Intertidal)	**No potential impact:** No marine habitats within the area.
Potential to impact on marine habitats (Subtidal)	**No potential impact:** No marine habitats within the area.
Potential to impact marine/coastal birds	**No potential impact:** No marine habitats within the area.

Criterion	Peamount
Potential to impact marine mammals	**No potential impact:** No marine habitats within the area.
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	**No potential impact:** No marine habitats within the area.
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**No potential impact:** No marine habitats within the area.

Table F4 - 2 Summary of the MCA for Peamount

2.4 Comparative Discussion

The habitats around the Peamount location do not support any significant natural aquatic habitats. Peamount is located within the Liffey River Catchment, divided between the Griffeen River and Shinkeen River sub-catchments. EU protected coastal areas are located downstream within Dublin Bay area, namely South Dublin Bay SAC; North Dublin Bay SAC, Rockabill to Dalkey Island SAC, South Dublin Bay and River Tolka SPA and North Bull Island SPA. All construction activities at the Peamount site must take consideration of this fact.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body and the proposed termination point, covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations) and sub-options for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F14 – 1.

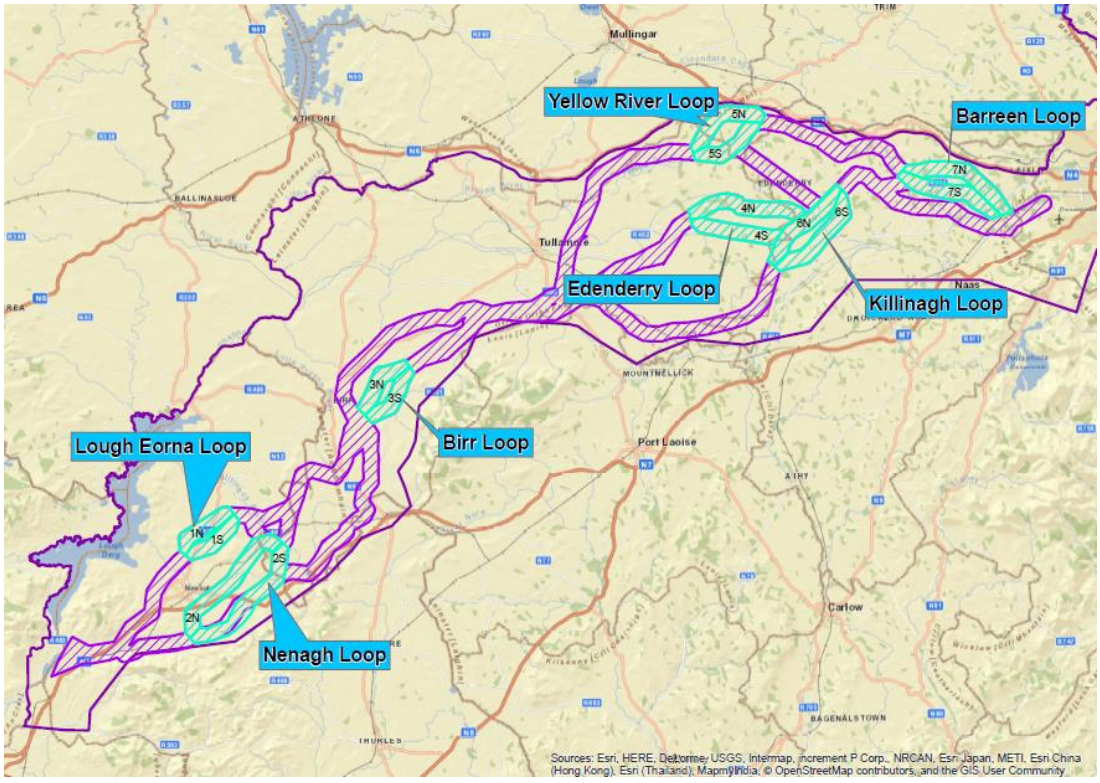


Figure F4 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop (Loop 1)

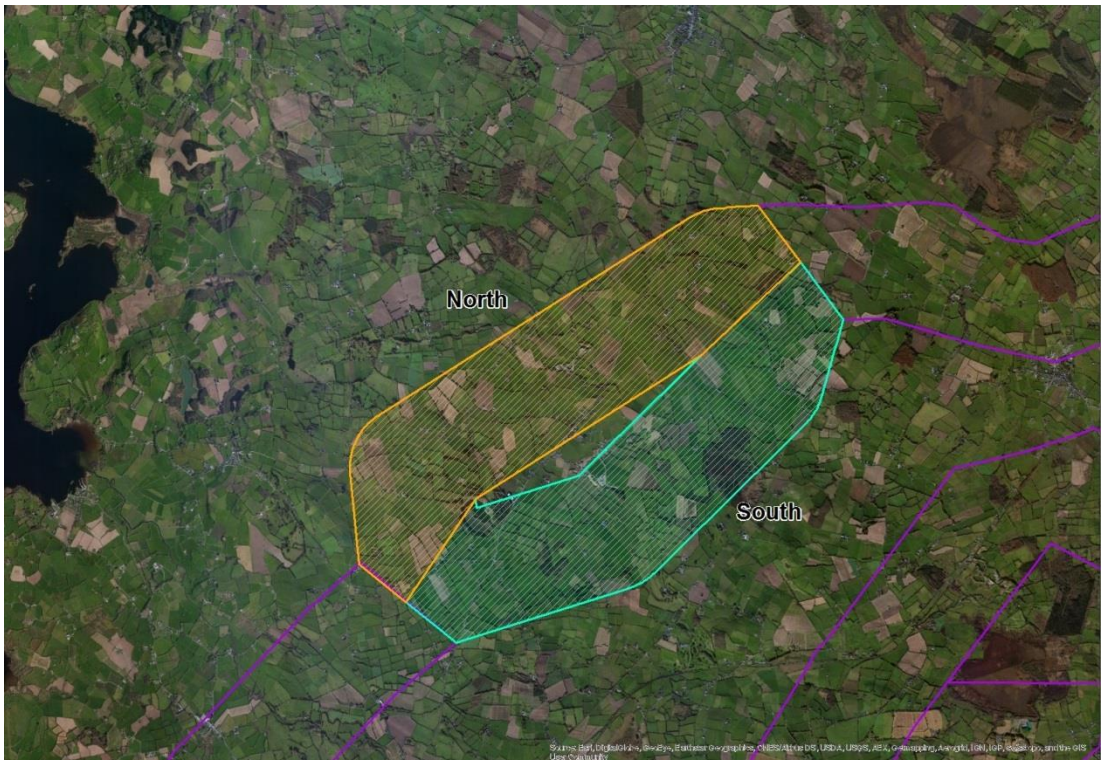


Figure F4 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

The only major water course that this northern route crosses is the Ballyfinboy River that flows into Lough Derg west of Ballinderry. There are no Natura sites on this northern route option of the L. Eorna loop and as a consequence, there can be no direct impact on designated Annex I habitats. Parts of Lough Derg are designated SAC's (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Ballyfinboy River empties. However, as Lough Derg, North-east Shore SAC is ca 30 km upstream of this area there cannot be any interaction between these two areas. Regarding Lower River Shannon SAC, this is ca 15 km to the south and the likely level of any impact arising at the Northern branch route is considered extremely low. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low as only one sizeable water course is crossed, the Ballyfinboy River. As this river is not known to support any significant salmonid populations and no Freshwater Pearl Mussels, there can be no impact on salmonid habitats nor on Freshwater Pearl Mussel populations. The impact on high quality aquatic habitat for protected aquatic species is considered very low as the Ballyfinboy River is not designated for any such species.

4.1.2 Southern Branch

This southern option does not cross any major water course. There are no Natura sites on this route option of the L. Eorna loop and as a consequence, there can be

no impact on designated Annex I habitats. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species are considered very low as no sizeable water course is crossed. As there is no water course on this route that supports salmonid populations or Freshwater Pearl Mussels, there can be no impact on either the habitat or species. No impact is predicted on high quality aquatic habitat for protected aquatic species as there is no river designated for any such species.

4.1.3 Conclusion

Using all the criteria listed in Section 1.2 above and the number of crossings that either route takes, since the southern branch does not cross any Natura designated river/stream and no water way flows into Lough Derg which contains Natura sites, there are no constraints on this option. It is therefore selected as the less constrained option.

4.2 The Nenagh Loop (Loop 2)

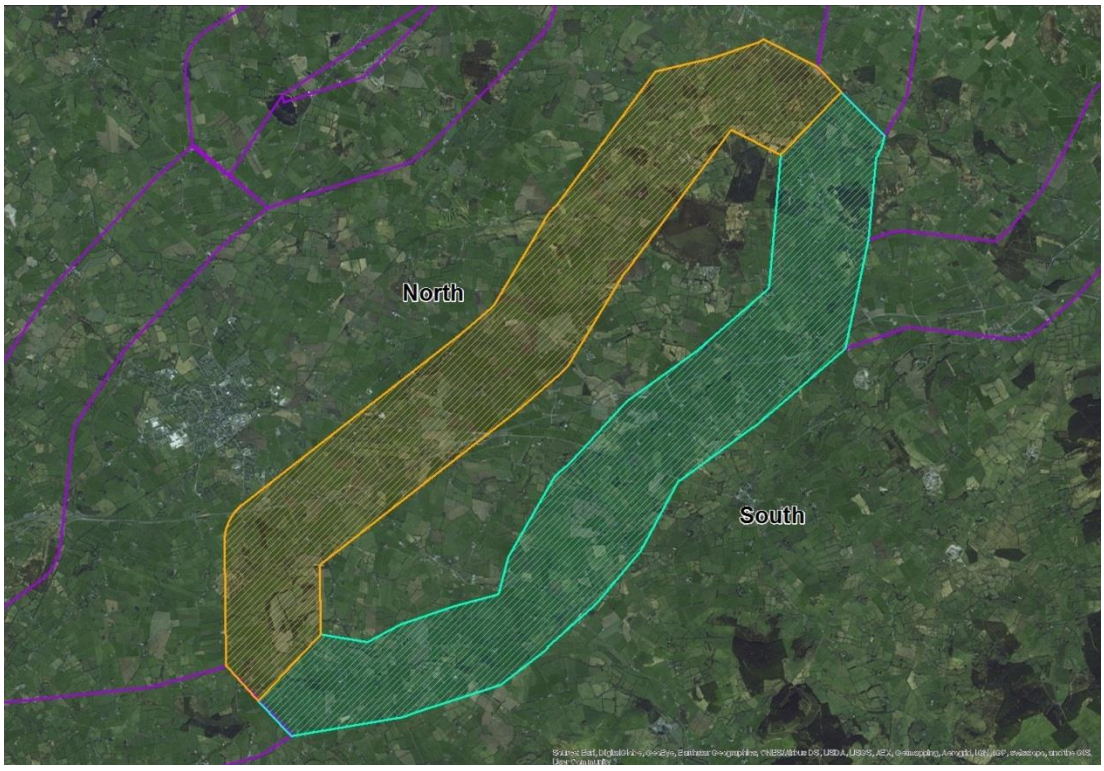


Figure F4 – 4 The Nenagh Loop

4.2.1 Northern Branch

The northern route crosses sections of the Nenagh River that flows into Lough Derg at Dromineer. It also crosses the Ballintotty and Ollatrim Rivers that are tributaries of the Nenagh River that flows into L. Derg. There are no Natura sites on this northern route option of the Nenagh loop and as a consequence, there can be no impact on designated Annex I habitats. Parts of Lough Derg are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Nenagh River empties. However, as the Lough Derg SAC is upstream of the inflowing Nenagh River by some 15 km, it is physically impossible for any possible interaction between construction activities at

Dromineer Bay and the SAC to the north. With regard to Parteen (Lower River Shannon SAC), this site is ca 20 km to the south of Dromineer and again is too remote for any interaction between the two sites to be possible. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered low as a number of water courses are crossed. As the Nenagh River and its tributaries the Ballintotty and Ollatrim Rivers all support salmonids (Brown Trout), the level of impact on this criterion is scored at low. This river system does not support Freshwater Pearl Mussels and the impact is therefore nil on this criterion. Impact high quality aquatic habitat for protected aquatic species is scored at low due to the presence of salmonids in this system.

4.2.2 Southern Branch

The southern route of the Nenagh Loop also crosses the Nenagh River and even though it too crosses the Ballintotty and Ollatrim Rivers, these are only small tributaries. As noted above, the Nenagh River flows into Lough Derg at Dromineer. There are no Natura sites on this southern route option and therefore, there can be no impact on Annex I habitats. Parts of Lough Derg are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Nenagh River empties. However, as the Lough Derg SAC is upstream of the inflowing Nenagh River by some 15 km, it is physically impossible for any possible interaction between construction activities at Dromineer Bay and the SAC to the north. With regard to Parteen (Lower River Shannon SAC), this site is ca 20 km to the south of Dromineer and again is too remote for any interaction between the two sites to be possible. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered low as a number of water courses are crossed. As the Nenagh River and its tributaries the Ballintotty and Ollatrim Rivers all support salmonids (Brown Trout), the level of impact on this criterion is scored at low. This river system does not support Freshwater Pearl Mussels and the impact is therefore nil on this criterion. Impact high quality aquatic habitat for protected aquatic species is scored at low due to the presence of salmonids in this system.

4.2.3 Conclusion

Using the criteria listed in Section 1.2 above and the size of rivers crossed which in the case of the southern option are small tributaries that are considered less sensitive in aquatic ecological terms, since the southern route only crosses such water course types e.g. small tributaries of the Ballintotty and Ollatrim Rivers, it is selected as the less constrained option.

4.3 Birr Loop (Loop 3)

4.3.1 Northern Branch

The route of the northern branch only crosses the Little Brosna River east of Birr and the Rapemills River. There are no Natura sites on this northern route option of the Birr loop and as a consequence, there can be no impact on designated Annex I habitats. Parts of Lough Derg are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Little Brosna and Rapemills Rivers empty. However, as these sites are too remote from Meelick where the Little Brosna River enters the Shannon i.e. ten kilometres from the Lough Derg, North-east Shore SAC site and

ca 50 km of the Parteen site (Lower River Shannon SAC), the likely impact is considered very low. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low as no sizeable water course is crossed. The Little Brosna River supports salmonid populations and the impact is therefore scored very low. No Freshwater Pearl Mussel populations are known from these rivers and the impact is scored at nil, there can be no impact on either the habitat or species. No impact is predicted on high quality aquatic habitat for protected aquatic species as neither river is designated for any such species.

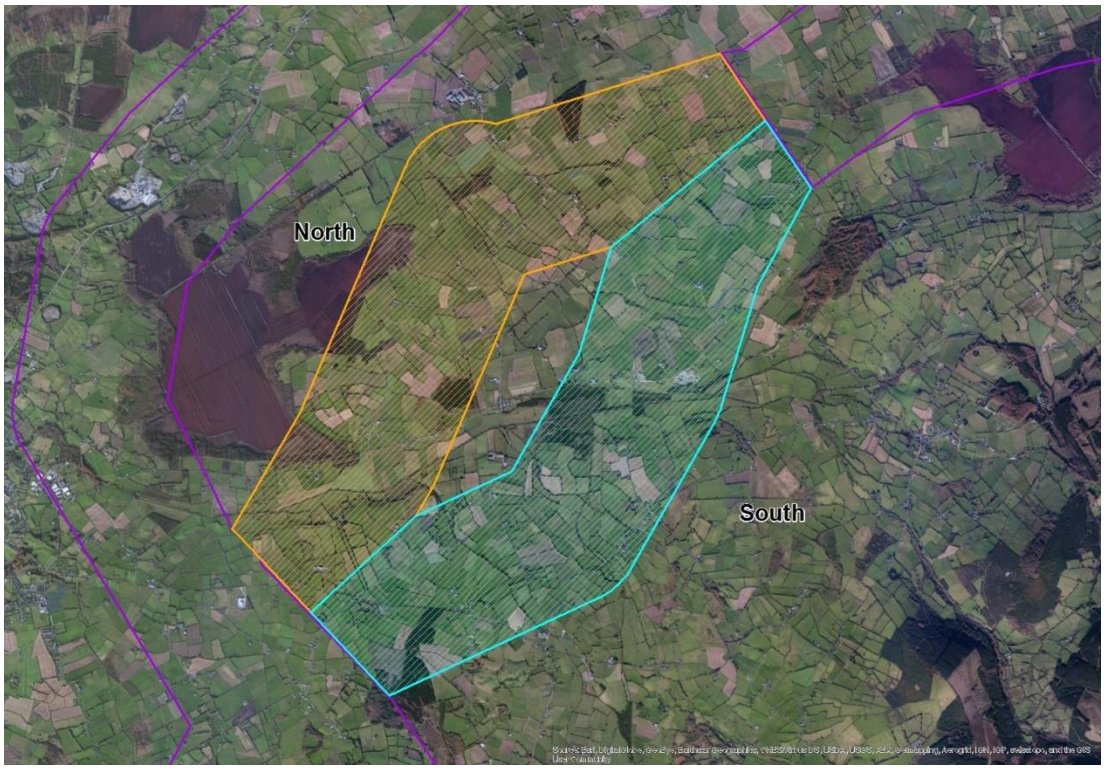


Figure F4 – 5 The Birr Loop

4.3.2 Southern Branch

This southern branch of the Birr loop crosses the Little Brosna and small upper tributaries of the Rapemills River. There are no Natura sites on this southern route option of the Birr loop and as a consequence, there can be no impact on designated Annex I habitats. Parts of Lough Derg are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Little Brosna and Rapemills Rivers empty. However, as these sites are too remote from Meelick where the Little Brosna River enters the Shannon i.e. ten kilometres from the Lough Derg, North-east Shore SAC site and ca 50 km from the Parteen site (Lower River Shannon SAC), the likely impact is considered extremely low. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species are considered very low as no sizeable water course is crossed. The Little Brosna River supports salmonid populations and the impact is therefore scored as low. No Freshwater Pearl Mussel populations are known from these rivers and the impact is scored at nil, there can be no impact on either the habitat or species. No impact is predicted on high quality aquatic habitat for protected aquatic species as neither river is designated for any such species.

4.3.3 Conclusion

Both route options for the Birr loop are very alike with regard to suite of criteria listed in Section 1.2. However, since the southern branch of the Nenagh Loop discussed above loop only crosses small tributaries of the Rapemills River, it is considered the less constrained option.

4.4 The Edenderry Loop (Loop 4)

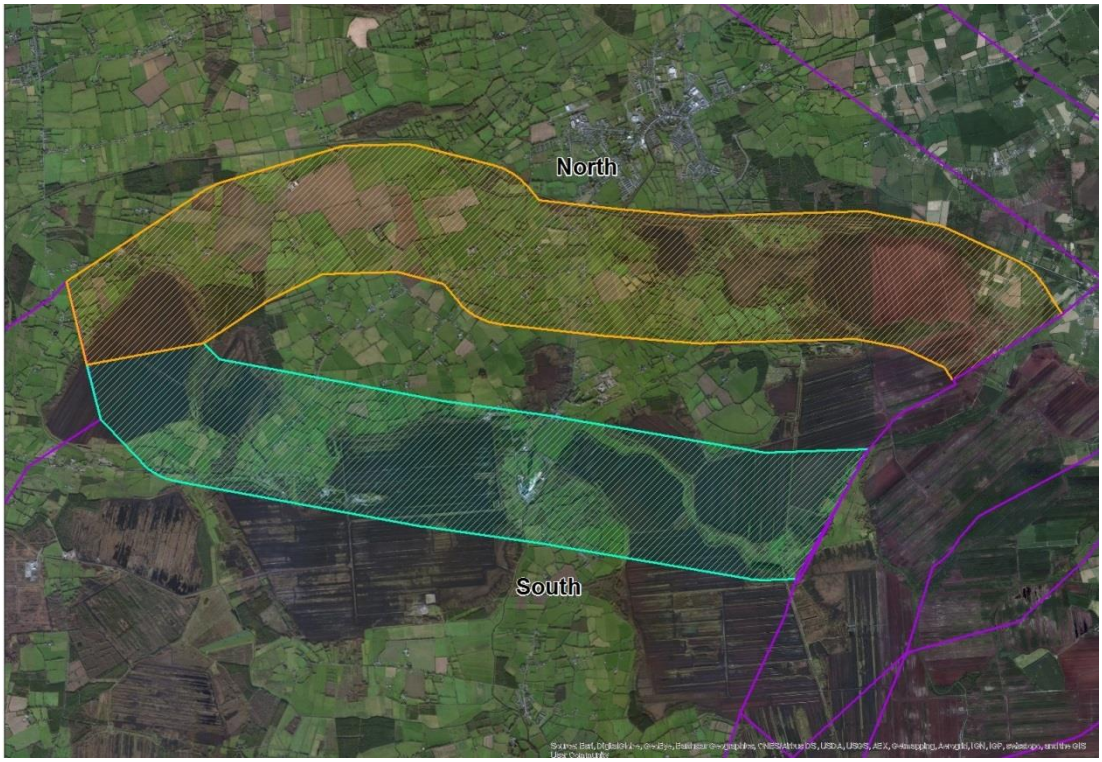


Figure F4 – 6 The Edenderry Loop

4.4.1 Northern Branch

This branch crosses the Phillipstown River and the Grand Canal. The Phillipstown River flows into, but is not a designated part of, the Barrow and Nore SAC (site synopsis code 002162). The Phillipstown River is *ca* 10 km to the north of the designated section of the Barrow and flows into the Figile River which in turn is *ca* 8 km away from the designated section of the Barrow River. Allowing for standard mitigation measures *e.g.* following best construction practices, it is considered that any development activity near the Phillipstown River will be too remote from the Barrow SAC to have any measurable effect. Due to also to the distance effect, no impact is predicted on Annex I designated or non-designated habitats. Potential impacts on high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low as only two water courses, the Phillipstown River and the Grand Canal are crossed. O'Reilly (2007) notes that the Phillipstown River supports populations of Brown Trout and because of this, impact on salmonid habitat is scored at low. As no Freshwater Pearl Mussel populations are known from this river, the impact is scored at nil. Impact on high quality aquatic habitat for protected species is scored at low as only two water course are crossed one on which is a man-made canal.

4.4.2 Southern Branch

The southern branch crosses the Phillipstown, Figile, Black and Slate Rivers and also, the Grand Canal. The Phillipstown River flows into, but is not a designated part of, the Barrow and Nore SAC (site synopsis code 002162). The Phillipstown River is *ca* 10 km to the north of the designated section of the Barrow and flows into the Figile River which in turn is *ca* 8 km away from the designated section of the Barrow River. Allowing for standard mitigation measures *e.g.* following best construction practices, it is considered that any development activity near the Phillipstown River will be too remote from the Barrow SAC to have any measurable effect. Due to also to the distance effect, no impact is predicted on Annex I designated or non-designated habitats. Potential impacts on high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low as only two water courses, the Phillipstown River and the Grand Canal are crossed. O'Reilly (2007) notes that the Phillipstown River supports populations of Brown Trout and because of this, impact on salmonid habitat is scored at low. As no Freshwater Pearl Mussel populations are known from this river, the impact is scored at nil. Impact on high quality aquatic habitat for protected species is scored at low as only two water course are crossed one on which is a man-made canal.

4.4.3 Conclusion

Examining the suite of criteria listed in Section1.2 and the number of water courses crossed, the northern route is the less constrained as it only crosses two water courses, one of which is a man-made canal and is therefore of lower conservation value in terms of biodiversity.

4.5 The Yellow River Loop (Loop 5)

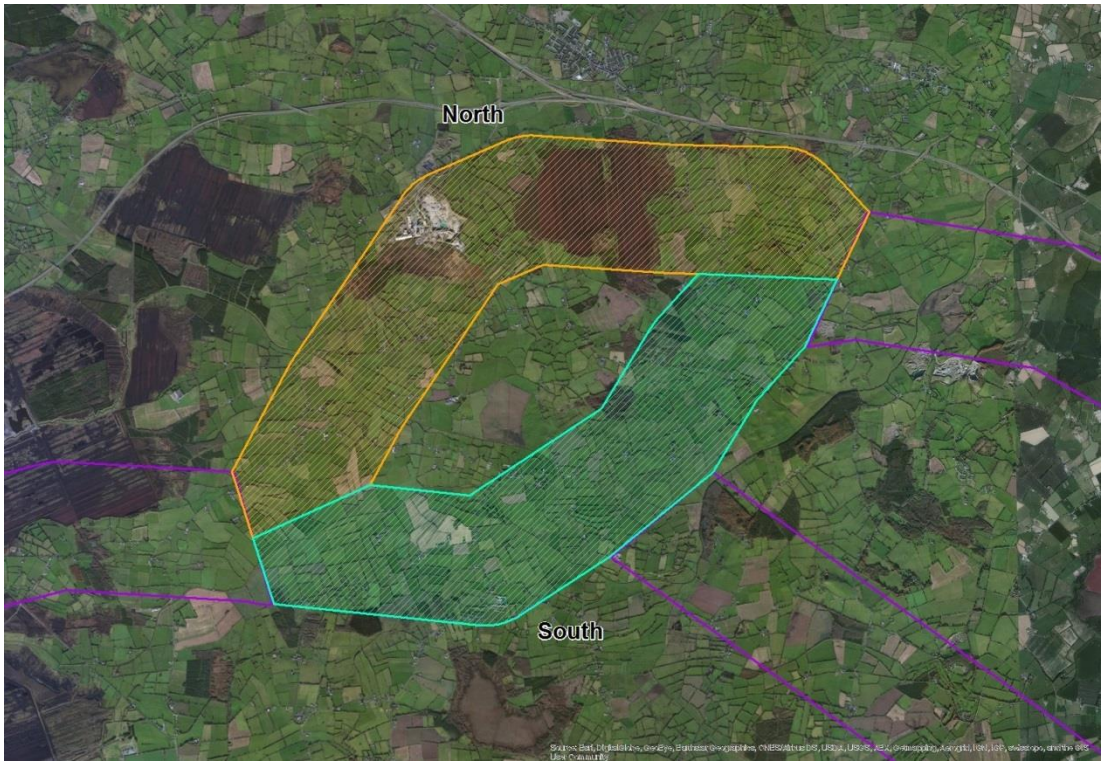


Figure F4 – 7 The Yellow River Loop

4.5.1 Northern Branch

The northern branch of this route crosses the Yellow and Boyne Rivers and the Royal Canal. The River Boyne is an SAC (site synopsis code (002299) and is also considered by Inland Fisheries Ireland as an important salmon fishery. For this reason impact on the criteria Natura sites, Annex I (both designated and non-designated) habitats, high ecological aquatic habitats, protected flora and fauna, Annex II, Annex IV, salmonid habitat and finally high quality aquatic habitat for protected aquatic species as listed in Section 1.2 are all scored at mid-range. Freshwater Pearl Mussels do not occur in this system and the impact is therefore scored at nil.

4.5.2 Southern Branch

This southern section of the Yellow River Loop crosses the Boyne River and Royal Canal. The River Boyne is an SAC (site synopsis code (002299) and is also considered by Inland Fisheries Ireland as an important salmon fishery. For this reason impact on the criteria Natura sites, Annex I (both designated and non-designated) habitats, high ecological aquatic habitats, protected flora and fauna, Annex II, Annex IV, salmonid habitat and finally high quality aquatic habitat for protected aquatic species as listed in Section 1.2 are all scored mid-range. Freshwater Pearl Mussels do not occur in this system and the impact is therefore scored at nil.

4.5.3 Conclusion

There is only one minor difference between these two route options and that is that the southern route only crosses two water courses, one of which is a man-made canals. However, this is far outweighed by the fact that the Yellow Branch loop crosses the Boyne River SAC which is also an important salmon fishery. Both routes are therefore weighted the same in terms of ecological sensitivity.

4.6 The Killinagh Loop (Loop 6)

4.6.1 Northern Branch

This branch crosses the Grand Canal and the Slate River, neither of which are within or are designated as Natura sites and as a consequence, there can be no impact on designated Annex I habitats. The Slate River flows into, but is not a designated part of, the Barrow and Nore SAC (site synopsis code 002162). It is *ca* 12 km to the north east of the designated section of the Barrow and flows into the Figile River which in turn is *ca* 8 km away from the designated section of the Barrow River. Allowing for standard mitigation measures *e.g.* following best construction practices, it is considered that any development activity near the Slate River will be too remote from the Barrow SAC to have any measurable effect. Due to also to the distance effect, no impact is predicted on Annex I designated or non-designated habitats. Potential impacts on high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low. O'Reilly (2007) notes that the Slate River supports populations of Brown Trout and because of this, impact on salmonid habitat is scored at low. As no Freshwater Pearl Mussel populations are known from this river, the impact is scored at nil. Impact on high quality aquatic habitat for protected species is scored at low as only two water course are crossed one on which is a man-made canal.

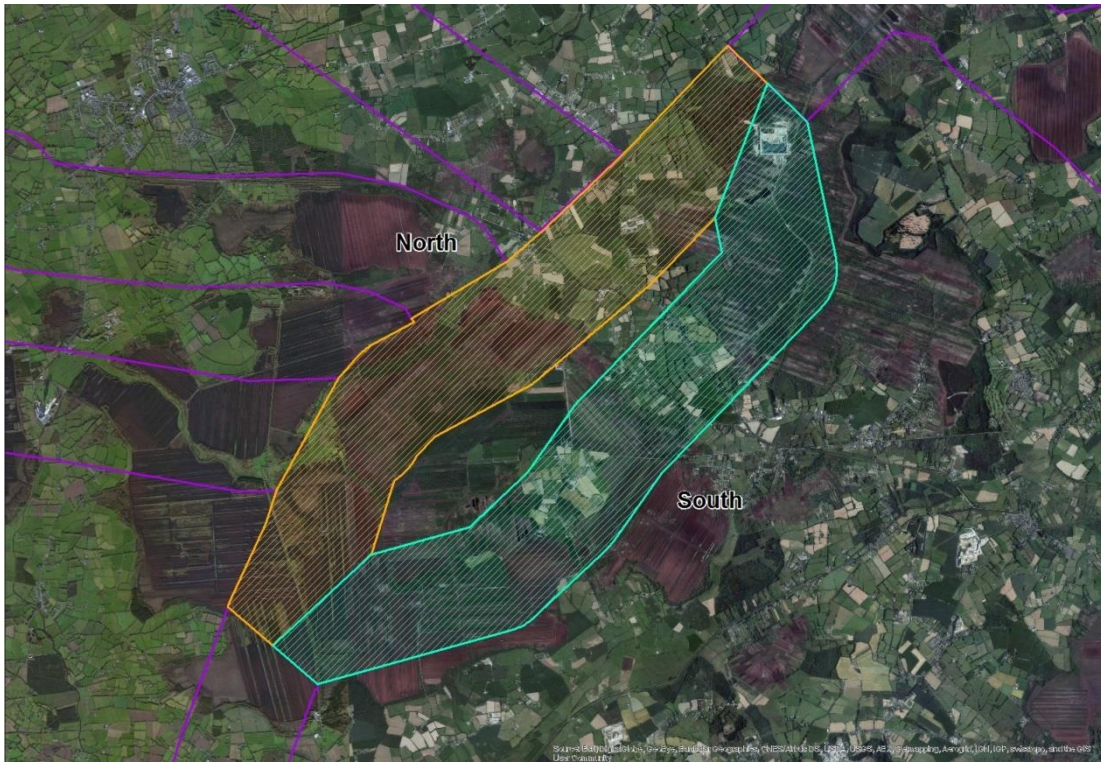


Figure F4 – 8 The Killinagh Loop

4.6.2 Southern Branch

The southern route also crosses the Grand Canal and the Slate River. The same analysis applies for the southern route as for the northern route.

4.6.3 Conclusion

As noted in Section 1.2 above, if options have the same number of constraints, neither could be selected in preference to the other. As both the northern and southern branches of the Killinagh Loop have the same levels of constraint, either option is possible.

4.7 The Barreen Loop (Loop 7)

4.7.1 Northern Branch

The northern branch of the Barreen Loop crosses tributaries of the Lyreen River. The Lyreen River is not designated as a Natura site sites and therefore, there can be no impact on designated Annex I habitats. Both these criteria are therefore scored at nil. Impacts on non-designated habitats, high aquatic ecological habitats, protected flora and fauna, Annex I and on Annex II species are scored at low because the number and size of aquatic habitats on both routes are low. O'Reilly (2007) does not record the Lyreen as being a salmonid fishery; however, as the Inland Fisheries Ireland web site does note that it supports a population of Brown, impact on the criterion salmonid habitat is scored at low. This scoring also applies to Freshwater Pearl Mussels which do not occur in the Lyreen River and also to the criterion high quality aquatic habitat for protected aquatic species as this river is not listed by the NPWS on its website.

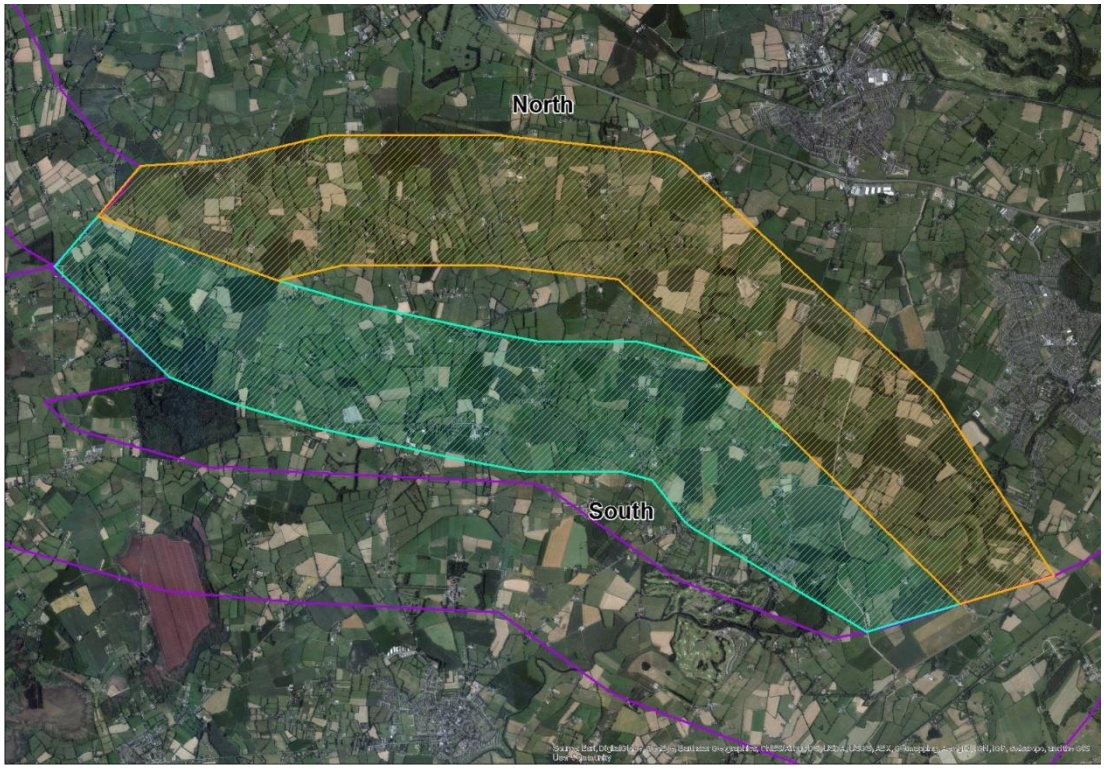


Figure F4 – 9 The Barreen Loop

4.7.2 Southern Branch

The southern branch of the Barreen Loop also crosses tributaries of the Lyreen River. The same analysis applies for the southern route as for the northern route.

4.7.3 Conclusion

As noted in Section 1.2 above, if options have the same number of constraints, neither could be selected in preference to the other. As both the northern and southern branches of the Lyreen Loop have the same levels of constraint, either option is possible.

4.8 Matrix of Multi Criteria Analysis

Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
North	South	North	South	North	South	North	South	North	South	North	South	North	South
Very Low: No Natura sites present. Only one river crossing at Ballyfinboy River.	**Very Low:** No major aquatic habitats present.	**Low:** Nenagh, Ballintotty and Ollatrim Rivers are known salmonid fisheries. Nenagh River flows into L. Derg parts of which are Natura sites.	**Low:** Nenagh, Ballintotty and Ollatrim Rivers are known salmonid fisheries. Nenagh River flows into L. Derg parts of which are Natura sites.	**Low:** Little Brosna and the Rapemills River are known salmonid fisheries.	**Low:** Little Brosna and small tributaries of the Rapemills River are known salmonid fisheries.	**Low:** Philips town River supports populations of Brown Trout.	**Low:** Figile, Philips town, Slate, and Black Rivers support populations of Brown Trout.	**Mid-range:** Boyne River is an SAC and an important salmonid habitat/ fishery.	**Mid-range:** Boyne River is an SAC and an important salmonid habitat/ fishery.	**Low:** Slate River is a known Brown Trout fishery.	**Low:** Slate River is a known Brown Trout fishery.	**Low:** River Lyreen is a known Brown Trout fishery	**Low:** River Lyreen is a known Brown Trout fishery

Table F4 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

The main feature that is readily apparent from the above assessment is that the Yellow River Loop is constrained by the Boyne SAC and its importance as a salmon fishery. To a lesser extent, the Nenagh, Birr, Edenderry, Killinagh and Barreen loops are constrained because rivers that flow through these areas are known fisheries for at least Brown Trout. In both instances, these sensitivities have to be given detailed consideration when planning any construction activities near the rivers/catchments.

5 Preliminary Route Corridor Section A

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F4 – 10 below.

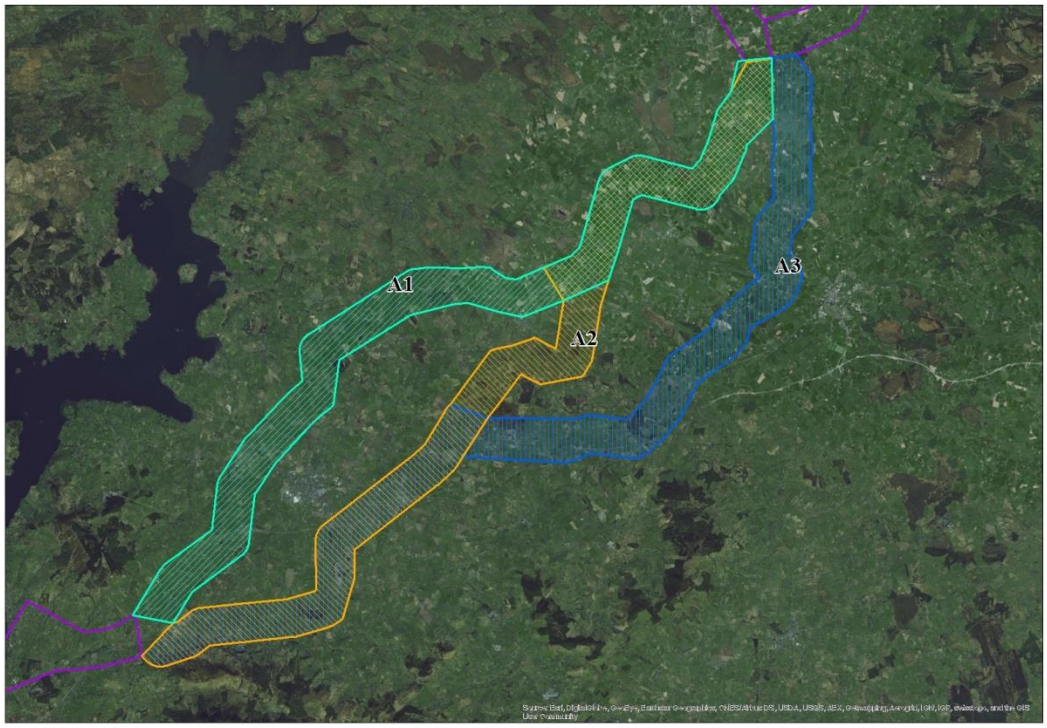


Figure F4 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

This route (A1) runs in a north easterly direction between Lough Derg and Nenagh, via Ballycommon where it crosses the Nenagh River and continues in a north easterly direction before turning east just to the north of Cloughjordan. The Nenagh River is the most significant water body along this route and supports salmonid populations (IFI website). Other water bodies are lower order streams with lower fisheries potential. The Nenagh River is not, however, within an SAC but does flow into Lough Derg (at Dromineer Bay), parts of which are designated SAC sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165). However, as the Lough Derg SAC is upstream of the inflowing Nenagh River by some 15 km, it is physically impossible for any possible interaction between construction activities at Dromineer Bay and the SAC to the north. With regard to Parteen (Lower River Shannon SAC), this site is ca 20 km to the south of Dromineer and again is too remote for any interaction between the two sites to be possible. Impacts on designated Annex I habitats, non-designated habitats, high ecological value aquatic habitats, protected flora and fauna, Annex II, Annex IV species and high quality aquatic habitat are all scored at very low for this route corridor option due to the lack of designated sites in the area. Impact on the criterion salmonid habitat is scored at low as O'Reilly (2007) records

populations of both Salmon and Brown Trout in the catchment. As Freshwater Pearl Mussels are not present on this route option, impact is scored at nil. If this northern branch is selected as the preferred option, it must be examined to minimise the number of stream/river crossings.

5.3 Route Corridor A2

This route (A2) goes south of Nenagh heading in a north easterly direction and terminates to the east of Cloughjordan. It too crosses the Nenagh River and two of its tributaries, the Ballinaboy and the Ollatrim Rivers. It also crosses a number of small order streams which are of lower fisheries value. The Nenagh River is not an SAC but flows into Lough Derg (at Dromineer Bay), parts of which are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165). However, as the Lough Derg SAC is upstream of the inflowing Nenagh River by some 15 km, it is physically impossible for any possible interaction between construction activities at Dromineer Bay and the SAC to the north. With regard to Parteen (Lower River Shannon SAC), this site is ca 20 km to the south of Dromineer and again is too remote for any interaction between the two sites to be possible. Impacts on designated Annex I habitats, non-designated habitats, high ecological value aquatic habitats, protected flora and fauna, Annex II, Annex IV species and high quality aquatic habitat are all scored at very low for this route corridor option due to the lack of designated sites in the area. Impact on the criterion salmonid habitat is scored at low as O'Reilly (2007) records populations of both Salmon and Brown Trout in the catchment. As Freshwater Pearl Mussels are not present on this route option, impact is scored at nil. If this southern route is selected, it will need further more detailed examination to minimise the number of stream crossings.

5.4 Route Corridor A3

Route A3 spurs off the southern A2 branch to the north east of Nenagh travelling in an easterly direction and crosses into Leinster. Here it heads in a north easterly direction and terminates south east of Birr. At its initial westerly section, it crosses the Ollatrim River, a tributary of the Nenagh River and the Little Brosna River west of Roscrea. The Little Brosna River joins the River Shannon Meelick. Parts of Lough Derg are Natura sites (Lough Derg, North-east Shore SAC site synopsis code 002241 and Lower River Shannon SAC site synopsis code 002165) into which the Nenagh and Little Brosna Rivers empty. As noted above for possible interaction between activities at this general area and SAC upstream and downstream of it, is considered extremely low due to distances involved. Potential impacts on non-designated aquatic habitats, high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species are considered very low as no sizeable water course is crossed. The Little Brosna River supports salmonid populations and the impact is therefore scored at very low. No Freshwater Pearl Mussel populations are known from these rivers and the impact is scored at nil, there can be no impact on either the habitat or species. No impact is predicted on high quality aquatic habitat for protected aquatic species as neither river is designated for any such species.

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor A1, A2 and A3 options.

5.5 Matrix of Multi Criteria Analysis

Criterion	Corridor A1	Corridor A2	Corridor A3
Potential to impact on Natura 2000 Sites	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.
Potential impact Annex I listed habitats (designated)	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.	**Very Low:** Nenagh River flows in to Lough Derg, parts of which are designated as SAC but due to distance, impact scored at very low.
Potential impact Annex I listed habitats (non-designated)	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites	**Very Low:** Nenagh River and its tributaries are not within designated sites
Potential to impact on protected Flora - Flora Protection Order	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no protected floral or faunal aquatic species are recorded from the area, the impact is scored at very low.
Potential to impact on Annex II species	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex II aquatic species are recorded from the area, the impact is scored at very low.
Potential to Impact on Annex IV species (wherever they occur)	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.	**Very Low:** As no Annex IV aquatic species are recorded from the area, the impact is scored at very low.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
Potential to impact high ecological value aquatic habitats (semi natural habitats)	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites.	**Very Low:** Nenagh River and its tributaries are not within designated sites.

Criterion	Corridor A1	Corridor A2	Corridor A3
Potential to impact on salmonid habitat - protected under SI Reg	**Low impact**: As the Nenagh River supports populations of salmonids, the impact is scored at low.	**Low impact**: As the Nenagh River supports populations of salmonids, the impact is scored at low.	**Low impact**: As the Nenagh and Little Brosna River support populations of salmonids, the impact is scored at low.
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	Freshwater Pearl Mussels are not present in the water courses. Impact score is nil.	Freshwater Pearl Mussels are not present in the water courses. Impact score is nil.	Freshwater Pearl Mussels are not present in the water courses Impact score is nil.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is scored at very low.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is scored at very low.	**Very Low:** As no high quality aquatic habitat for protected aquatic species is recorded from area, the impact is scored at very low.
Potential to impact on coastal zone habitats (Intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on marine habitats (Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Low impact**: Salmon pass through the system.	**Low impact**: Salmon pass through the system	**Low impact**: Salmon pass through the system

Table F4 - 4 Summary of the MCA for C Route Corridors A

5.6 Comparative Discussion

Although these route options cross water bodies that flow into Lough Derg parts of which are designated as SAC, these sites are too far away from where the rivers enter the lake to be of any concern. These rivers do support populations of salmonids and care must be taken when carrying out river crossings. As the northern route option (A1) only crosses the Nenagh River once, it is considered as the least constrained option.

6 Preliminary Route Corridor Section B

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F4 – 11 below.

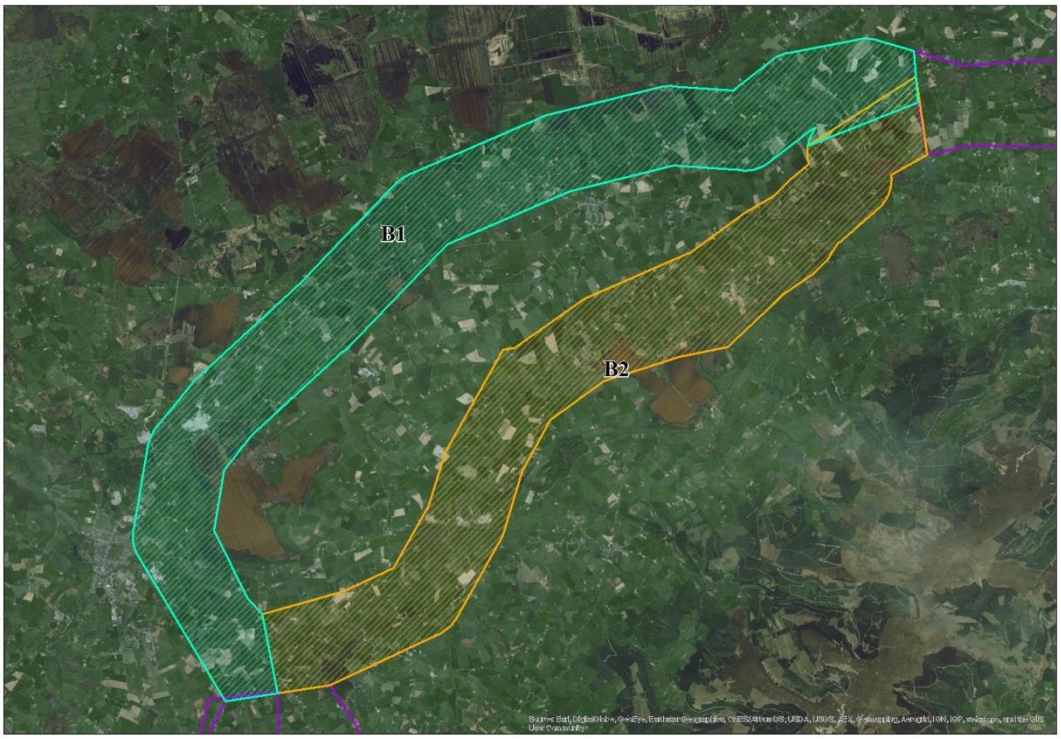


Figure F4 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

This branch (B1) follows the line of the N52 road between Birr and Kilcormack and terminates at Mountbolus. Along its way, it crosses the Camcor, the Rapemills and the Silver Rivers, all of which are tributaries of the River Shannon. The Lower River Shannon is an SAC (site Code 0002165). However, because of distances involved (the Camcor is a tributary of the Little Brosna River that enters the River Shannon *ca* 50 km to the north of the Shannon SAC and *ca* 10 km to the north of Lough Derg SAC) and given adherence to proper construction practices close to these water ways, impact on either SAC is scored at low and also therefore low on Annex I designated habitats. Impact on non-designated habitats, high ecological aquatic habitats, protected flora and fauna, Annex I habitats, Annex II habitats and high quality aquatic habitat for protected aquatic species is also scored at low as no Natura sites with aquatic designations are present directly along this route. O'Reilly (2007) records the Camcor as having stocks of Brown Trout and runs of salmon and for this reason, impact on salmonid habitat is scored at low. Freshwater Pearl Mussel populations are not recorded along this route and impact is therefore scored at nil. Before Route B1 terminates, it passes close to Boora Bog where the Boora River rises.

6.3 Route Corridor B2

This route (B2) follows a line that is to the south of B2 above and it too crosses the Camcor and the Silver Rivers and upper reaches of the Rapemills River. As noted above, these are tributaries of the River Shannon. The River Shannon is an SAC (site Code 0002165). However, because of distances involved and given adherence to proper construction practices close to these water ways, impact on the Lower Shannon SAC is scored at low and also therefore low on Annex I designated habitats. Impact on non-designated habitats, high ecological aquatic habitats, protected flora and fauna, Annex I habitats, Annex II habitats and high quality aquatic habitat for protected aquatic species is also scored at low mainly as no Natura sites with aquatic designations are present directly along this route. O'Reilly (2007) records the Camcor as having stocks of Brown Trout and runs of salmon and for this reason, impact on salmonid habitat is scored at low. Freshwater Pearl Mussel populations are not recorded along this route and impact is therefore scored at nil.

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor B1 and B2 options.

6.4 Matrix of Multi Criteria Analysis

Criterion	Corridor B1	Corridor B2
Potential to impact on Natura 2000 Sites	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.
Potential impact Annex I listed habitats (designated)	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.	**Very Low:** Little Brosna River flows in to Shannon SAC designated as SAC but located *ca* 50km downstream.
Potential impact Annex I listed habitats (non-designated)	**Very Low:** No designated aquatic site with the area.	**Very Low:** No designated aquatic site with the area.
Potential to impact on protected Flora - Flora Protection Order	**Very Low:** No protected aquatic flora or fauna recorded from the area.	**Very Low:** No protected aquatic flora or fauna recorded from the area.
Potential to impact on Annex II species	**Very Low:** No Annex II aquatic species recorded from the area.	**Very Low:** No Annex II aquatic species recorded from the area.
Potential to Impact on Annex IV species (wherever they occur)	**Very Low:** No Annex IV aquatic species recorded from the area.	**Very Low:** No Annex IV aquatic species recorded from the area.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*
Potential to impact on salmonid habitat - protected under SI Reg	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.

Criterion	Corridor B1	Corridor B2
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	Freshwater Pearl Mussels do not occur in the water courses therefore impact score is nil.	Freshwater Pearl Mussels do not occur in the water courses therefore impact score is nil.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.	**Low impact**: As the River Camcor supports populations of Brown Trout, the impact is scored at low.
Potential to impact on coastal zone habitats (Intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on marine habitats (Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Low impact**: Salmonids may pass through the site	**Low impact**: Salmonids may pass through the site

6.5 Comparative Discussion

Although these route options (B1 and B2) cross water bodies that flow into the River Shannon parts of which are designated as SAC, these locations are too far away from where the rivers enter the SAC to be of any concern (Lower River Shannon SAC located *ca* 50 km downstream and the North east Lough Derg SAC located *ca* 10km downstream). The rivers do support populations of salmonids and care must be taken when carrying out river crossings. Other than this, there is little to separate these two routes in terms of aquatic ecology. However, as the northern route (B1) crosses the main section of the Rapemills, it is considered that B2 is less constrained as it can be designed to avoid the upper section of this river.

7 Preliminary Route Corridor Section C

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F4 – 12 below.

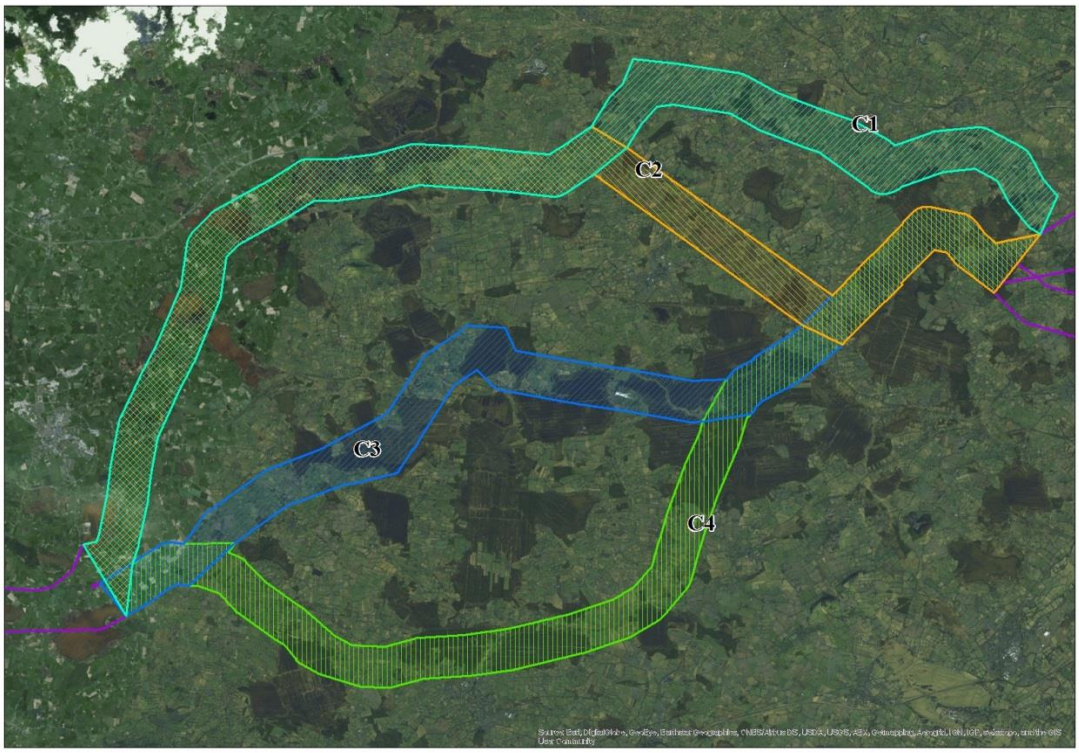


Figure F4 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

This route option starts south of Tullamore and heads northeast towards Rhode, then east to the south of Enfield where it terminates south of Knockanally. Along this route, it crosses the Tullamore River, the Grand and the Yellow, Boyne and Blackwater Rivers. The Yellow and Backwater Rivers are tributaries of the Boyne. The Boyne is considered by Inland Fisheries Ireland as being an important salmonid river. The River Boyne is an SAC (site synopsis code (002299) and for this reason, impact on the criteria Natura sites, Annex I (both designated and non-designated) habitats, high ecological aquatic habitats, protected flora and fauna, Annex II, Annex IV, salmonid habitat and finally high quality aquatic habitat for protected aquatic species as listed in Section 1.2 are all scored high. Freshwater Pearl Mussels do not occur in this system and the impact is therefore scored at nil.

7.3 Route Corridor C2

C2 is an easterly continuation of C1 from which it splits at Castlejordan and heads in a south easterly direction and terminates east of Edenderry. It crosses the Yellow and Boyne Rivers and a number of small order streams. Since this route also

crosses the Boyne River SAC (site synopsis 00299) and some its tributaries, the same levels of impact as noted above for C1 apply here. Freshwater Pearl Mussels do not occur in this system and the impact is therefore scored at nil.

7.4 Route Corridor C3

The first half of this route runs in a north easterly direction where it starts at Killeigh, south of Tullamore. Its second half is in a more easterly direction and it terminates to the east of Edenderry. C3 crosses the Tullamore, Phillipstown and Cushaling Rivers and a number of small order streams. The Tullamore River is a tributary of the River Shannon SAC (site Code 0002165) while the Phillipstown River in a tributary of the River Barrow SAC (site synopsis code 0021625). However, due to distances involved between both the Tullamore River and the River Shannon SAC and the Phillipstown River and the Barrow SAC *i.e.* + 10 km, the level of impact on the SAC is scored at low. For this reason, impact on designated Annex I habitats is also scored low. As neither of these river systems are designated for any conservation reasons and also as they are small order rivers, impacts on non-designated Annex I habitats, high ecological aquatic habitats, protected flora and fauna, Annex II and on Annex IV species and finally, high quality aquatic habitat for protected aquatic species are all scored low. O'Reilly (2007) notes that both the Phillipstown and Tullamore Rivers support populations of Brown Trout and because of this, impact on salmonid habitat is scored at low. As no Freshwater Pearl Mussel populations are known from these rivers, the impact is scored at nil.

7.5 Route Corridor C4

The route corridor is furthest south and starts to the south of Tullamore, heading in a south easterly direction, then east passing north of Portarlington and north easterly to end northeast of Clonbulloge. It crosses the Cushina and Figile Rivers, both of which are tributaries of the River Barrow SAC (site synopsis code 002162). The location is *ca* 10 km to the north of the designated section of the Barrow and flows into the Figile River which in turn is *ca* 8 km away from the designated section of the Barrow River. Allowing for standard mitigation measures *e.g.* following best construction practices, it is considered that any development activity near the Slate River will be too remote from the Barrow SAC to have any measurable effect. Due to also to the distance effect, no impact is predicted on Annex I designated or non-designated habitats. Potential impacts on high ecological value aquatic habitats, protected flora and fauna species, Annex II and on Annex IV species is considered very low. O'Reilly (2007) notes that the Cushina and Figile Rivers support populations of Brown Trout and because of this, impact on salmonid habitat is scored at low. As no Freshwater Pearl Mussel populations are known from this river, the impact is scored at nil. Impact on high quality aquatic habitat for protected species is scored at low. The route also crosses a number of small order streams.

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor C1, C2, C3 and C4 options.

7.6 Matrix of Multi Criteria Analysis

Criterion	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to impact on Natura 2000 Sites	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.
Potential impact Annex I listed habitats (designated)	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.	**Mid-range impact.** Boyne River is an SAC therefore impact scored at mid-range.
Potential impact Annex I listed habitats (non-designated)	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No non-designated Annex I listed habitats recorded from the area therefore impact scored at very low.
Potential to impact high ecological value habitats (semi natural habitats)	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.	**Very Low Impact:** No high ecological value aquatic habitats recorded from the area therefore impact scored at very low.
Potential to impact on protected Flora - Flora Protection Order	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.	**Very Low Impact:** No protected aquatic floral or faunal species recorded from the area therefore impact scored at very low.
Potential to impact on Annex II species	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex II aquatic species listed for the area therefore very low impact
Potential to Impact on Annex IV species (wherever they occur)	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact.	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact	**Very Low Impact:** No Annex IV aquatic species listed for the area therefore very low impact

Criterion	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*	*See terrestrial section*
Potential to impact on salmonid habitat - protected under SI Reg	**Mid-range impact.** River Boyne is an important salmonid fishery.	**Mid-range impact.** River crossings. River Boyne River Boyne is an important salmonid fishery.	**Low impact.** Shannon and Barrow Rivers are important salmonid fisheries but are far from the sites.	**Mid-range impact.** River Boyne is an important salmonid fishery.
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.	**Very Low Impact:** Populations thought to be extinct.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.	**Very Low Impact:** As no high quality aquatic habitat for aquatic species is recorded from the area, impact is scored at very low.
Potential to impact on coastal zone habitats (Intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on marine habitats (Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.

Criterion	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Mid-range impact.** Salmon pass through the rivers.	**Mid-range impact.** Salmon pass through the rivers.	**Very Low Impact:** Salmon unlikely to pass through the rivers, therefore impact scored at very low.	**Mid-range impact.** Salmon pass through the rivers.

7.7 Comparative Discussion

As can be seen from the above commentary, Route Section C is constrained due to the Boyne SAC, the fact that the Bone is an important salmonid fishery and finally that salmonids migrate up and down it at different part of the year. Special attention must be paid to the constructing any river crossing to ensure that water and habitat quality are not impacted. With regard to a preferred option, as the only option that does not cross an important salmonid river is Corridor C3, it is this route that is considered least constrained in terms of aquatic ecology.

8 Preliminary Route Corridor Section D

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F4 – 13 below.

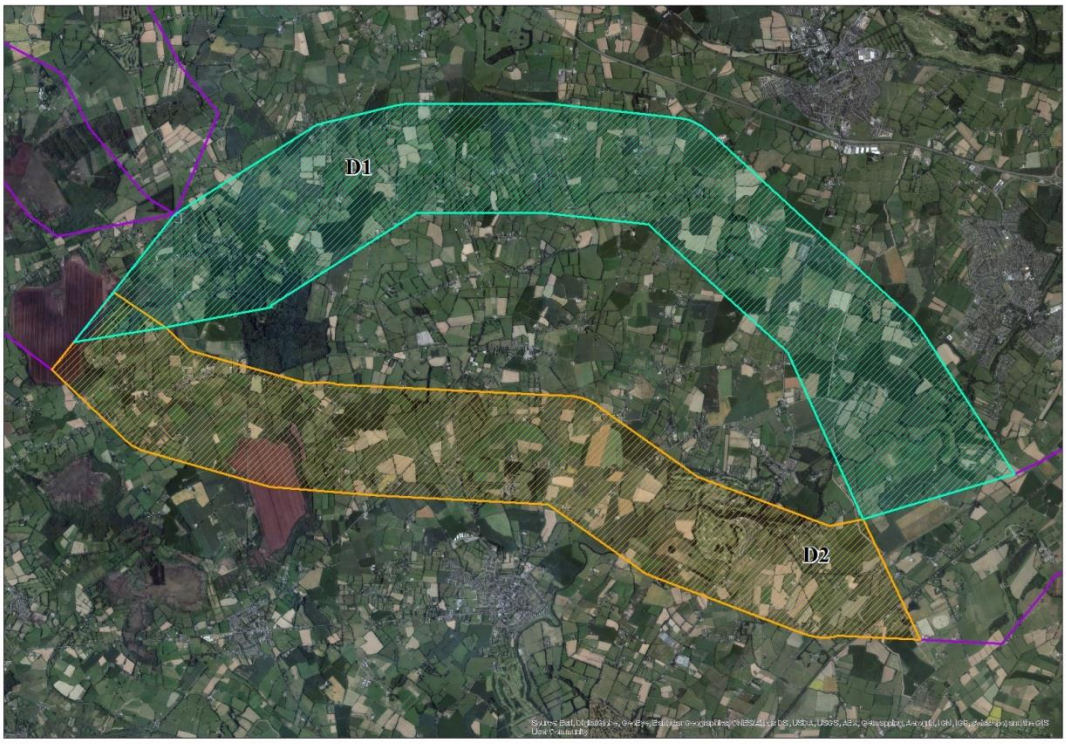


Figure F4 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

Corridor D1 commences south of Knockanally and travels south of Kilcock/Maynooth ending to the east of Straffan. Along its path, it crosses the Lyreen River and a number of small order streams. The Lyreen River is not designated as a Natura site sites and therefore, there can be no impact on designated Annex I habitats. Both these criteria are therefore scored at nil. Impacts on non-designated habitats, high aquatic ecological habitats, protected flora and fauna, Annex I and on Annex II species are scored at low because the number and size of aquatic habitats on both routes are low. O'Reilly (2007) does not record the Lyreen as being a salmonid fishery; however, as the Inland Fisheries Ireland web site does note that it supports a population of Brown Trout, impact on the criterion salmonid habitat is scored at low. This scoring also applies to Freshwater Pearl Mussels which do not occur in the Lyreen River and also to the criterion high quality aquatic habitat for protected aquatic species as this river is not listed by the NPWS on its web site.

8.2.1 Route Corridor D2

Corridor D2 follows a course that is to the south of D1 and the most significant waterway it crosses is the River Liffey. The Liffey is considered as an important salmonid river by Inland Fisheries Ireland and produces sizeable Brown Trout and is normally the first river in Ireland to produce the earliest New Year Salmon. O'Reilly (2007) also notes that the River Liffey produces Sea Trout. The River Liffey is not designated as a Natura site sites and therefore, there can be no impact on designated Annex I habitats. Both these criteria are therefore scored at nil. Impacts on non-designated habitats, high aquatic ecological habitats, protected flora and fauna, Annex I and Annex II species and on high quality aquatic habitat for protected aquatic species are all scored at low. Because of the importance of fisheries with regard to the River Liffey, impact on salmonid habitat is scored mid-range.

The Matrix of Multi Criteria analysis below summarises the assessment of Route Corridor D1 and D2 options.

8.3 Matrix of Multi Criteria Analysis

Criteria	Corridor D1	Corridor D2
Potential to impact on Natura 2000 Sites	Very Low impact No Natura sites in the area	Very Low impact: No Natura sites in the area
Potential impact Annex I listed habitats (designated)	Very Low impact No Natura sites in the area	Very Low impact: No Natura sites in the area
Potential impact Annex I listed habitats (non-designated)	**Very Low Impact:** As no non-designated Annex I listed habitats are recorded for the area, impact scored at very low.	**Very Low Impact:** As no non-designated Annex I listed habitats are recorded for the area, impact scored at very low.
Potential to impact high ecological value habitats (semi natural habitats)	**Very Low Impact:** As no high ecological value aquatic habitats are recorded for the area, impact scored at very low.	**Very Low Impact:** As no high ecological value aquatic habitats are recorded for the area, impact scored at very low.
Potential to impact on protected Flora - Flora Protection Order	**Low Impact:** As no protected aquatic flora or fauna are recorded aquatic habitats are recorded for the area, impact scored at very low.	**Mid-range Impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
Potential to impact on Annex II species	**Low Impact:** As no Annex I aquatic species are recorded for the area, impact is scored at very low.	**Low Impact:** As no Annex I aquatic species are recorded for the area, impact is scored at very low.
Potential to Impact on Annex IV species (wherever they occur)	**Low Impact:** As no Annex IV aquatic species are recorded for the area, impact is scored at very low.	**Low Impact:** As no Annex IV aquatic species are recorded for the area, impact is scored at very low.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	*See terrestrial section*	*See terrestrial section*

Criteria	Corridor D1	Corridor D2
Potential to impact on salmonid habitat - protected under SI Reg	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	As there are no Freshwater Pearl Mussels in the water courses, impact scored at nil.	As there are no Freshwater Pearl Mussels in the water courses, impact scored at nil.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.	**Mid-range impact:** River Liffey is an important salmonid fishery there impact scored at mid-range.
Potential to impact on coastal zone habitats (Intertidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on marine habitats (Subtidal)	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine/coastal birds	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact marine mammals	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	This criterion is not relevant as the water course is not marine.	This criterion is not relevant as the water course is not marine.
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	**Mid-range impact:** Salmonids pass up the rivers.	**Mid-range impact:** Salmon pass up the Liffey.

8.4 Comparative Discussion

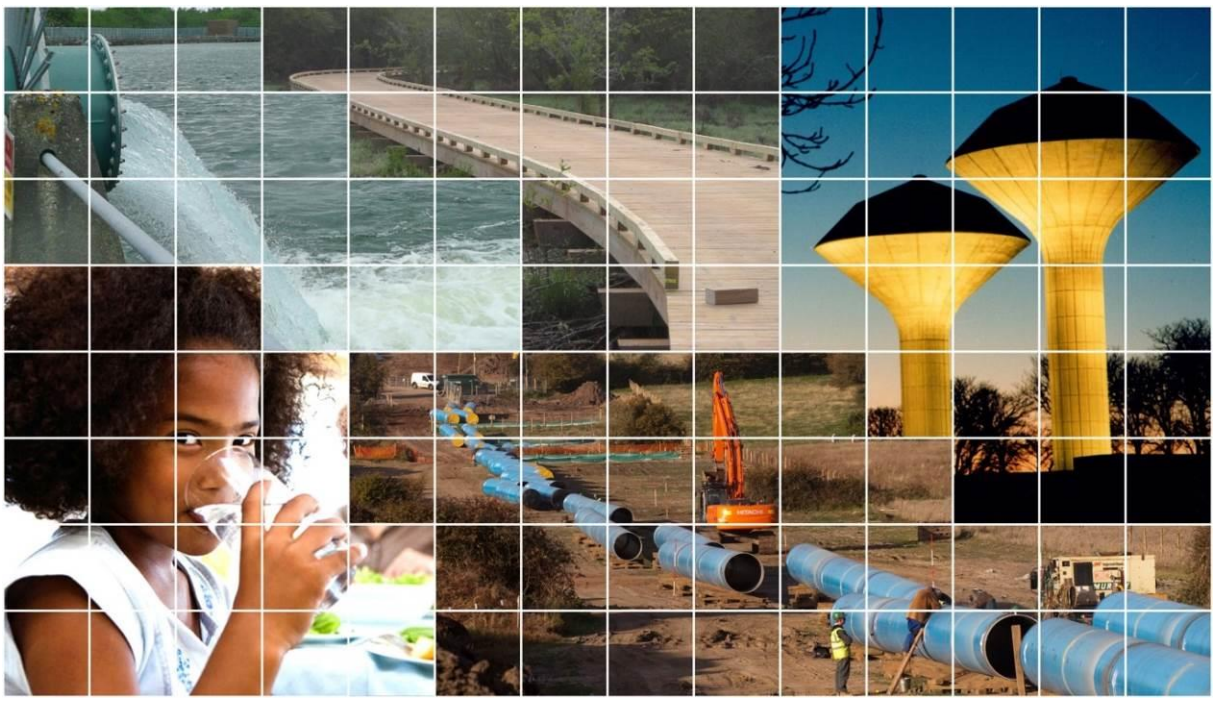
The River Liffey is an important fishery for Brown Trout, Salmon and even Sea Trout and for a river that flows through a capital city with major conurbation and commercial activity and also through a significant commercial port, every effort should be made to maximise protection of it as a life support system for salmonids. Therefore, as the northern option, D1 does not cross the River Liffey, it is considered as the less constrained option.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F5: Surface Water Environment

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see **Error! Reference source not found.**), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F5 – 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F5 is a statement on the specialism Surface Water Environment and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under a range of Surface Water Environment sub-criteria.

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a "least constrained" component is based upon a subjective assessment by each Specialist in their discipline of

expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.1.1 Peamount

Figure F5 – 1 Peamount Location

(a) Water Framework Directive

Table F5- 2 details the WFD waterbodies within the study area for the Peamount terminal location.

Waterbody Name	Waterbody Type	EU WFD Code	WFD Status
Lucan waterbody	River/Stream	IE_EA_09_1870_5	Unassigned
Griffen waterbody	River/Stream	IE_EA_09_242	Bad

Table F5 – 2 WFD Waterbodies

Within the Peamount study area, there are no WFD related protected areas therefore, the study area is rated as **Low** sensitivity.

2.2 Multi Criteria Assessment and Conclusion

Table F5-3 outlines the key WFD constraints in the Peamount study area.

Study Area	Rivers / Streams	Lakes	WFD good or higher status	Drinking water	Shellfish Area	Recreational Waters	Nutrient Sensitive	cSAC & SPA
Peamount	√√							

√ - Within close proximity
√√ - Within Study Area

Table F5 – 3 Summary of WFD Constraints

Potential impacts are likely to be most severe during the construction phase as these have the potential to release suspended sediment, lubricants, fuels and other hazardous substances into surface waterbodies. Potential impacts associated with the operation of the termination point reservoir are associated with potential contaminated runoff from new hardstanding areas discharging into surface water waterbodies. The location of the terminal at this location should not impede the objectives of the WFD. Therefore, potential impacts associated with the terminal location are considered to be of **low** significance. The location of the termination point reservoir can be further refined at a future stage to avoid surface water features within the study area and the potential impact associated with these.

Flooding within the study area is minimal and land for the termination point reservoir development is likely to be available outside of the flood zone. Therefore, potential impacts associated with the terminal location are considered to be of **very low** significance.

2.3 Matrix of Multi Criteria Analysis

Table F5 – 4 provides a summary of the MCA for the terminal location.

Criteria	Peamount
Water	
- Potential to impede the objectives of the WFD (Potential to impact on the water quality, ecology and hydromorphology of WFD waterbodies) - Potential to impact on WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species	Potential to impede the objectives of WFD is considered to be **low**.

Table F5 – 4 Summary of the MCA for the Terminal Location

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F5 – 2.

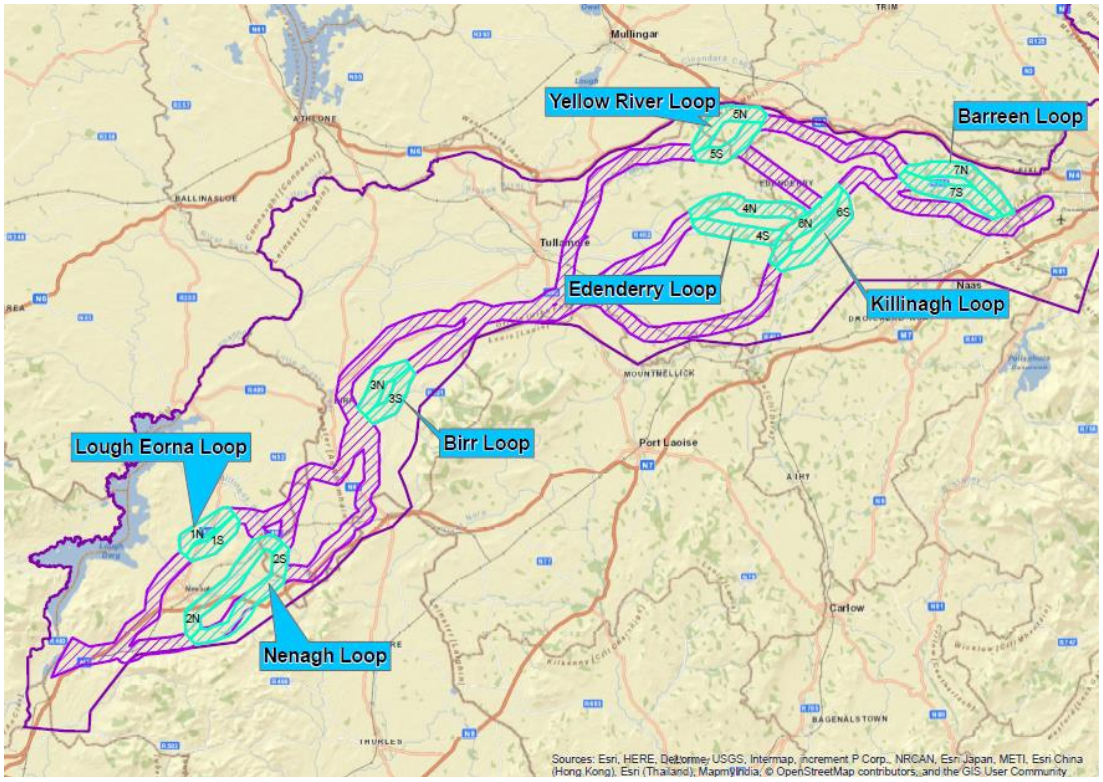


Figure F5-2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

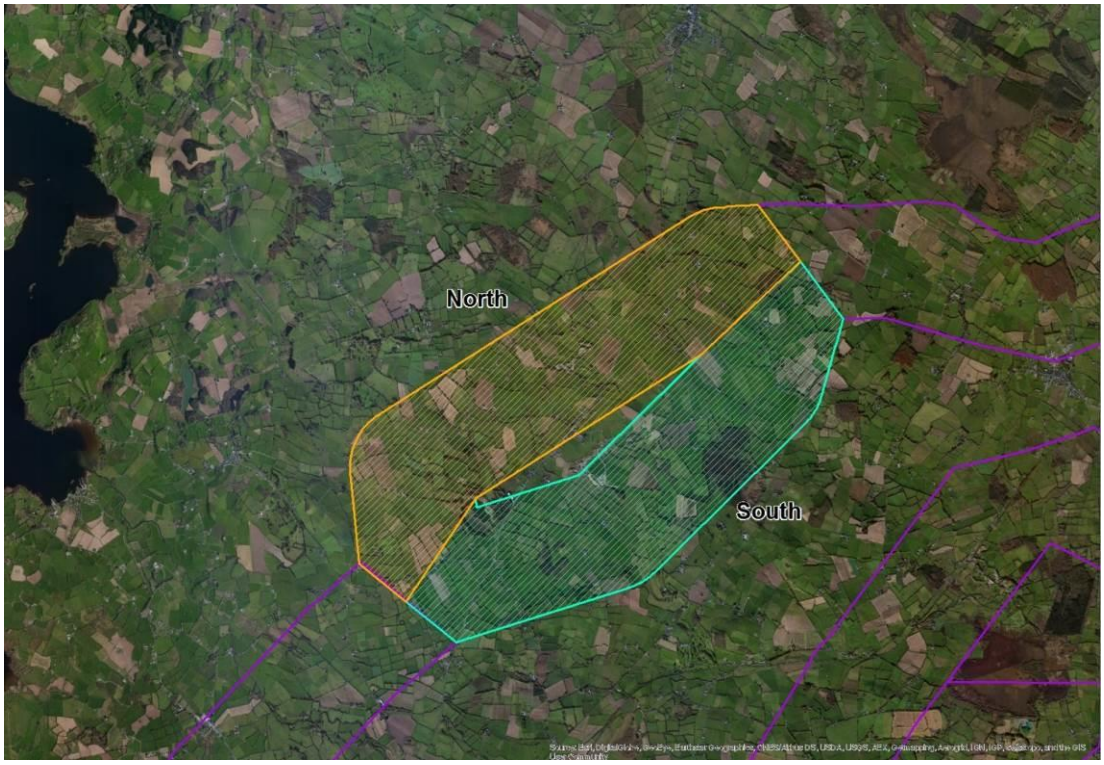


Figure F5 – 3 The Lough Eorna Loop

Table F5 – 5 outlines the baseline within each branch of the Lough Eorna Loop.

Criteria	Pipeline Loop 1 - "The Lough Eorna Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Poor	Poor
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	1 drinking water abstraction point downstream (d/s) of potential crossing point	None

Table F5 – 5 Baseline Data

Table F5 – 6 outlines the potential number of water crossings required within each branch at Lough Eorna.

Criteria	North	South
Approximate number of water crossings	5	4

Table F5 – 6 Watercourse Crossings

Table F5 – 7 outlines the potential category of impact associated with each branch at Lough Eorna.

Criteria	North	South
Significance of Impact - WFD	**Mid-range**	**Low**
Significance of Impact – Watercourse Crossings	**Mid-range**	**Low**

Table F5 – 7 Assessment Matrix

4.1.1 Summary

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, overall there is little to differentiate between the two branches (north and south) at Lough Eorna in terms of surface water. **Therefore, no clear differentiation is apparent to support the selection of a least constrained option.**

4.2 The Nenagh Loop

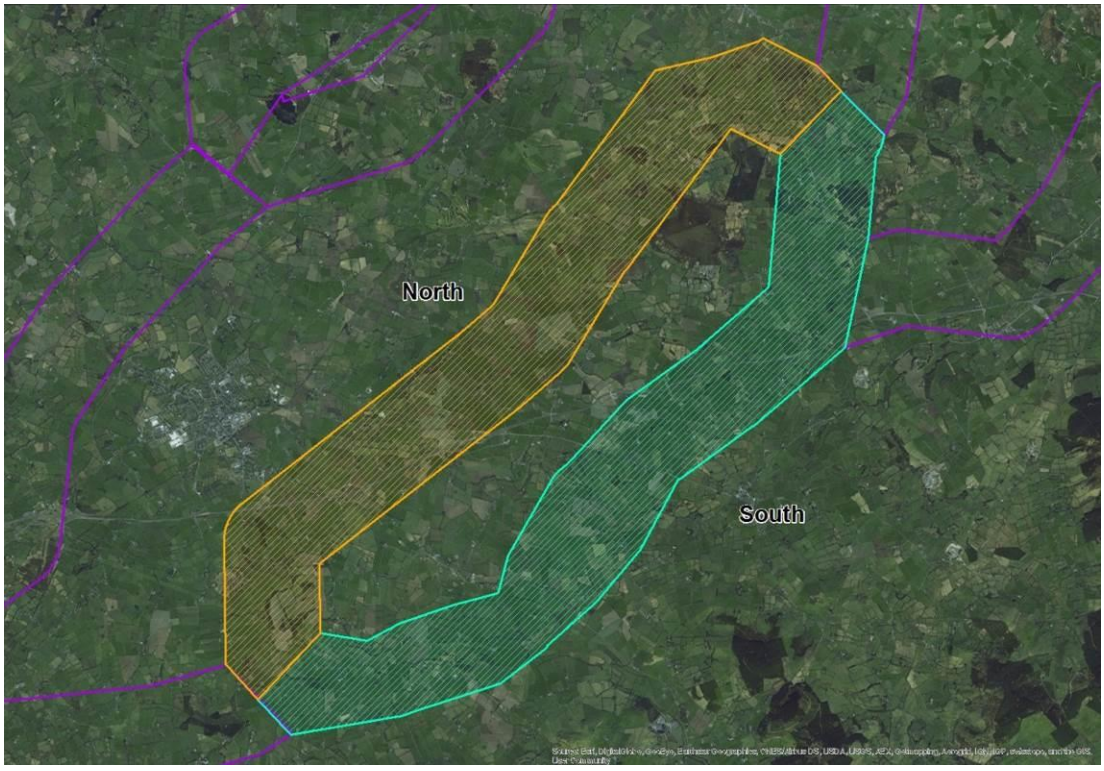


Figure F5 – 8 The Nenagh Loop

Table F5 – 8 outlines the baseline within each branch at Nenagh.

Criteria	Pipeline Loop 2 - "The Nenagh Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Moderate & bad	Moderate
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	2 drinking water abstraction point d/s of the potential crossing point and 1 groundwater	1 drinking water abstraction point upstream (u/s) of the potential crossing point

Table F5 – 8 Baseline Data

Table F5 – 9 outlines the potential number of water crossings required within each branch at Nenagh.

Criteria	North	South
Approximate number of water crossings	13	13

Table F5 – 9 Watercourse Crossings

Table F5 – 10 outlines the potential category of impact associated with each branch at Nenagh.

Criteria	North	South
Significance of Impact - WFD	**Mid-range**	**Low**
Significance of Impact – Watercourse Crossings	**Low**	**Low**

Table F5 – 10 Assessment Matrix

4.2.1 Summary

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **the south branch has been identified overall as the least constrained option.**

4.3 The Birr Loop

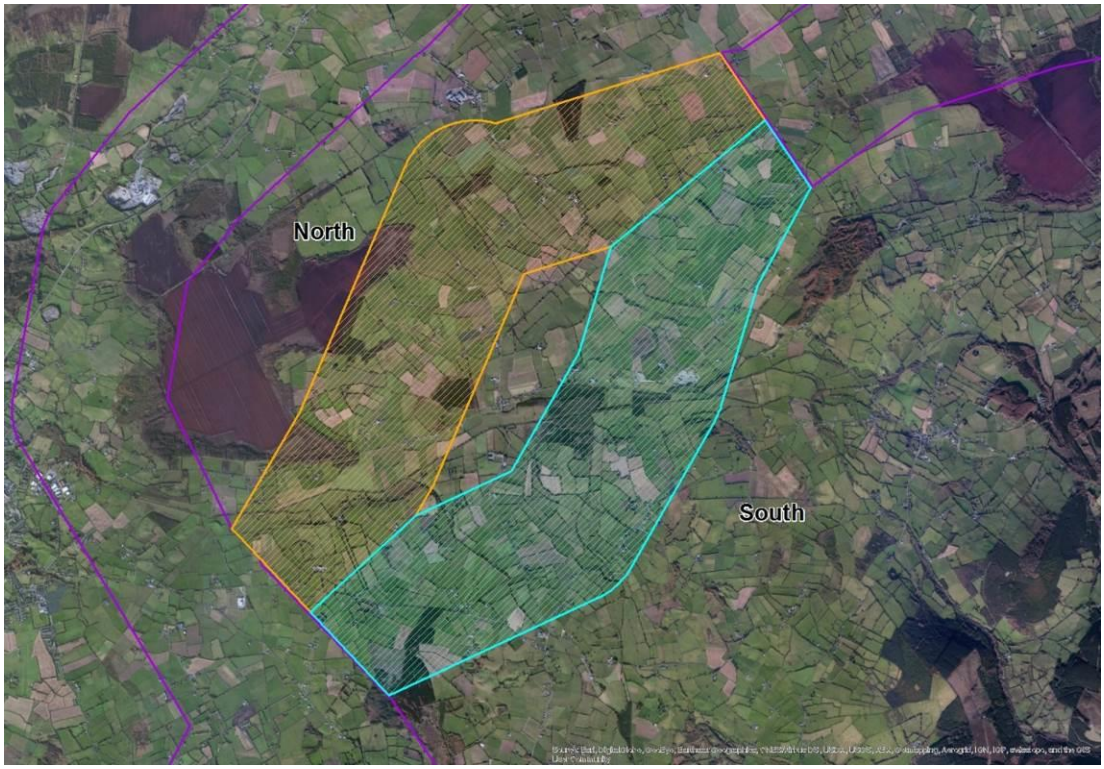


Figure F5 – 5 The Birr Loop

Table F5 – 11 outlines the baseline within each branch at Birr.

Criteria	Pipeline Loop 3 - "The Birr Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Moderate	Poor, Moderate & Good
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	None	None

Table F5 – 11 Baseline Data

Table F5 – 12 outlines the potential number of water crossings required within each branch at Birr.

Criteria	North	South
Approximate number of water crossings	4	6

Table F5 – 12 Watercourse Crossings

Table F5 – 13 outlines the potential category of impact associated with each branch at Birr.

Criteria	North	South
Significance of Impact - WFD	**Low**	**Mid-range**
Significance of Impact – Watercourse Crossings	**Low**	**Mid-range**

Table F5 – 13 Assessment Matrix

4.3.1 Summary

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **the north branch has been identified overall as the least constrained option.**

4.4 The Edenderry Loop

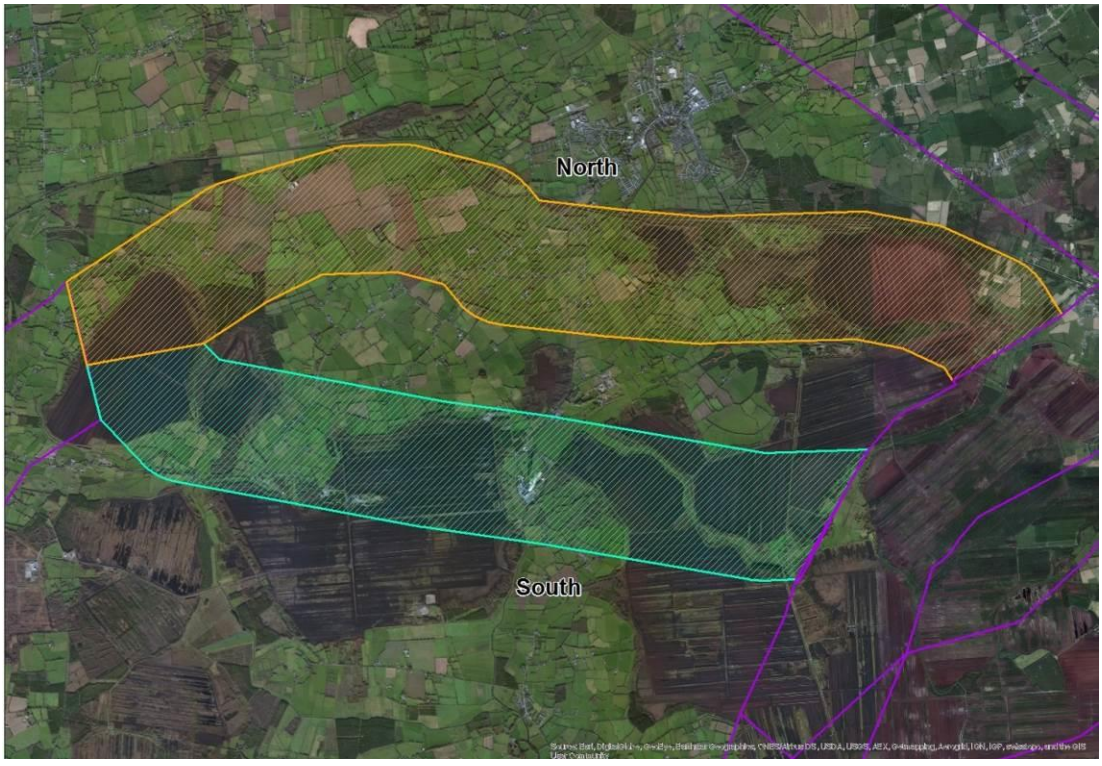


Figure F5 – 6 The Edenderry Loop

Table F5 – 14 outlines the baseline within each branch at Edenderry.

Criteria	Pipeline Loop 4 - "The Edenderry Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Moderate	Poor & Moderate
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	1 drinking water abstraction point (groundwater) 1 Special Area of Conservation (SAC), the Long Derries, Edenderry SAC. However, this is not considered a water dependent SAC.	1 Salmon waterbody of interest

Table F5 – 14 Baseline Data

Table F5 – 15 outlines the potential number of water crossings required within each branch at Edenderrry.

Criteria	North	South
Approximate number of water crossings	5	7

Table F5 – 15 Watercourse Crossings

Table F5 – 16 outlines the potential category of impact associated with each branch at Edenderry.

Criteria	North	South
Significance of Impact - WFD	**Mid-range**	**Mid-range**
Significance of Impact – Watercourse Crossings	**Low**	**Mid-range**

Table F5 – 16 Assessment Matrix

4.4.1 Summary

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **the north branch has been identified overall as the least constrained option.**

4.5 The Yellow River Loop

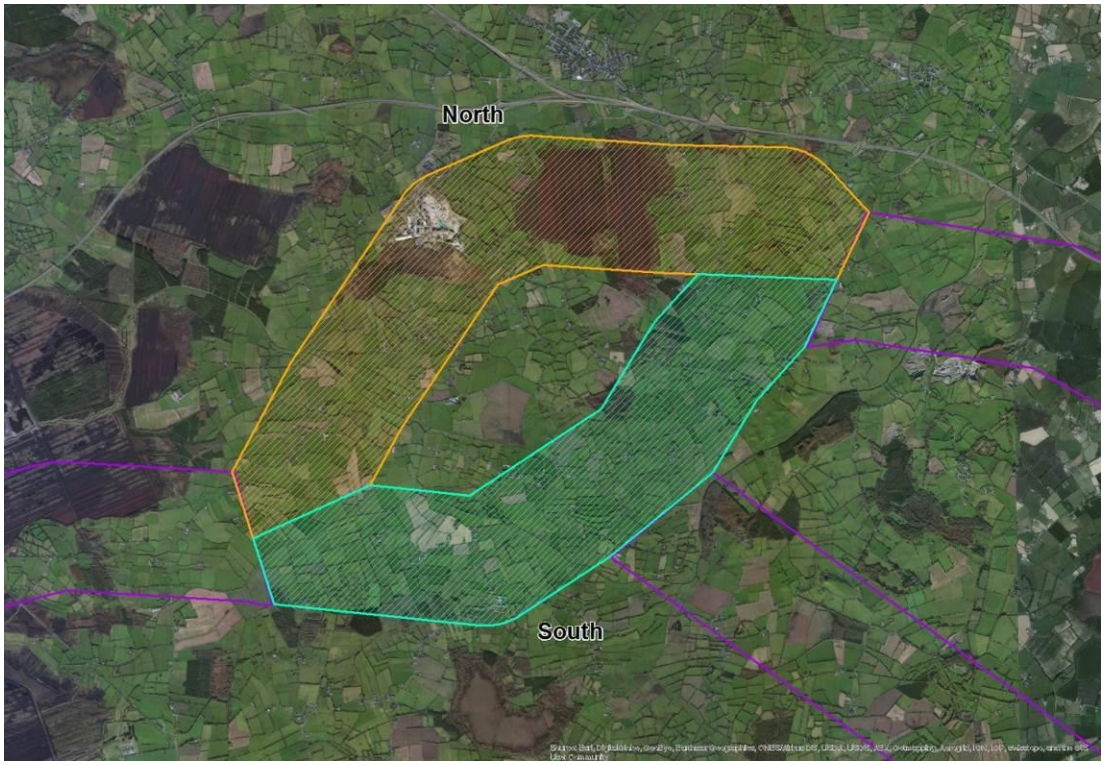


Figure F5 – 7 The Yellow River Loop

Table F5 – 17 outlines the baseline conditions within each branch at the Yellow River.

Criteria	Pipeline Loop 5 - "The Yellow River Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Poor	Poor & Moderate
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	None	None

Table F5 – 17 Baseline Data

Table F5 – 18 outlines the potential number of water crossings required within each branch at the Yellow River.

Criteria	North	South
Approximate number of water crossings	6	9

Table F5 – 18 Watercourse Crossings

Table F5 – 19 outlines the potential category of impact associated with each branch at the Yellow River.

Criteria	North	South
Significance of Impact - WFD	**Low**	**Low**
Significance of Impact – Watercourse Crossings	**Low**	**Mid-range**

Table F5 – 19 Assessment Matrix

4.5.1 Summary

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, overall there is little to differentiate between the two loop options at the Yellow River in terms of surface water. **Therefore, no clear differentiation is apparent to support the selection of a least constrained option.**

4.6 The Killinagh Loop

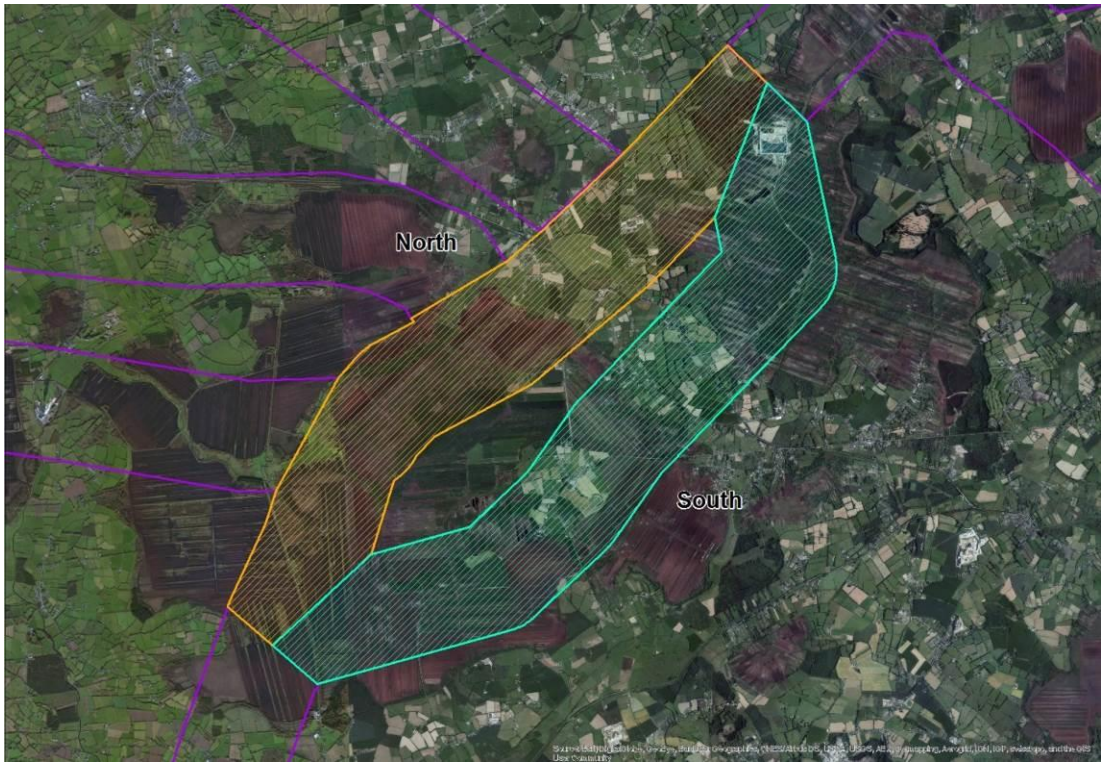


Figure F5 – 8 The Killinagh Loop

Table F5 – 20 outlines the baseline conditions within each branch at Killinagh.

Criteria	Pipeline Loop 6 - "The Killinagh Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Bad & Moderate	Bad (waterbodies drain to waterbody at bad status)
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	None	None

Table F5 – 20 Baseline Data

Table F5 – 21 outlines the potential number of water crossings required within each branch at Killinagh.

Criteria	North	South
Approximate number of water crossings	8	6

Table F5 – 21 Watercourse Crossings

Table F5 – 22 outlines the potential category of impact associated with each branch at Killinagh.

Criteria	North	South
Significance of Impact - WFD	**Low**	**Low**
Significance of Impact – Watercourse Crossings	**Mid-range**	**Low**

Table 5 – 22 Assessment Matrix

4.6.1 Summary

Based on the baseline, number of potential watercourse crossing and potential for flooding, **the south branch has been identified overall as the least constrained option.**

4.7 The Barreen Loop

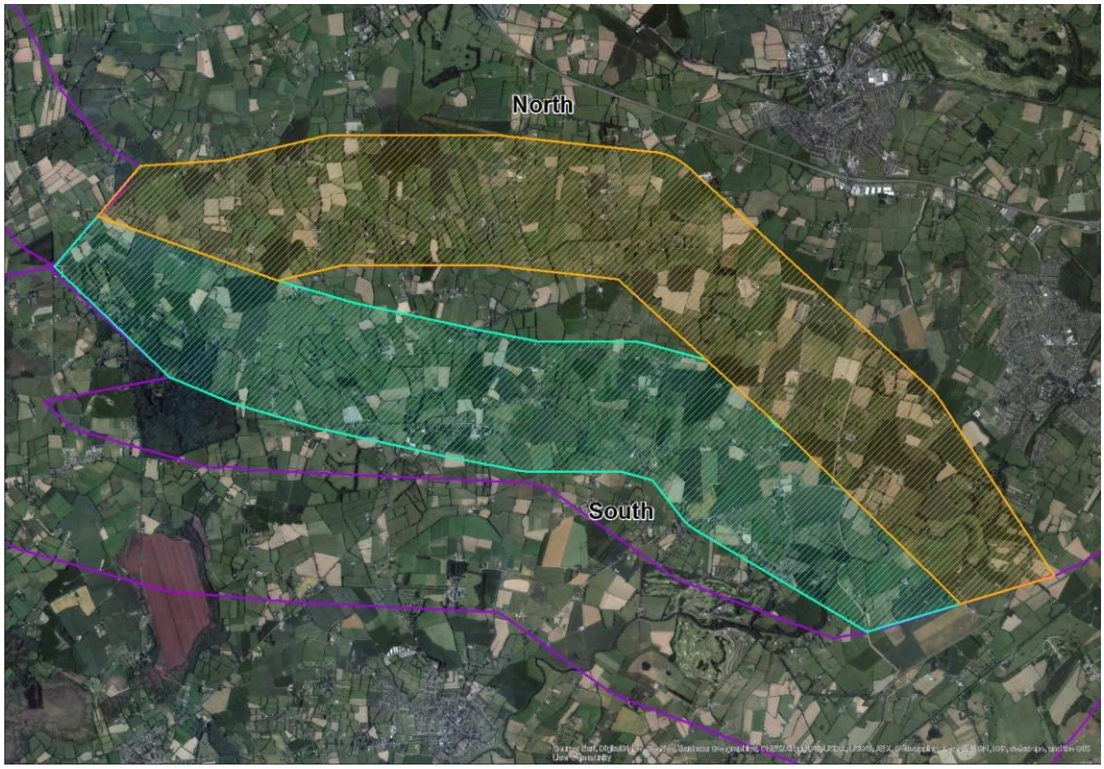


Figure F5 – 9 The Barreen Loop

Table F5 – 23 outlines the baseline conditions within each loop option at Barreen.

Criteria	Pipeline Loop 7 - "The Barreen Loop"	
	North Baseline	South Baseline
WFD Status of the watercourses	Bad & Moderate	Bad & Moderate
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	1 Nutrient Sensitive	1 Nutrient Sensitive

Table F5 – 23 Baseline Data

Table F5 – 24 outlines the potential number of water crossings required within each loop option at Barreen.

Criteria	North	South
Approximate number of water crossings	15	10

Table F5 – 24 Watercourse Crossings

Table F5 – 25 outlines the potential category of impact associated with each loop option at Birr.

Criteria	North	South
Significance of Impact - WFD	**Low**	**Low**
Significance of Impact – Watercourse Crossings	**Mid-range**	**Low**

Table F5 – 25 Assessment Matrix

4.7.1 Summary

Based on the baseline conditions, the number of potential watercourse crossing and the potential for flooding, **the south loop has been identified as the least constrained.**

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna		Nenagh		Birr		Edenderry		Yellow River		Killinagh		Barreen	
Noise	North	South	North	South	North	South	North	South	North	South	North	South	North	South
Significance of Impact - WFD	Mid-range	Low	Mid-range	Low	Low	Mid-range	Low	Mid-range	Low	Low	Low	Low	Low	Low
Significance of Impact – Watercourse Crossings	Low	Low	Low	Low	Low	Mid-range	Low	Mid-range	Low	Mid-range	Mid-range	Low	Mid-range	Low

Table F5 – 26 Assessment Matrix

5 Preliminary Route Corridor AB

5.1 Route Corridor A1, A2 and A3

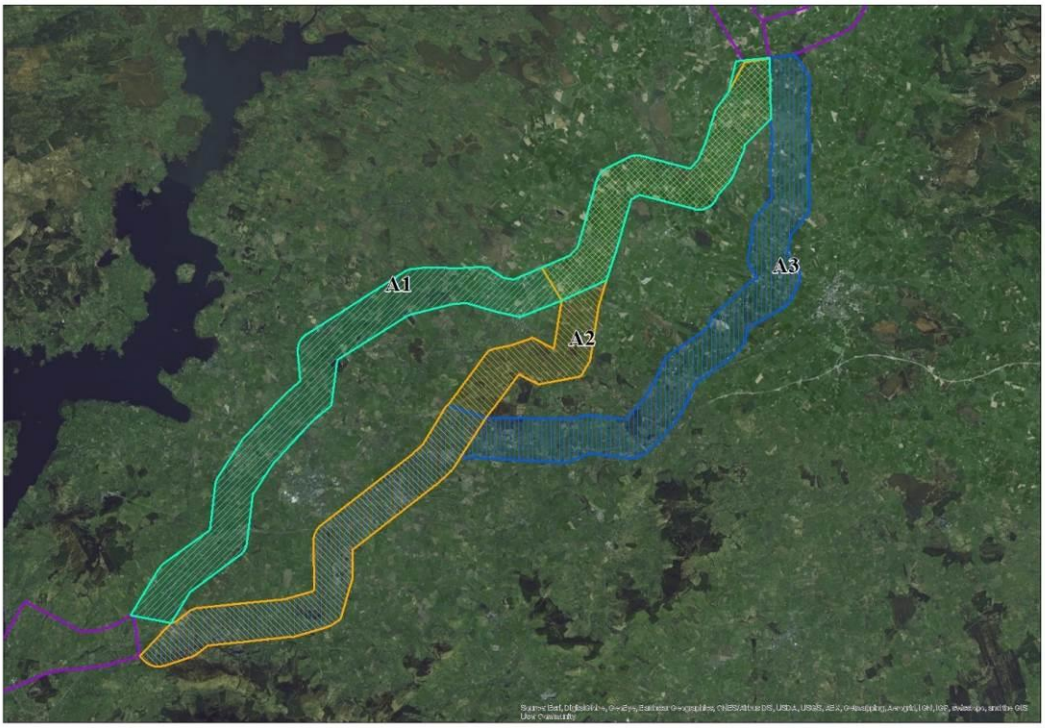


Figure F5 – 10 Preliminary Route Corridors and Loops

Table F5 – 27 outlines the baseline conditions within route corridors A1 to A3.

Criteria	Corridor A1	Corridor A2	Corridor A3
WFD Status of watercourses	Poor and Moderate	Poor and Moderate	Poor and Moderate
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of	• 1 salmonid WFD waterbody of interest. • 1 nutrient sensitive waterbody. • 3 abstraction points (all groundwater). • 0.1 km2 of Eorna Lough (total 0.33km2) is within the route corridor. • 1 SPA and 2 SAC WFD RPA	• 1 salmonid WFD waterbody of interest. • No nutrient sensitive waterbodies. • 5 abstraction points (all groundwater). • No significant lakes within the corridor. • 1 SPA and 2 SAC WFD RPA waterbodies.	• 1 salmonid WFD waterbody of interest. • 1 nutrient sensitive waterbody. • 10 abstraction points (9 groundwater and 1 surface water). • No significant lakes within the corridor. • 2 SPA and 2 SAC WFD RPA waterbodies.

Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	waterbodies.		

Table F5 – 27 Baseline Data

Table F5 – 28 outlines the potential number of water crossings required and the number of water crossings with a stream order of 3 or 4 within route corridor options A1 to A3.

Criteria	Corridor A1	Corridor A2	Corridor A3
Potential number of watercourse crossings	25	36	45
Crossing with a Stream Order 3 and/or 4	3	9	13

Table F5 – 28 Watercourse Crossings

5.2 Matrix of Multi Criteria Analysis

Table F5 – 29 outlines the potential category of impact associated with each route corridor option A1 to A3.

Criteria	Corridor A1	Corridor A2	Corridor A3
Significance of Impact - WFD	**Low**	**Mid-range**	**Mid-range**
Significance of Impact - Watercourse Crossings	**Low**	**Mid-range**	**High**

Table F5 – 29 Assessment Matrix

5.3 Comparative Discussion

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **route corridor option A1 has been identified overall as the least constrained route corridor along this stretch.**

6 Preliminary Route Corridor BC

6.1 Route Corridor B1 and B2

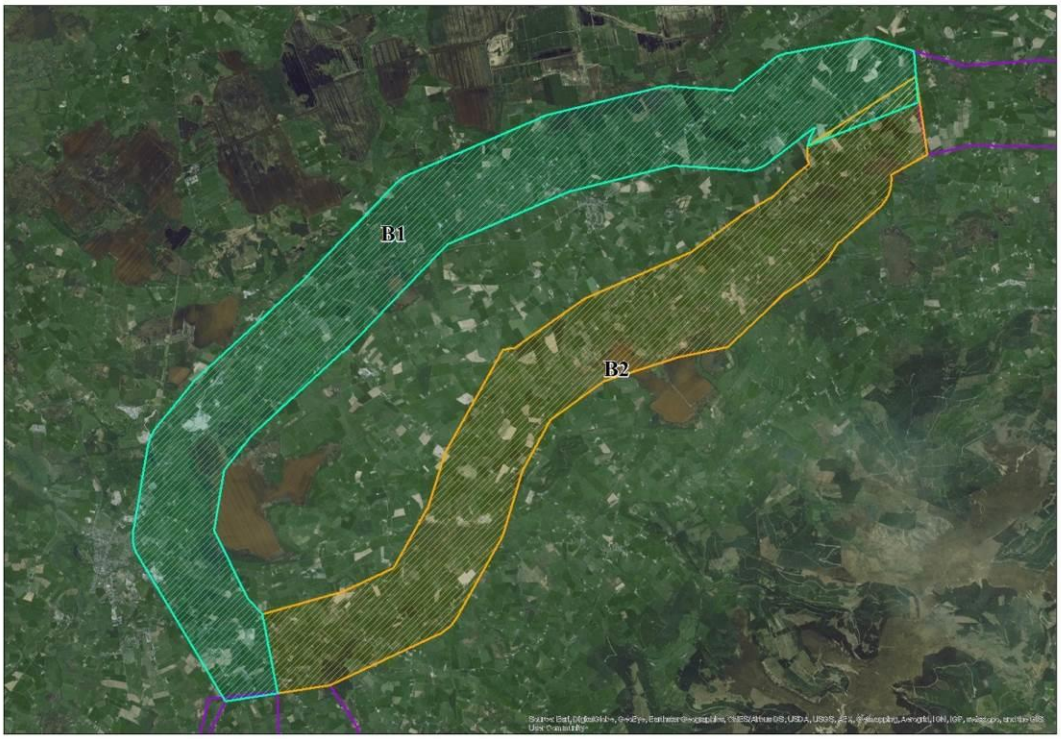


Figure F5 – 11 Preliminary Route Corridors and Loops

Table F5 – 30 outlines the baseline conditions within the route corridor options B1 to B2.

Criteria	Corridor B1	Corridor B2
WFD Status	Moderate	Moderate and Good
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	• There are no salmonid WFD Waterbodies of interest. • There is no nutrient sensitive Waterbodies. • There are 2 abstraction points (one Groundwater and one surface water). • There is 1 SPA and 1 SAC WFD RPA waterbodies.	• There are no salmonid WFD Waterbodies of interest. • There are no nutrient sensitive Waterbodies. • There is 1 abstraction point (groundwater). • There are 2 SPA and 1 SAC WFD RPA waterbodies.

Table F5 – 30 Baseline Data

Table F5 – 31 outlines the potential number of water crossings required and the number of water crossing with a stream order of 3 or 4 within route corridor options B1 to B2.

Criteria	Corridor B1	Corridor B2
Potential No. Watercourse Crossings	16	15
Crossing with a Stream Order 3 and/or 4	3	4

Table F5 – 31 Watercourse Crossings

6.2 Matrix of Multi Criteria Analysis

Table F5 – 32 outlines the potential category of impact associated with each route corridor option, B1 to B2.

Criteria	Corridor B1	Corridor B2
Significance of Impact - WFD	**Low**	**Mid-range**
Significance of Impact - Watercourse Crossings	**Low**	**Low**

Table F5 – 32 Assessment Matrix

6.3 Comparative Discussion

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **route corridor option B1 has been identified as the least constrained route corridor along this stretch.**

7 Preliminary Route Corridor CD

7.1 Route Corridor C1, C2, C3 and C4

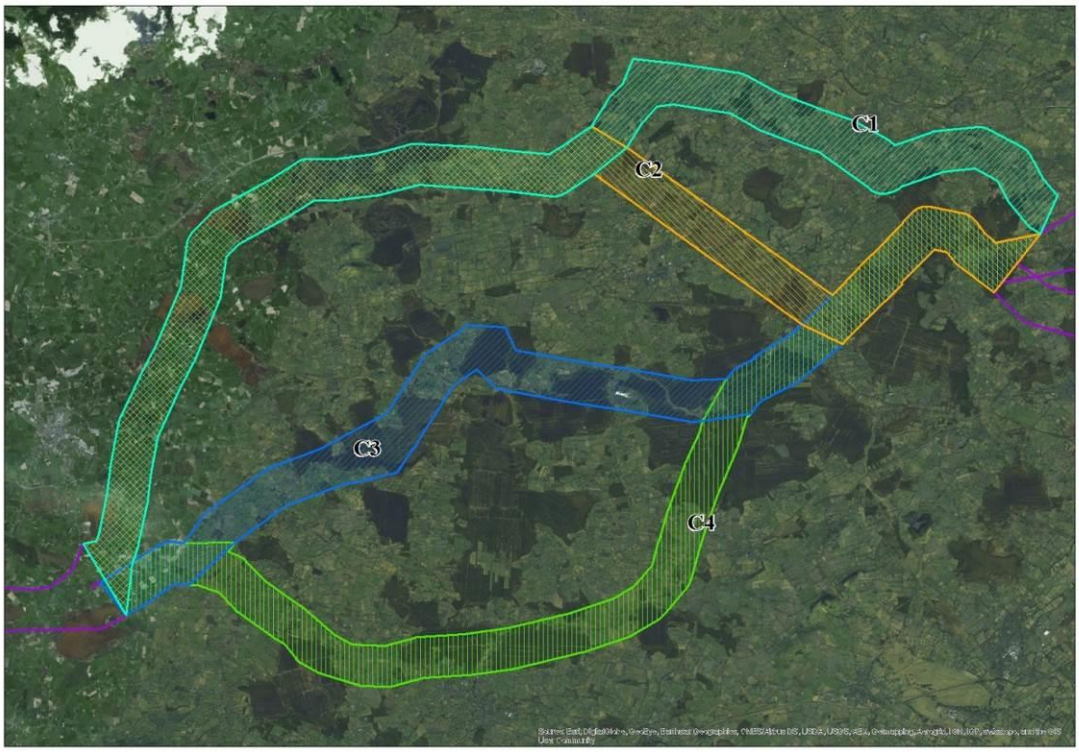


Figure F5 – 12 Preliminary Route Corridors and Loops

Table F5 – 33 outlines the baseline conditions within route corridor options, C1 to C4.

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
WFD Status	Poor, Moderate and Good.	Bad, Poor, Moderate and Good.	Bad, Poor, Moderate and Good.	Bad, Poor, Moderate and Good.
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection	• There is 1 Salmonid River (Boyne) and 1 salmonid WFD Waterbody of interest. • There are no nutrient sensitive Waterbodies. • There are no abstraction points. • There is 1 SPA and 2 SAC WFD RPA	• There is 1 Salmonid River (Boyne). • There is no nutrient sensitive Waterbodies. • There are no abstraction points. • There are no SPAs and there is one SAC WFD RPA waterbodies.	• There is 1 salmonid WFD Waterbody of interest. • There are no nutrient sensitive Waterbodies. • There are two abstraction points (both groundwater). • There are no SPA and two SAC WFD RPA waterbodies.	• There are 2 salmonid WFD waterbodies of interest. • There are no nutrient sensitive Waterbodies. • There is one abstraction point (groundwater). • There is no SPA and there SAC WFD RPA

of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	waterbodies.			waterbodies.

Table F5 – 33 Baseline Data

Table F5 – 34 outlines the potential number of water crossings required and the number of water crossing with a stream order of 3 or 4 within route corridor options C1 to C4.

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential No. Watercourse Crossings	38	29	20	19
Crossing with a Stream Order 3 and/or 4	10	6	3	3

Table F5 – 34 Watercourse Crossings

7.2 Matrix of Multi Criteria Analysis

Table F5 – 35 outlines the potential category of impact associated with each route corridor options C1 to C4.

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Significance of Impact - WFD	Mid-range	Low	Very low	Very low
Significance of Impact – Watercourse Crossings	High	Mid-range	Low	Very low

Table F5 – 35 Watercourse Crossings

7.3 Comparative Discussion

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, **route corridor C3 has been identified overall as the least constrained route corridor along this stretch.**

8 Preliminary Route Corridor DE

8.1 Route Corridor D1 and D2

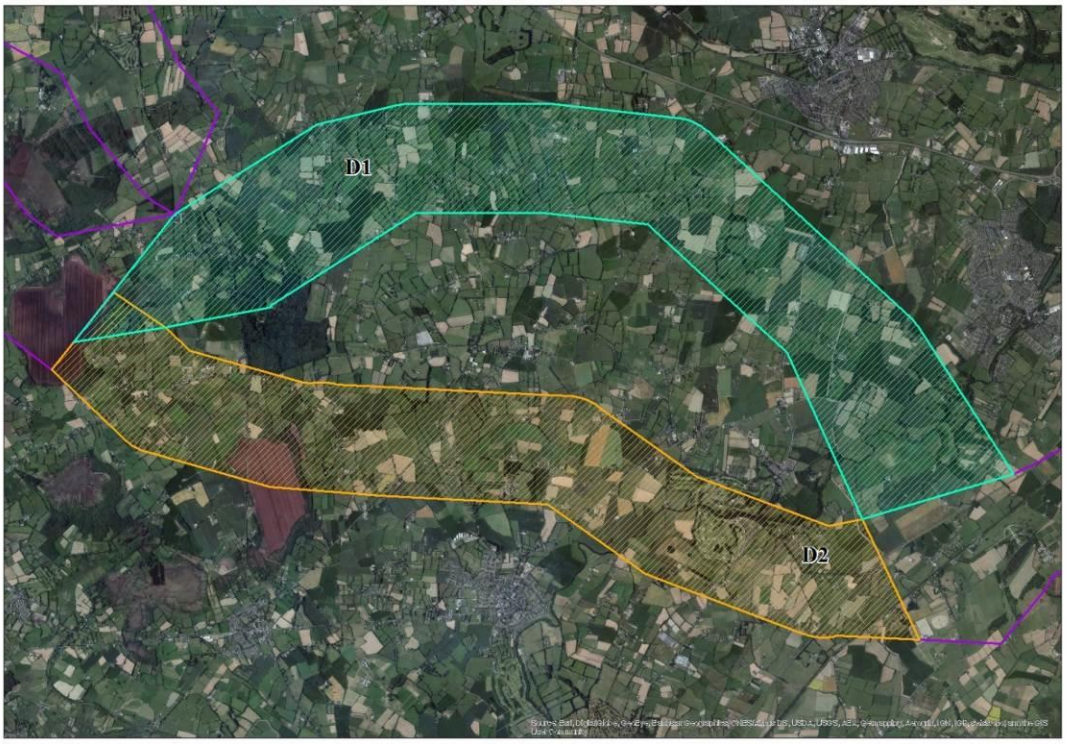


Figure F5 – 13 Preliminary Route Corridors and Loops

Table F5 – 36 outlines the baseline conditions within route corridor options D1 and D2.

Criteria	Corridor D1	Corridor D2
WFD Status	Bad, Moderate and Good	Moderate and Good
WFD Annex IV - Protected Areas: A) Waters used for the abstraction of drinking water B) Areas designated to protect economically significant aquatic species C) Recreational Waters D) Nutrient Sensitive Areas E) Areas designated for the protection of habitats or species (also Ecology Scope, see Assessment of Preliminary Route Corridors - Ecology) Other Sensitivities: - Drinking Abstraction points	• There are no salmonid WFD Waterbodies of interest. • There is 1 nutrient sensitive Waterbody. • There are no abstraction points. • There are no SPA and no SAC WFD RPA waterbodies.	• There is no salmonid WFD Waterbody of interest. • There is 1 nutrient sensitive Waterbody. • There is 1 relatively large surface water feature (unnamed lake). • There are no abstraction points. • There are no SPA and no SAC WFD RPA waterbodies.

Table F5 – 36 Baseline Data

Table F5 – 36 outlines the potential number of water crossings required and the number of water crossing with a stream order of 3 or 4 within route corridor options D1 and D2.

Criteria	Corridor D1	Corridor D2
Potential No. Watercourse Crossings	10	11
Crossing with a Stream Order 3 and/or 4	2	1

Table F5 – 36 Watercourse Crossings

8.2 Matrix of Multi Criteria Analysis

Table F5 – 37 outlines the potential category of impact associated with each route corridor option, D1 and D2.

Criteria	Corridor D1	Corridor D2
Significance of Impact - WFD	**Low**	**Mid-range**
Significance of Impact – Watercourse Crossings	**Low**	**Low**

Table F5 – 37 Assessment Matrix

8.3 Comparative Discussion

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, overall there is little to differentiate between the two route corridor options, D1 and D2. **Therefore, no clear differentiation is apparent to support the selection of a least constrained route corridor.**

8.4 Matrix of Multi Criteria Analysis

Criteria	Corridor A1	Corridor A2	Corridor A3	Corridor B1	Corridor B2	Corridor C1	Corridor C2	Corridor C3	Corridor C4	Corridor D1	Corridor D2
Noise											
Significance of Impact - Flooding	**Low**	**Mid-range**	**Mid-range**	**Low**	**Mid-range**	**Mid-range**	**Low**	**Very low**	**Very low**	**Low**	**Mid-range**
Significance of Impact – Watercourse Crossing	**Low**	**Mid-range**	**High**	**Low**	**Low**	**High**	**Mid-range**	**Low**	**Very low**	**Low**	**Low**

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F6: Air Quality

October 2015 **F02**

Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F6 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F6 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F6 is a statement on Air Quality and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

The National Roads Authority document entitled Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (NRA, 2011) provides guidance on the route selection assessment procedures in “Chapter 2 - Route Selection”. The primary aspects of the assessment relate to existing ambient air quality and the proximity of sensitive locations.

Although the aforementioned guidance is designed for road schemes, the methodology involved can be applied in this instance, as the identification of air quality constraints will drive the selection process.

The objective at this stage of the option selection process is to indicate whether there are likely to be significant air quality impacts associated with particular broadly defined study areas and routes. In the current assessment, air quality constraints such as the number of residential properties, baseline air quality conditions and the presence of IPPC licenced facilities and quarries have been investigated for each of the potential options. It is the investigation of these air quality constraints which will lead to the emergence of preferred options.

A desk study was carried out by analysing GIS data using the software package *ArcReader* which was provided by Jacobs Tobin.

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Five categories of impact

The relative analysis of potential locations to define a "least constrained" location is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

In the current assessment, air quality constraints such as the number of residential properties, baseline air quality conditions and the presence of IPPC licenced facilities and quarries have been investigated for each of the potential locations. There is the potential for a number of emissions to atmosphere during the operational phase of the development. In particular, vehicle related air emissions may generate quantities of air pollutants such as NO_2, CO, VOC and PM_{10}/$PM_{2.5}$. The pollutants of most concern are NO_2 and PM_{10}, as these pollutants are generated as a direct result of vehicles and have the greatest potential to exceed the air quality standards. However, for this project it is considered that significant increases in traffic associated with the project are unlikely.

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. Due to the nature of activities undertaken on a construction site, there is potential for generation of significant levels of dust. However, the application of mitigation measures will ensure dust impacts will not be significant.

Dust minimisation for the construction phase of the project may be required, as construction activities are likely to generate some dust emissions. Material handling activities, including excavation and backfill, on site may typically emit dust. Dust is characterised as encompassing particulate matter with a particle size of between 1 and 75 microns (1-75 µm). Deposition typically occurs in close proximity to each site and potential impacts generally occur within 500 metres of the dust generating activity as dust particles fall out of suspension in the air. Larger particles deposit closer to the generating source and deposition rates will decrease with distance from the source. Sensitivity to dust depends on the duration of the dust deposition, the dust generating activity, and the nature of the deposit. Therefore, a higher tolerance of dust deposition is likely to be shown if only short periods of dust deposition are expected and the dust generating activity is either expected to stop or

move on. In particular, it is proposed that various practices be adopted during construction, including:

- Vehicles using site roads shall have their speeds restricted where there is a potential for dust generation. Vehicles delivering material with dust potential to an off-site location shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust.

- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

- The dust minimisation plan shall be reviewed at regular intervals during the construction phase to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

One reservoir terminal location is proposed as part of the assessment process and this is located in Peamount, Co. Dublin. The matrix in Section 2.2 outlines the impact magnitude for each constraint criteria on the location in question, in this case Peamount, Co. Dublin. With regards to the proposed development at this location, the most significant potential impact from an air quality perspective is the potential for dust emissions during the construction phase. The area is predominantly rural with sparse one-off residential development. The area also contains a hospital which can be classified as a sensitive receptor. As a result of this, there will likely be a low impact on these receptors as a result of the construction phase of the proposed terminal reservoir. With regards to impacts during the operational phase of the proposed development, operational traffic is likely to be the only air quality impact. Considering that the proposed development will lead to a minimal increase in AADT on the surrounding road network, there will be a very low air quality impact during the operational phase. Other constraints in the area include some IPPC licenced facilities in nearby industrial estates. However, due to the low predicted impact of the terminal reservoir, cumulative impacts are likely to be insignificant.

2.2.1 Peamount

Figure F6 – 1 Peamount

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Potential for Construction phase Air Quality impact at Sensitive receptors	Predominantly rural area with few residential receptors but hospital is located in the area. Low impact from construction phase dust emissions
Potential for Operational phase Air Quality impact at Sensitive receptors	Very low impacts during operational phase, only operational impacts would be due to traffic generated from staff
Proximity to EPA Waste Licensed facility	Some waste licence facilities located to the south of study area
Proximity to EPA IPPC Licensed Intensive Agriculture facility	Some IPPC licence facilities located to north east of study area
EPA Air Quality Zone Classification	Zone A
Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	Very low impact due to additional traffic (likely to be minimal) generated by development

Table F6 - 2 Summary of the MCA for Peamount

2.4 Comparative Discussion

It is considered that with appropriate mitigation measures the construction and operation of a terminal reservoir at Peamount, Co. Dublin will have a negligible impact on air quality. Mitigation measures are discussed in section 1.2.2.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F6 – 2.

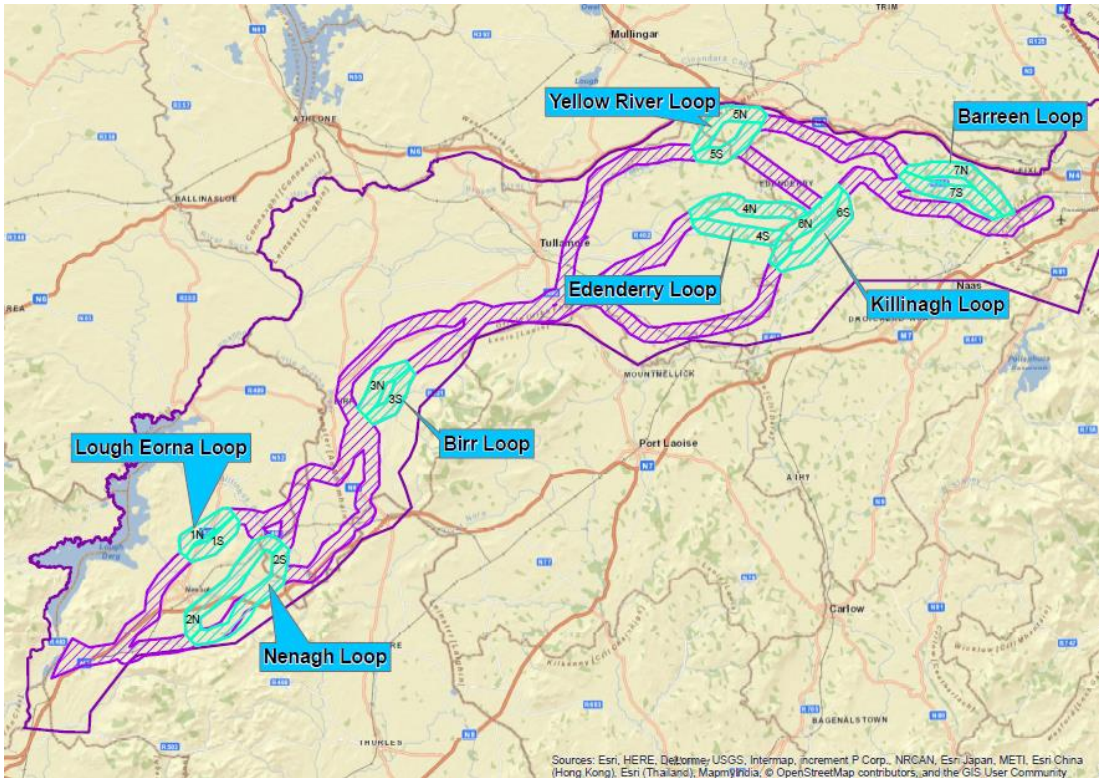


Figure F6 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or “Loops”

4.1 The Lough Eorna Loop

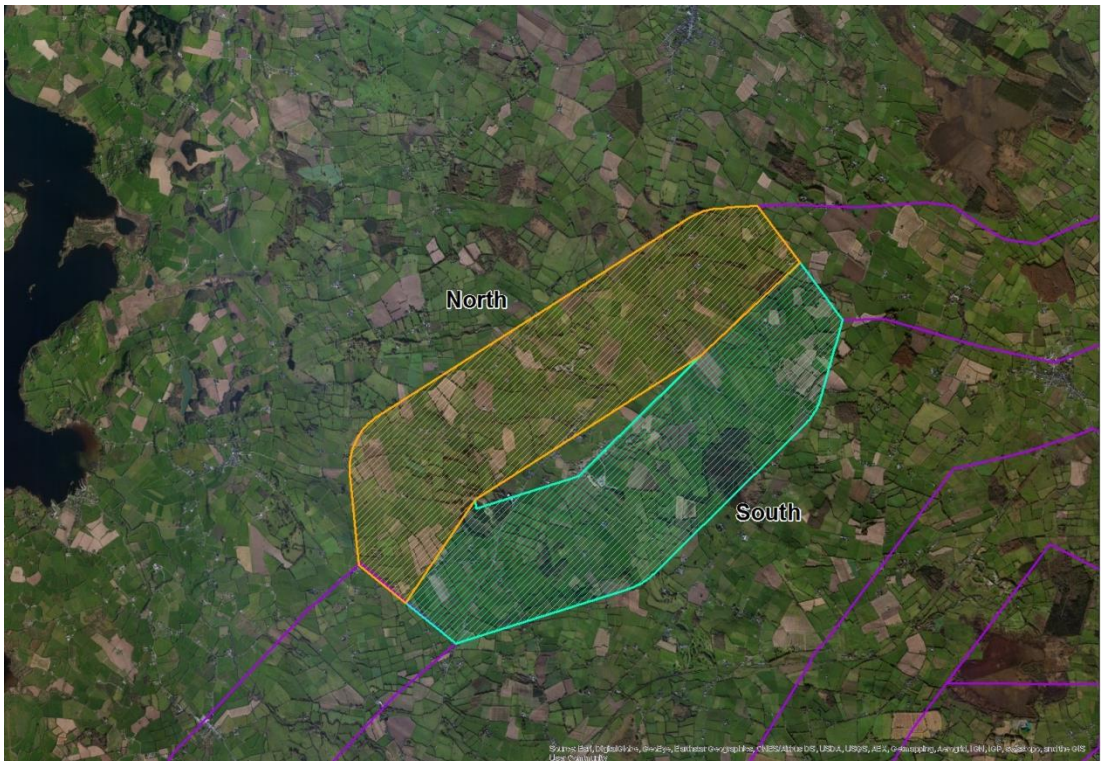


Figure F6 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

Criteria	Pipeline Loop 2 - "The Lough Eorna Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads and motorways contained in this area. It is considered that this loop option will have a very low air quality impact.

4.1.2 Southern Branch

Criteria	Pipeline Loop 2 - "The Lough Eorna Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads and motorways contained in this area. There is also a pig farm which may cause higher air quality baseline concentrations in the area. The area is also more sensitive due to the presence of a pNHA. It is considered that this loop option will have a low air quality impact.

4.1.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

The northern loop is considered to be slightly less constrained due to the presence of a pig farm and a pNHA in the southern option.

4.2 The Nenagh Loop

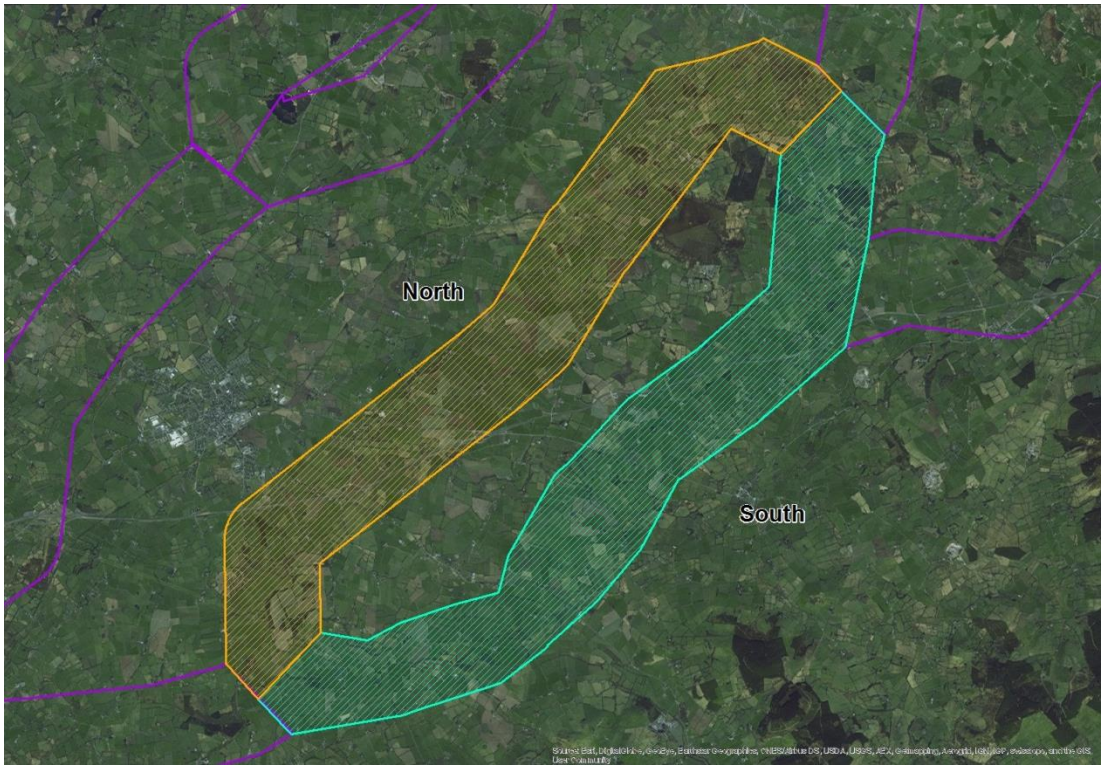


Figure F6 – 4 The Nenagh Loop

4.2.1 Northern Branch

Criteria	Pipeline Loop 1 - "The Nenagh Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains Lough Eorna pNHA. It is considered that this loop option will have a very low air quality impact.

4.2.2 Southern Branch

Criteria	Pipeline Loop 1 - "The Nenagh Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional contained in this area. The area also contains Lough Eorna pNHA. It is considered that this loop option will have a very low air quality impact.

4.2.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

Both loops contain similar constraints and as a result, they are both expected to have a very low air quality impact.

4.3 The Birr Loop

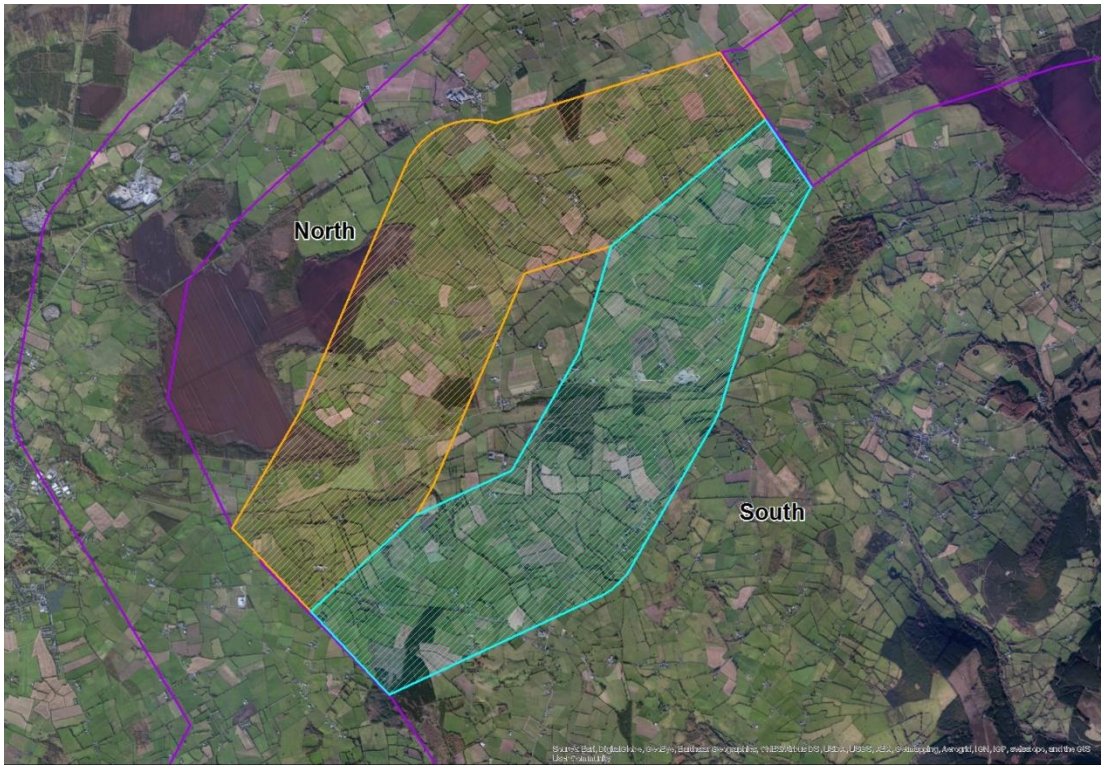


Figure F6 – 5 The Birr Loop

4.3.1 Northern Branch

Criteria	Pipeline Loop 3 - "The Birr Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a small number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a very low air quality impact.

4.3.2 Southern Branch

Criteria	Pipeline Loop 3 - "The Birr Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a larger number of quarries which can lead to elevated dust levels in the area. The area is also more sensitive due to the presence of a pNHA. It is considered that this loop option will have a low air quality impact.

4.3.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

The northern loop is considered to be slightly less constrained due to the presence of a larger number of quarries and a pNHA in the southern option.

4.4 The Edenderry Loop

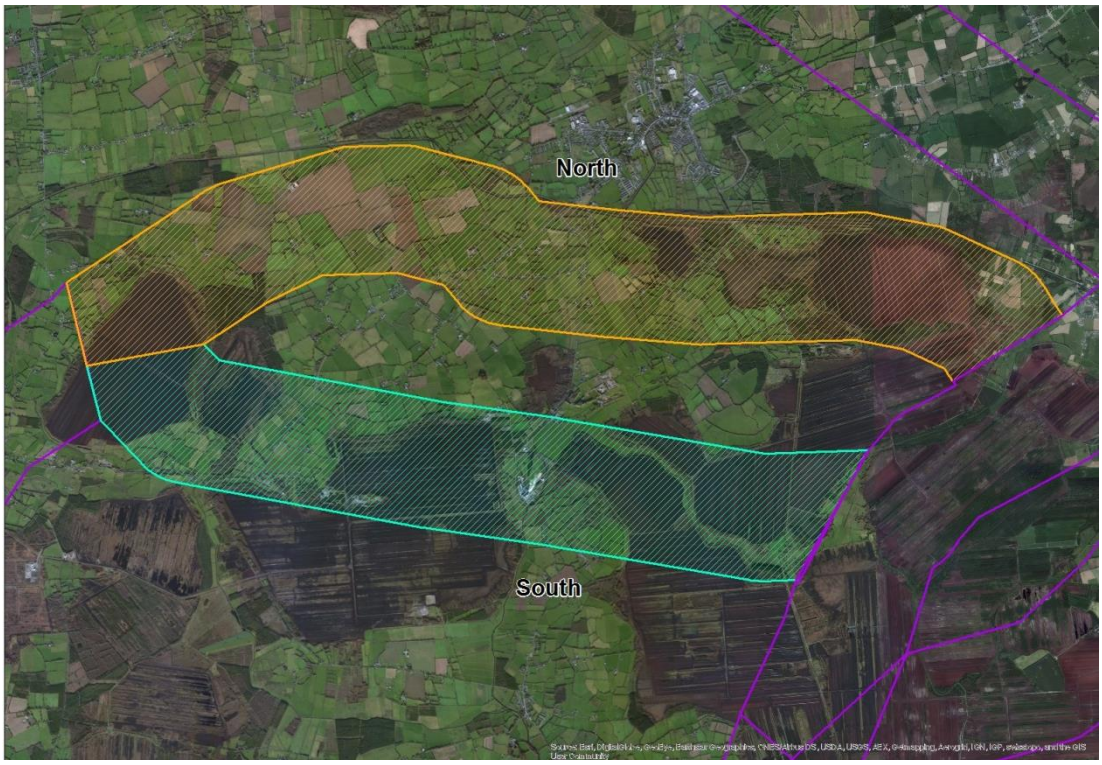


Figure F6 – 6 The Edenderry Loop

4.4.1 Northern Branch

Criteria	Pipeline Loop 4 - "The Edenderry Loop" North
Air Quality	Constraints include areas in terms of short-term construction air quality impacts. There are slightly more residential dwellings in the northern loop. The route also traverses a regional road and contains an SAC. It is considered that this loop option will have a low air quality impact.

4.4.2 Southern Branch

Criteria	Pipeline Loop 4 - "The Edenderry Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a small number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a very low air quality impact.

4.4.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

The southern loop is considered to be slightly less constrained due to the number of air quality sensitive properties located within this corridor.

4.5 The Yellow River Loop

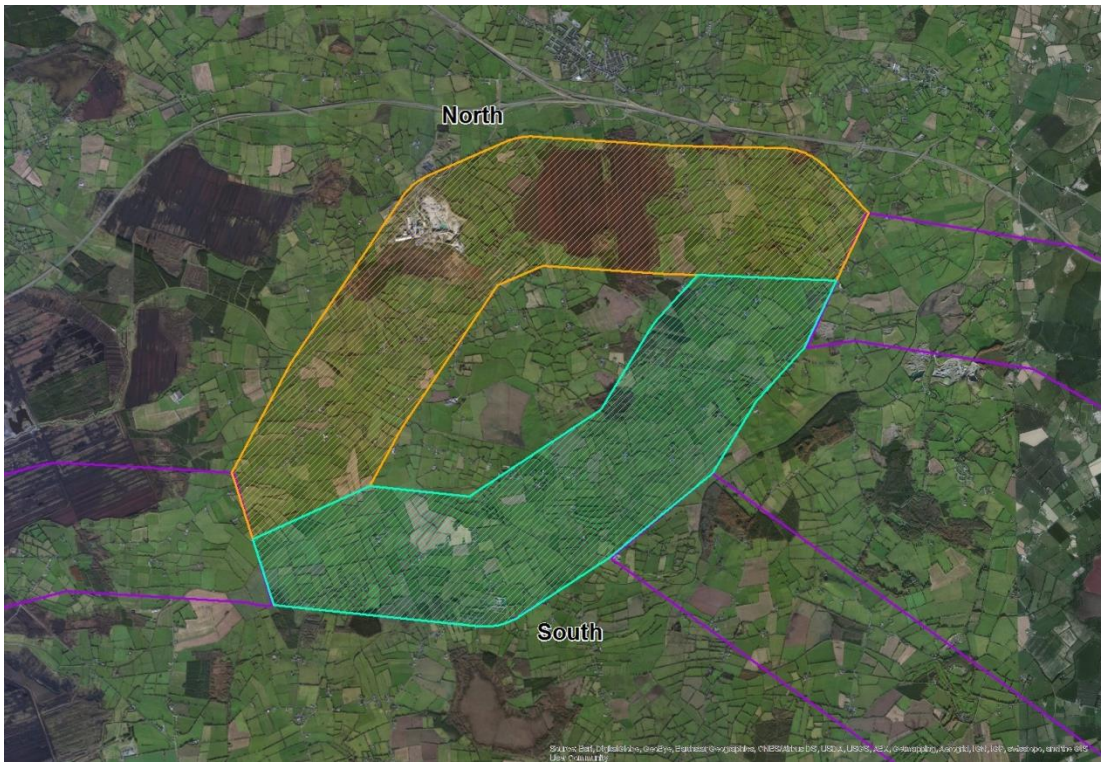


Figure F6 – 7 The Yellow River Loop

4.5.1 Northern Branch

Criteria	Pipeline Loop 5 -"The Yellow River Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a small number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a very low air quality impact.

4.5.2 Southern Branch

Criteria	Pipeline Loop 5 - The Yellow River Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a small number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a very low air quality impact.

4.5.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

Both loops contain similar constraints and as a result, they are both expected to have a very low air quality impact.

4.6 The Killinagh Loop

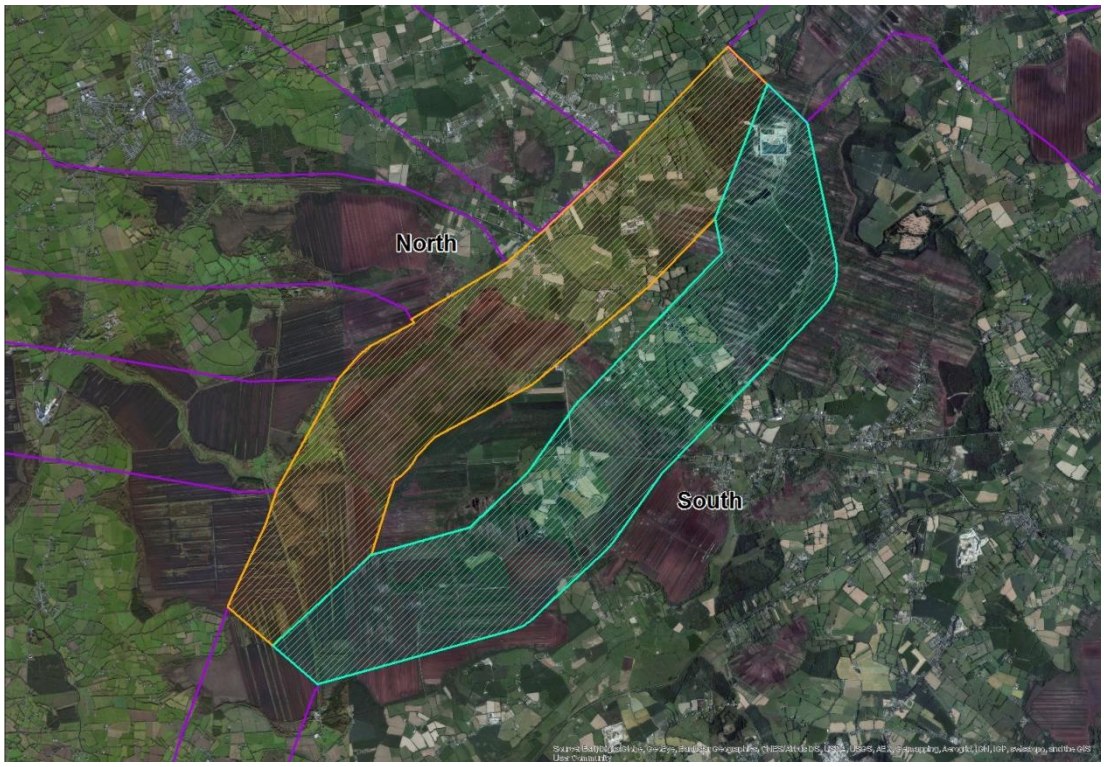


Figure F6 – 8 The Killinagh Loop

4.6.1 Northern Branch

Criteria	Pipeline Loop 6 - "The Killinagh Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There is also a pNHA in the area. It is considered that this loop option will have a very low air quality impact.

4.6.2 Southern Branch

Criteria	Pipeline Loop 6 - "The Killinagh Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality. There are slightly more residential dwellings in the southern loop. Route also traverses regional roads. It is considered that this loop option will have a low air quality impact.

4.6.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

The northern loop is considered to be slightly less constrained due to the number of air quality sensitive properties located within this corridor.

4.7 The Barreen Loop

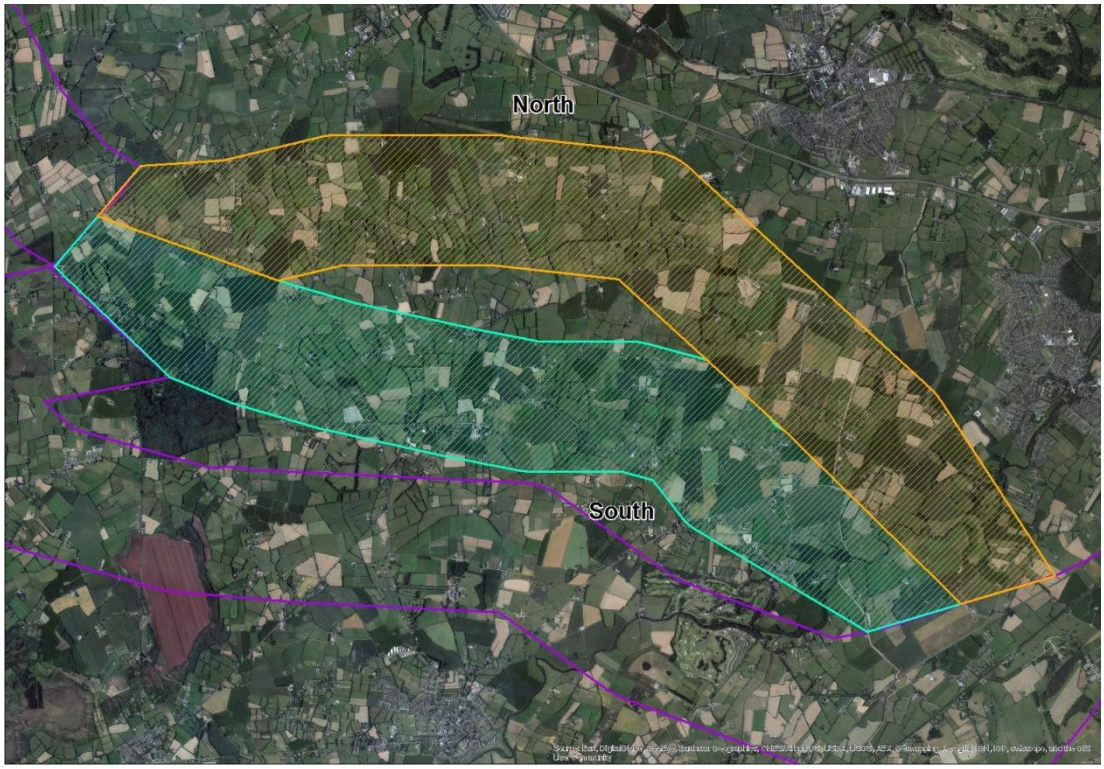


Figure F6 – 9 The Barreen Loop

4.7.1 Northern Branch

Criteria	Pipeline Loop 7 - "The Barreen Loop" North
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are also regional roads contained in this area. The area also contains a small number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a very low air quality impact.

4.7.2 Southern Branch

Criteria	Pipeline Loop 7 - "The Barreen Loop" South
Air Quality	Constraints include residential areas in terms of short-term construction air quality impacts. There are a higher number of residential receptors in this branch. There are also regional roads contained in this area. The area also contains a larger number of quarries which can lead to elevated dust levels in the area. It is considered that this loop option will have a low air quality impact.

4.7.3 Conclusion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that both options can be developed whilst having a negligible air quality impact.

The northern loop is considered to be slightly less constrained due to the number of air quality sensitive properties located within this corridor.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna	Nenagh	Birr	Edenderry	Yellow River	Killinagh	Barreen
Northern Loop	**Low:** See section 4.1.1	**Low:** See section 4.2.1	**Very low:** See section 4.3.1	**Low:** See section 4.4.1	**Very low:** See section 4.5.1	**Very low:** See section 4.6.1	**Very low:** See section 4.7.1
Southern Loop	**Very low:** See section 4.1.2	**Very low:** See section 4.2.2	**Very low:** See section 4.3.2	**Very low:** See section 4.4.2	**Very low:** See section 4.5.2	**Low:** See section 4.6.2	**Low:** See section 4.7.2

Table F6 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

There are marginal differences in the expected air quality impact between the various loop options, which are typically dictated by the number of residential properties in the proximity of each corridor.

Once consideration is given to standard good practice measures to control air quality impacts during the construction phase (as outlined in Section 1.2.2), it is considered that any of the proposed options can be developed whilst having a very low or low air quality impact.

5 Preliminary Route Corridor Section AB

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F6 – 10 below.

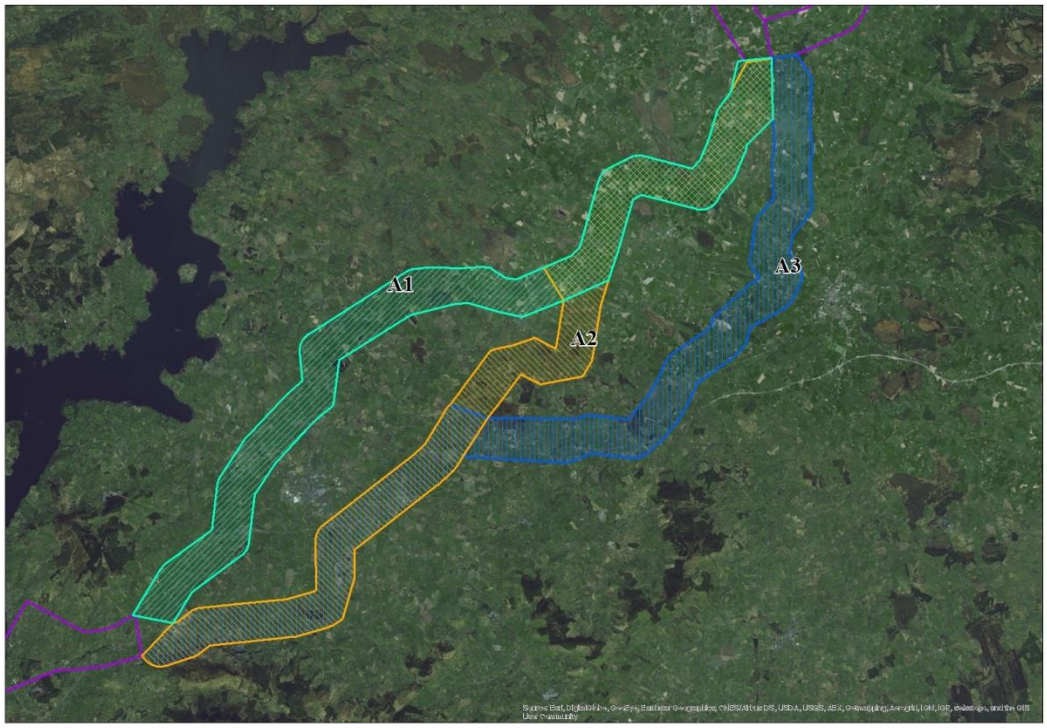


Figure F6 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Criteria	Corridor A1
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area, one pNHA (Lough Eorna), Cloughjordan Landfill also in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	One Landfill in area
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

5.3 Route Corridor A2

Criteria	Corridor A2
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area, Silvermines SAC and SPA in area, some small pits/quarries in area, no IPPC / Waste Licenced Facilities
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

5.4 Route Corridor A3

Criteria	Corridor A3
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (Moneygall, Dunkerrin), large number of pNHA's, large pits/quarries in area, landfill and pig farm in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	Landfill in the area
Proximity to EPA IPPC Licensed Intensive Agriculture facility	Pig Farm in the Area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

The Matrix of Multi Criteria analysis below summarises the assessment of the Route Corridors A1, A2 and A3.

5.5 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area, one pNHA (Lough Eorna), Cloughjordan Landfill also in area	Very low impact in construction phase due to low density residential receptors in area, Silvermines SAC and SPA in area, some small pits/quarries in area, no IPPC / Waste Licenced Facilities	Low impact in construction phase due to higher density residential receptors in area (Moneygall, Dunkerrin), large number of pNHA's, large pits/quarries in area, landfill and pig farm in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	One Landfill in area	None	Landfill in the area
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area	No facilities present in study area	Pig Farm in the Area
EPA Air Quality Zone Classification	Zone D	Zone D	Zone D
Wind Rose Assessment	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind	Shannon Airport Windrose 2010-2014 identifies west-south west prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions	Very low impact from construction dust emissions	Low impact from construction dust emissions

Table F6 - 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that all options can be developed whilst having a negligible air quality impact.

Corridors A1 and A2 are considered to be slightly less constrained due to the number of air quality sensitive properties located within Corridor A3.

6 Preliminary Route Corridor Section BC

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F6 – 11 below.

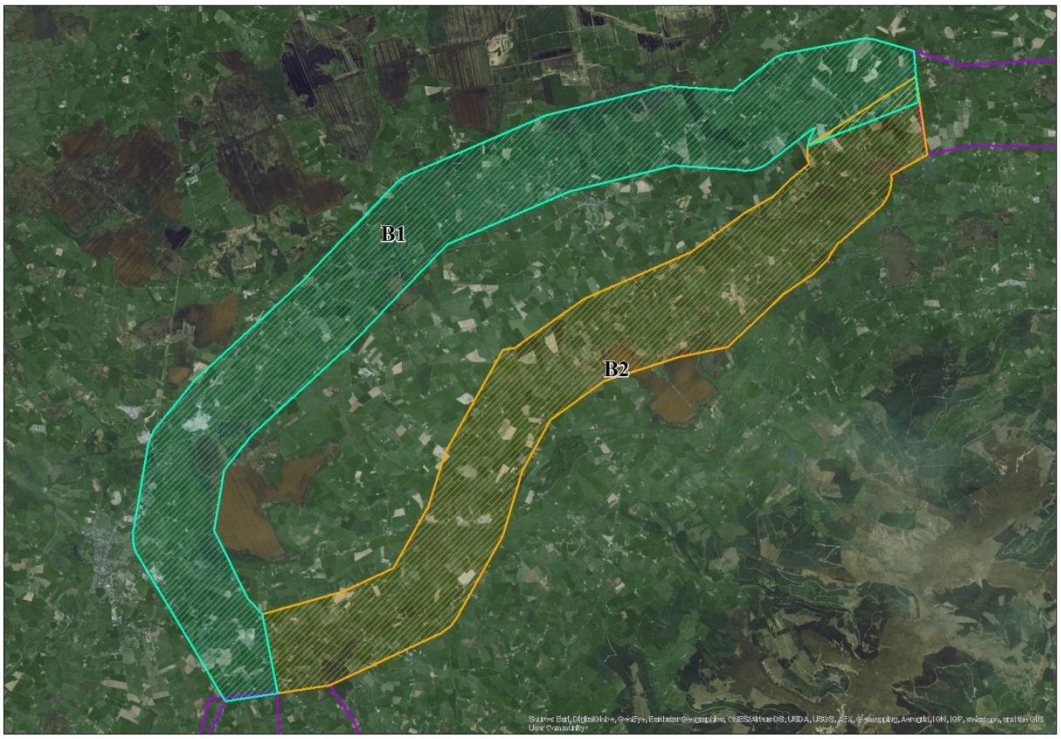


Figure F6 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

Criteria	Corridor B1
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Birr), large number of large pits/quarries in area, pNHA also located in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	None
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

6.3 Route Corridor B2

Criteria	Corridor B2
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area, one pNHA in area (Derrykeel Meadows), some small pits/quarries in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

6.4 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Birr), large number of large pits/quarries in area, pNHA also located in area	Very low impact in construction phase due to low density residential receptors in area, one pNHA in area (Derrykeel Meadows), some small pits/quarries in area
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	None	No facilities present in study area
EPA Air Quality Zone Classification	Zone D	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions	Very low impact from construction dust emissions

Table F6 - 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that either option can be developed whilst having a negligible air quality impact.

Corridor B2 is considered to be slightly less constrained due to the number of air quality sensitive properties located within Corridor B1.

7 Preliminary Route Corridor Section CD

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F6 – 12 below.

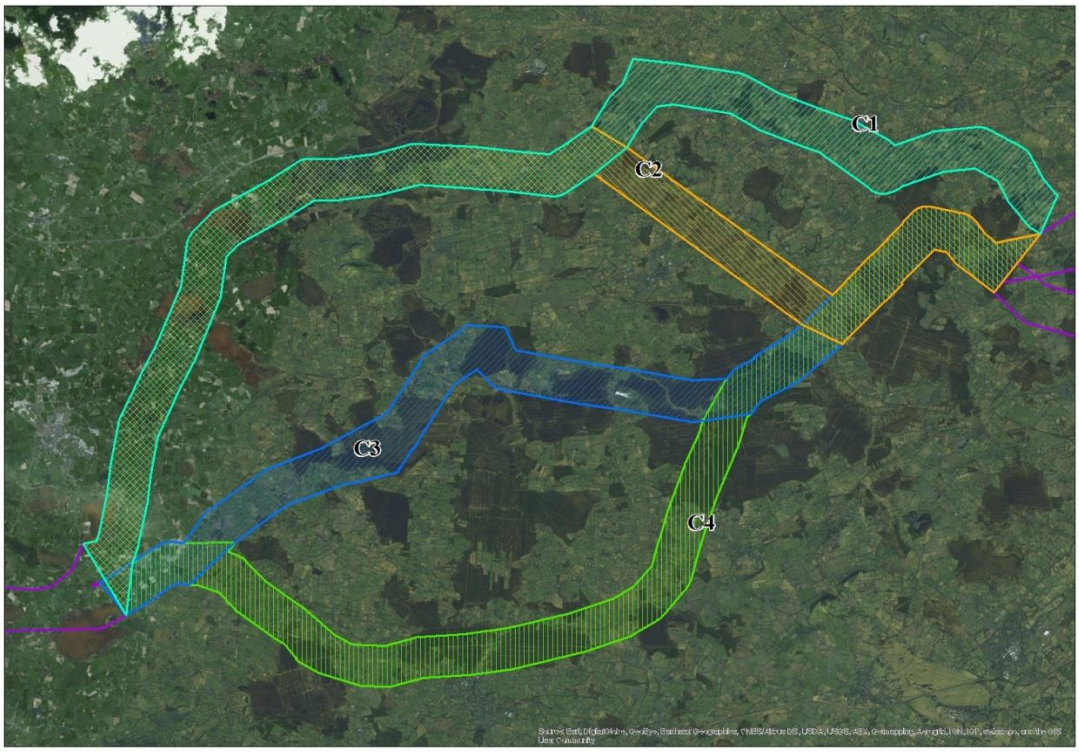


Figure F6 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

Criteria	Corridor C1
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Enfield), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	None
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

7.3 Route Corridor C2

Criteria	Corridor C2
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice.
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	None
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

7.4 Route Corridor C3

Criteria	Corridor C3
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area (only dense residential south of Edenderry), few small pits/quarries, one large quarry.
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

7.5 Route Corridor C4

Criteria	Corridor C4
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area (only dense residential north of Portarlington), few small pits/quarries, one large quarry.
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

7.6 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Enfield), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice	Low impact in construction phase due to higher density residential receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry), large number of large pits/quarries in area (Roadstone), traverses Grand Canal pNHA twice.	Very low impact in construction phase due to low density residential receptors in area (only dense residential south of Edenderry), few small pits/quarries, one large quarry.	Very low impact in construction phase due to low density residential receptors in area (only dense residential north of Portarlington), few small pits/quarries, one large quarry.
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None	None	None	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	None	None	No facilities present in study area	No facilities present in study area
EPA Air Quality Zone Classification	Zone D	Zone D	Zone D	Zone D
Wind Rose Assessment	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind	Kilkenny Airport Windrose 2003-2007 identifies southerly to north-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions	Low impact from construction dust emissions	Very low impact from construction dust emissions	Very low impact from construction dust emissions

Table F6 - 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that all options can be developed whilst having a negligible air quality impact.

Corridors C3 and C4 are considered to be slightly less constrained due to the number of air quality sensitive properties and larger number of pits and quarries located within Corridors C1 and C2.

8 Preliminary Route Corridor Section DE

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F6 – 13 below.

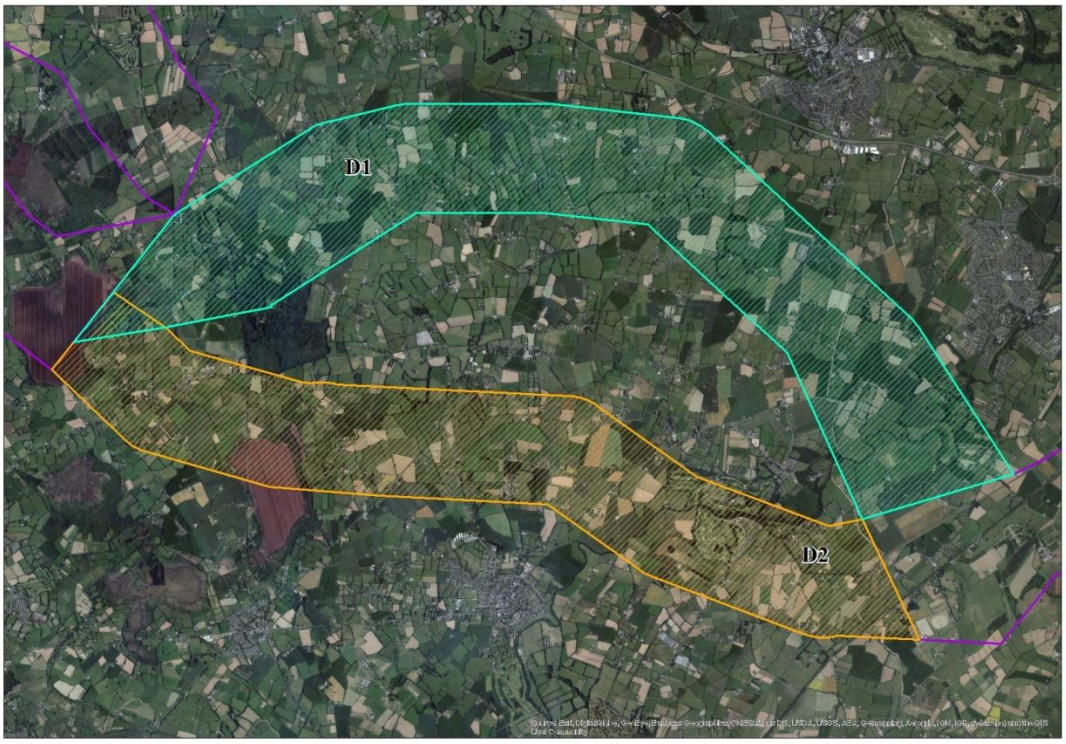


Figure F6 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

Criteria	Corridor D1
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area few small pits/quarries.
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

8.3 Route Corridor D2

Criteria	Corridor D2
Potential for Construction phase Air Quality impact at Sensitive receptors	Low impact in construction phase due to low density residential receptors in area few small pits/quarries. However route traverses lands of/near K Club
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area
EPA Air Quality Zone Classification	Zone D
Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions
Operational Phase Impact rating	No impacts due to nature of operational phase

8.1 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Potential for Construction phase Air Quality impact at Sensitive receptors	Very low impact in construction phase due to low density residential receptors in area few small pits/quarries.	Low impact in construction phase due to low density residential receptors in area few small pits/quarries. However route traverses lands of/near K Club
Potential for Operational phase Air Quality impact at Sensitive receptors	No impacts due to nature of operational phase	No impacts due to nature of operational phase
Proximity to EPA Waste Licensed facility	None	None
Proximity to EPA IPPC Licensed Intensive Agriculture facility	No facilities present in study area	No facilities present in study area
EPA Air Quality Zone Classification	Zone D	Zone D
Wind Rose Assessment	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind	Casement Aerodrome Windrose 2007-2011 identifies south-westerly prevailing wind
Construction Phase Impact rating	Very low impact from construction dust emissions	Low impact from construction dust emissions

Table F6 - 7 Summary of the MCA for Route Corridors DE

8.2 Comparative Discussion

Once consideration is given to standard good practice measures to control air quality emissions during the construction and operational phases, it is considered that either option can be developed whilst having a negligible air quality impact.

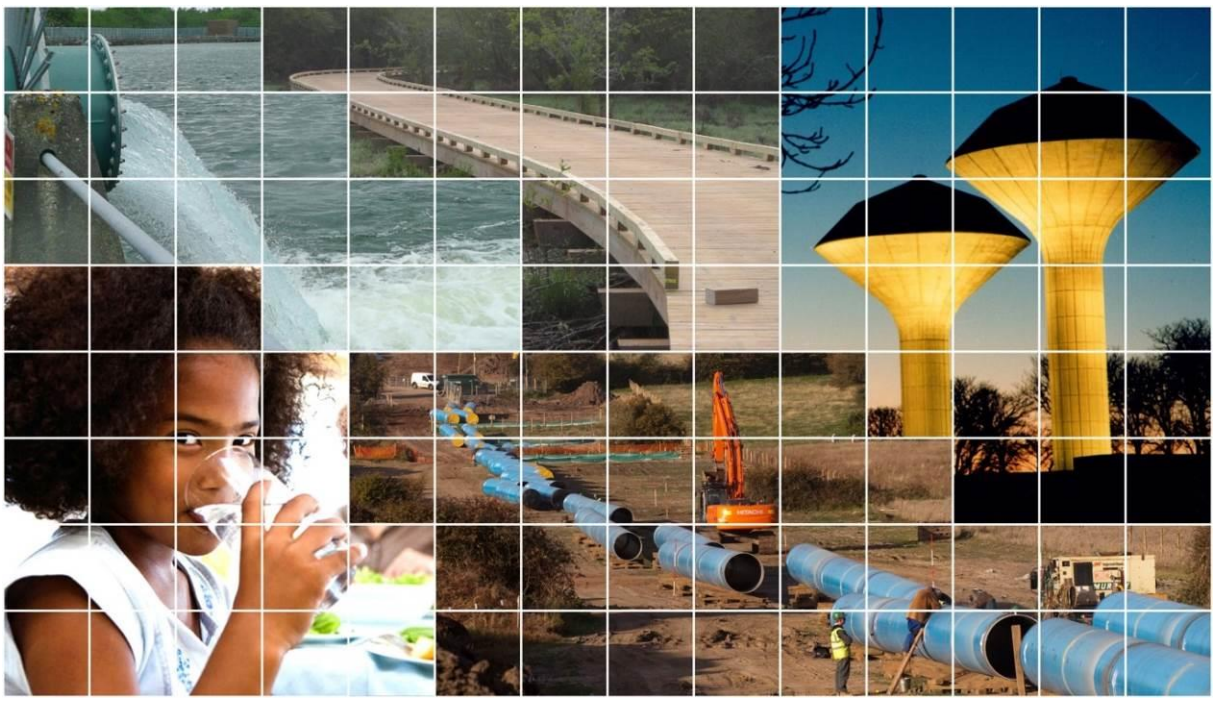
Corridor D1 is considered to be slightly less constrained due to the number of air quality sensitive properties (including the K Club) located within Corridor D2.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F7: Noise

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F7 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F7 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F7 is a statement on the specialism Noise and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

The NRA document provides guidance on the route selection assessment procedures in “Section 5.0 – Route Corridor Selection”. The primary aspects of the assessment relate to the proximity routes to noise sensitive locations.

The objective at this stage of the option selection process is to indicate whether there are likely to be significant noise impacts associated with particular broadly defined study areas. In the current assessment, noise constraints such as the number of residential properties and the presence of cultural heritage areas (which may have more stringent criteria for vibration) have been investigated for each of the potential options. It is the investigation of these noise constraints which will lead to the emergence of preferred options.

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a "least constrained" component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

With regards to noise, the potential impacts of the proposed development will be considered during both the construction and operational phases.

The most significant potential impact from a project if this nature is typically related to noise emissions during the construction phase. Typical construction noise sources in this context include fixed and mobile plant and machinery that will be required for ground works and for construction of the proposed development and associated infrastructure. Due to the nature of activities undertaken on a construction site, there is potential for generation of significant levels of noise. However, the application of limits along with implementation of appropriate noise and vibration control measures (as discussed in outline form below) will ensure that noise and vibration impacts will not be excessive.

In terms of construction noise mitigation, the contractor will be obliged to give due regard to British Standard BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*, which offers detailed guidance on the control of noise and vibration from construction activities. In particular, it is proposed that various practices be adopted during construction, including:

- Limiting the hours during which site activities likely to create high levels of noise are permitted;
- Establishing channels of communication between the contractor, local authority and residents;
- Appointing a site representative responsible for matters relating to noise, and;
- Monitoring typical levels of noise during critical periods and at sensitive locations.

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed, including:

- Selection of plant with low inherent potential for generation of noise, and;
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints.

In the operational context, the proposed development would have potential to result in increased traffic flows on the existing road network that could potentially lead to increased noise emissions. However for this project it is considered that significant increases in traffic noise associated with the project are unlikely due to the small amount of infrastructure required along the majority of the route. There will be some fixed mechanical plant / pumps which will generate noise. In this context, noise emissions will be considered at the detailed design stage and standard noise mitigation measures (i.e. attenuators, acoustic screens/enclosures etc.) will be provided in order to reduce noise emissions to within acceptable limits, where required.

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

2.2.1 Peamount

One reservoir terminal location is proposed as part of the assessment process and this is located in Peamount, Co. Dublin. The matrix in Section 2.3 outlines the impact magnitude for each constraint criteria on the location in question.

The existing ambient noise climate at this location is likely to be reasonably low. Nearby noise sources are likely to consist of local and distant traffic from regional / national roads, noise from the nearby Casement Aerodrome and other anthropogenic sources.

With regards to the proposed development at this location, the most significant potential impact from a noise perspective is the potential of noise emissions during the construction phase. The area is predominantly rural with low density residential development. The area also contains a hospital which is classified as a sensitive receptor. With consideration if standard good practice measures for the control of noise during construction (See Section 3.5), there will likely be a low impact on these receptors during the construction phase of the proposed terminal reservoir.

With regards to impacts during the operational phase of the proposed development, operational traffic is likely to have small noise impact and there may be some fixed mechanical plant / pumps which will generate noise. At the detailed design stage however noise from fixed plant will be considered and standard noise mitigation measures will be provided to minimise impacts. Considering that the proposed development will lead to a minimal increase in AADT on the surrounding road network, there will be a very low noise impact due to traffic. Noise impacts are expected to be very low.

Figure F7 – 1 Peamount

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Potential for Construction phase noise impact at Sensitive receptors	The area is predominantly rural with low density residential development. The area also contains a hospital which is classified as a sensitive receptor and a golf course. With consideration of standard good practice measures for the control of noise during construction, there will likely be a **low impact** on these receptors during the construction phase of the proposed terminal reservoir.
Potential for Operational phase noise impact at Sensitive receptors	Operational traffic is likely to have small noise impact and there may be some fixed mechanical plant / pumps which will generate noise. At the detailed design stage noise from fixed plant will be considered and standard noise mitigation measures will be provided to minimise impacts. Considering that the proposed development will lead to a minimal increase in AADT on the surrounding road network, there will be a very **low noise impact** due to traffic.
Existing Ambient Noise Climate in the Area (significant noise sources)	Existing ambient noise climate likely to be reasonably **low**. Nearby noise sources are likely to consist of local and distant traffic from regional / national roads, noise from the nearby Casement Aerodrome and other anthropogenic sources
Construction Phase Impact rating	**Low** noise impact expected during construction phase
Operational Phase Impact rating	**Very low** noise impact expected during operational phase

Table F7 - 2 Summary of the MCA for Peamount

2.4 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), the terminal reservoir at Peamount, Co. Dublin will have a negligible impact on noise.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F7 – 2.

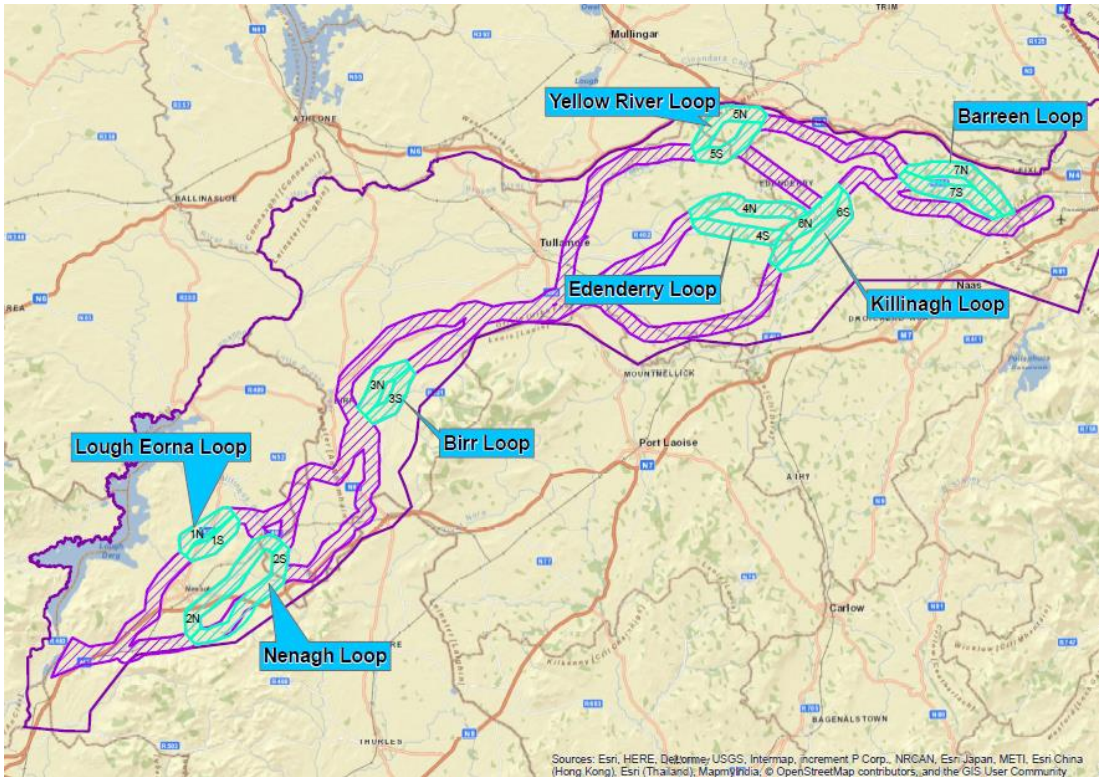


Figure F7 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

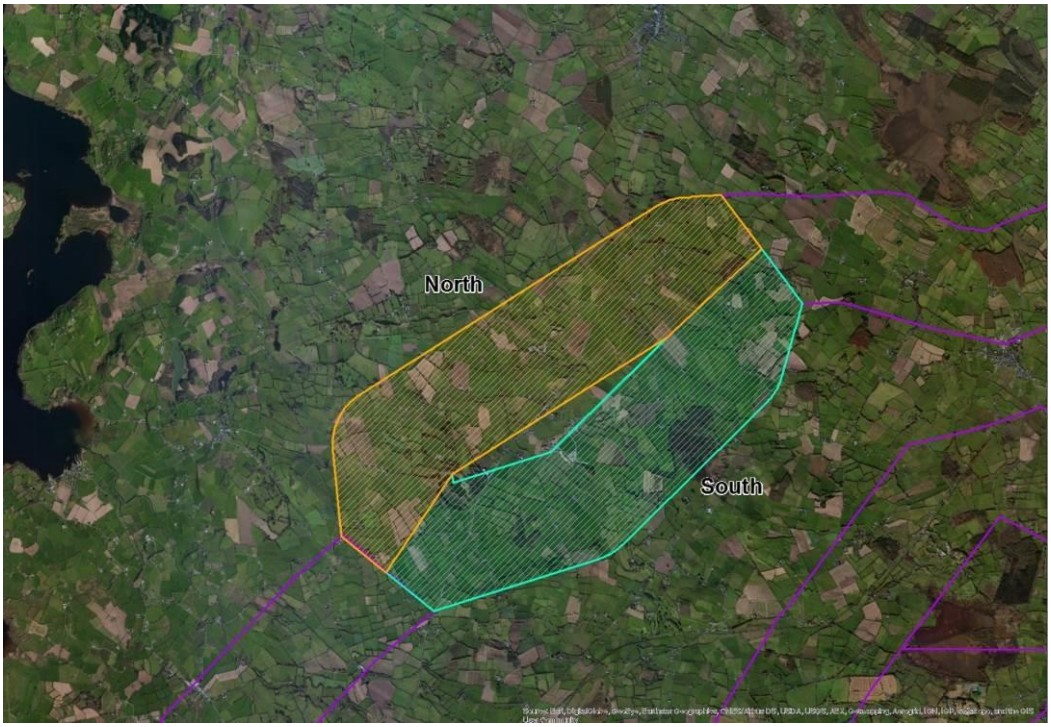


Figure F7 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

Criteria	Pipeline Loop 2 - "The Lough Eorna Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. There are slightly more residential dwellings in the northern loop. In addition there are slightly more Cultural Heritage areas in the northern loop that may have more stringent vibration criteria. It is considered that this loop option will have a **low** noise impact.

4.1.2 Southern Branch

Criteria	Pipeline Loop 2 - "The Lough Eorna Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.1.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The southern loop is considered to be slightly less constrained due to the number of noise sensitive properties located within this corridor.

4.2 The Nenagh Loop

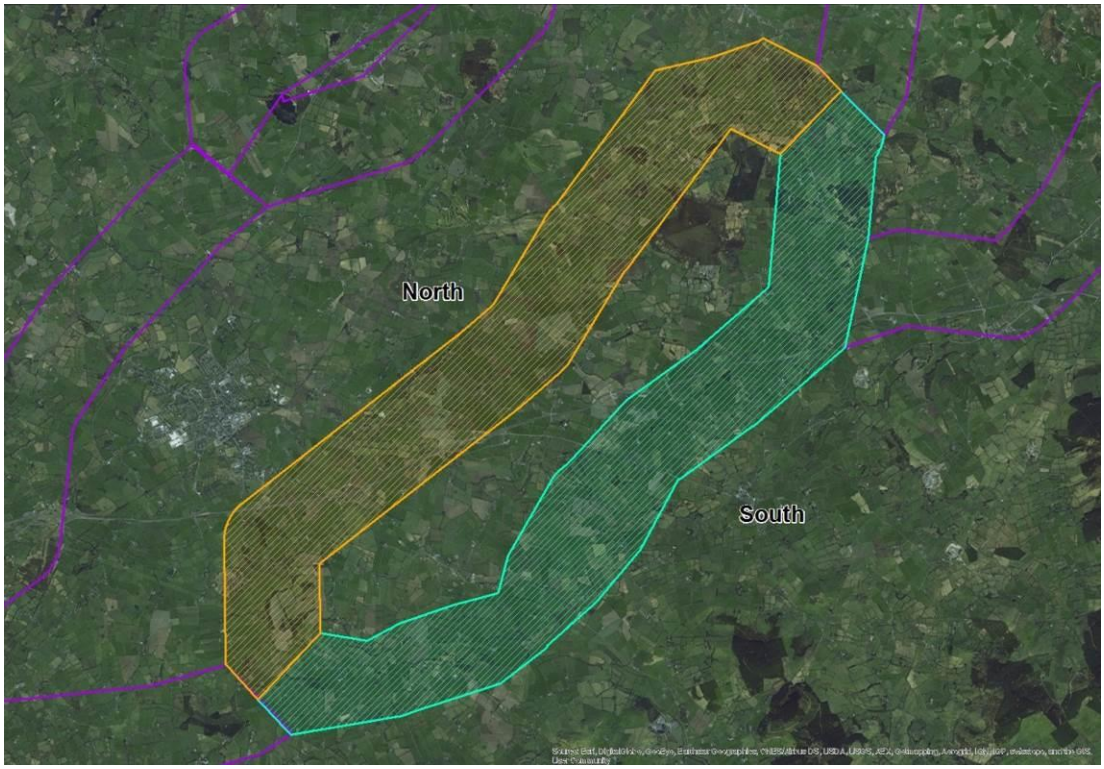


Figure F7 – 4 The Nenagh Loop

4.2.1 Northern Branch

Criteria	Pipeline Loop 1 - "The Nenagh Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. There are slightly more residential dwellings in the northern loop. In addition there are slightly more Cultural Heritage areas in the northern loop that may have more stringent vibration criteria. It is considered that this loop option will have a **low** noise impact.

4.2.2 Southern Branch

Criteria	Pipeline Loop 1 - "The Nenagh Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.2.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The southern loop is considered to be slightly less constrained due to the number of noise sensitive properties located within this corridor.

4.3 The Birr Loop

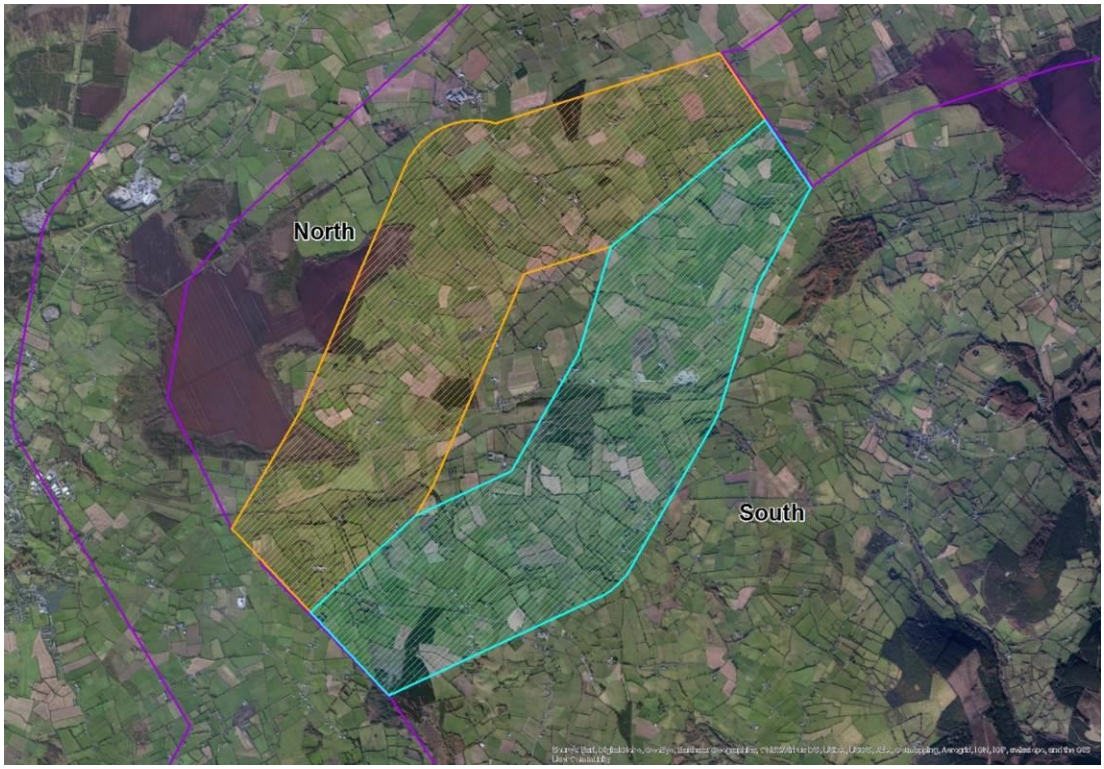


Figure F7 – 5 The Birr Loop

4.3.1 Northern Branch

Criteria	Pipeline Loop 1 - " The Birr Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.3.2 Southern Branch

Criteria	Pipeline Loop 1 - " The Birr Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.3.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The two branches are considered to be similar in terms of the likely noise impact as a similar number of noise sensitive properties are located within both corridors.

4.4 The Edenderry Loop

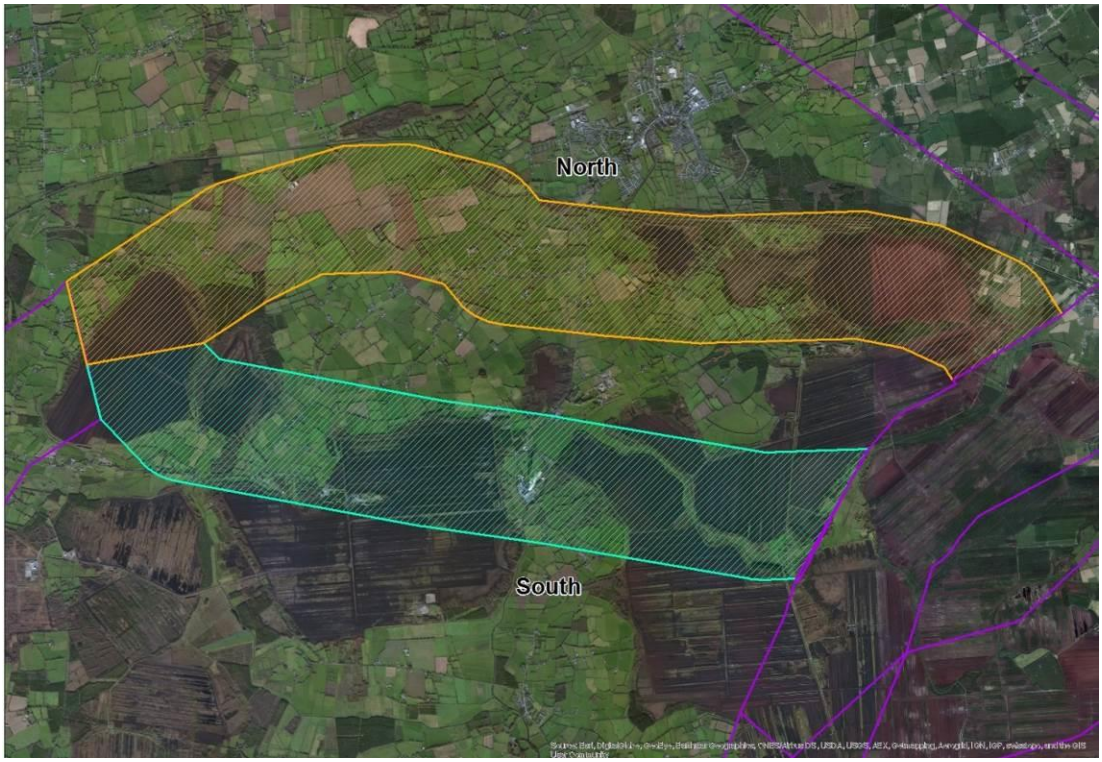


Figure F7 – 6 The Edenderry Loop

4.4.1 Northern Branch

Criteria	Pipeline Loop 4 - "The Edenderry Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. There are slightly more residential dwellings in the northern loop. It is considered that this loop option will have a **low** noise impact.

4.4.2 Southern Branch

Criteria	Pipeline Loop 4 - "The Edenderry Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.4.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The southern loop is considered to be slightly less constrained due to the number of noise sensitive properties located within this corridor.

4.5 The Yellow River Loop

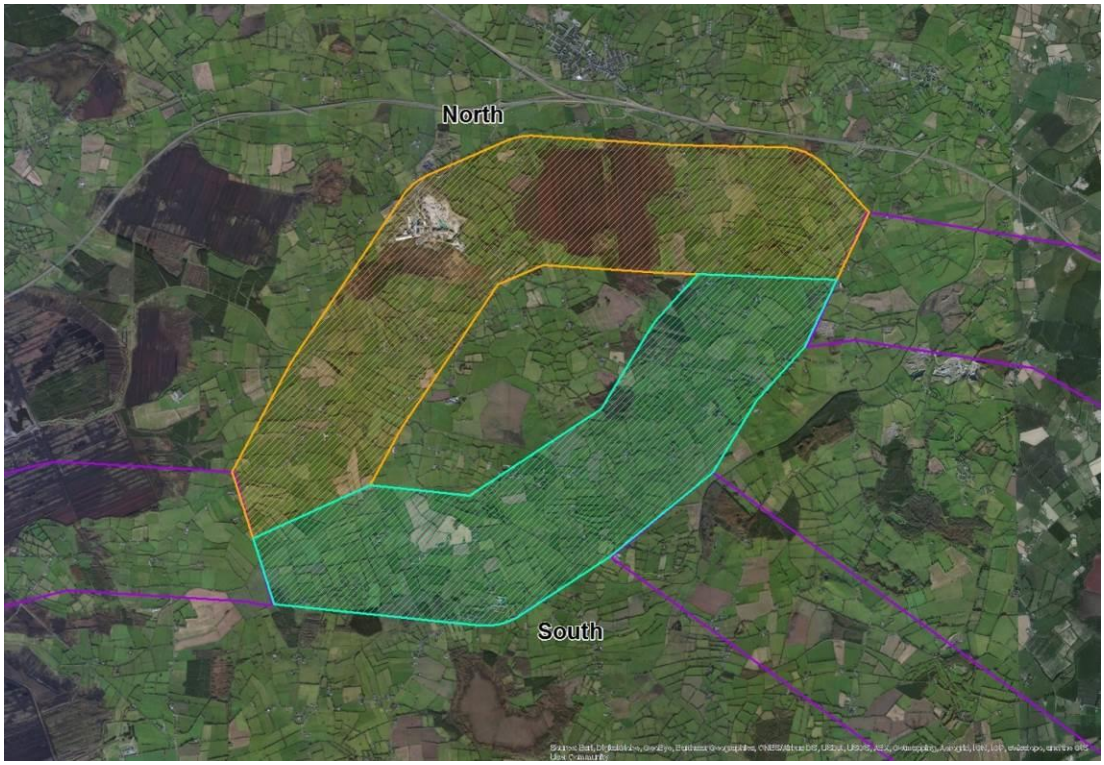


Figure F7 – 7 The Yellow River Loop

4.5.1 Northern Branch

Criteria	Pipeline Loop 5 - "The Yellow River Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.5.2 Southern Branch

Criteria	Pipeline Loop 5 - "The Yellow River Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.5.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The two branches are considered to be similar in terms of the likely noise impact as a similar number of noise sensitive properties are located within both corridors.

4.6 The Killinagh Loop

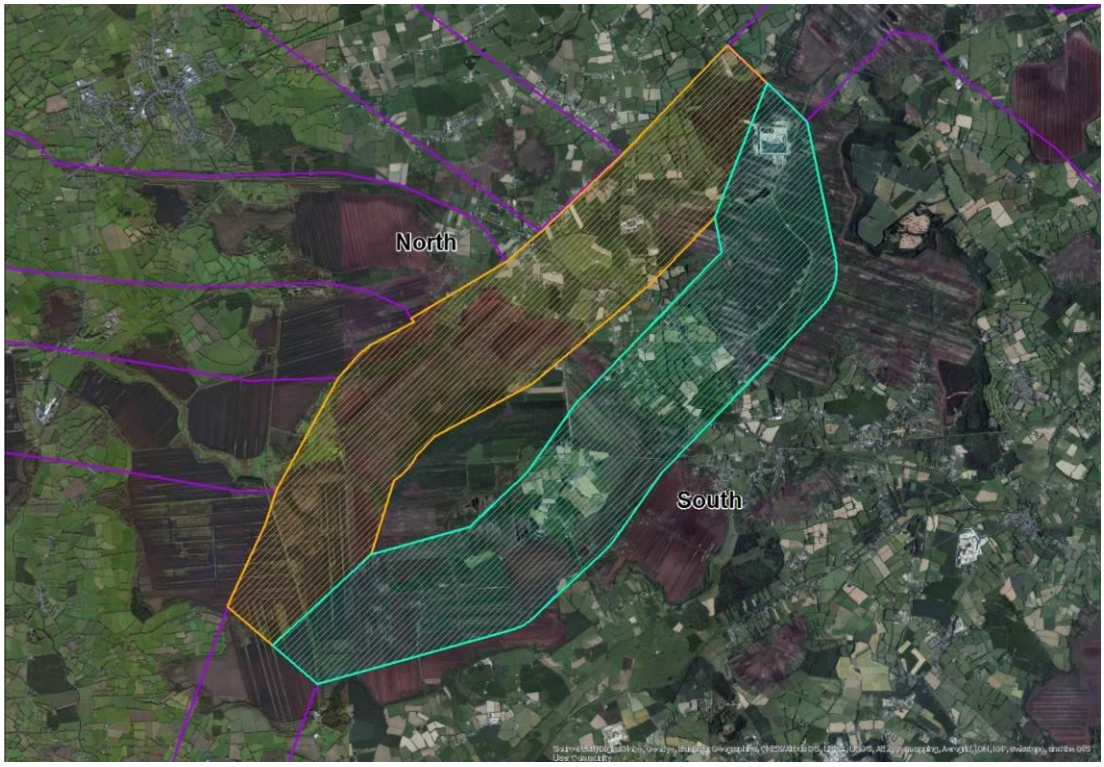


Figure F7 – 8 The Killinagh Loop

4.6.1 Northern Branch

Criteria	Pipeline Loop 6 - "The Killinagh Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.6.2 Southern Branch

Criteria	Pipeline Loop 6 - "The Killinagh Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. There are slightly more residential dwellings in the southern loop. In addition there are slightly more Cultural Heritage areas in the southern loop that may have more stringent vibration criteria. It is considered that this loop option will have a **low** noise impact.

4.6.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The northern loop is considered to be slightly less constrained due to the number of noise sensitive properties located within this corridor.

4.7 The Barreen Loop

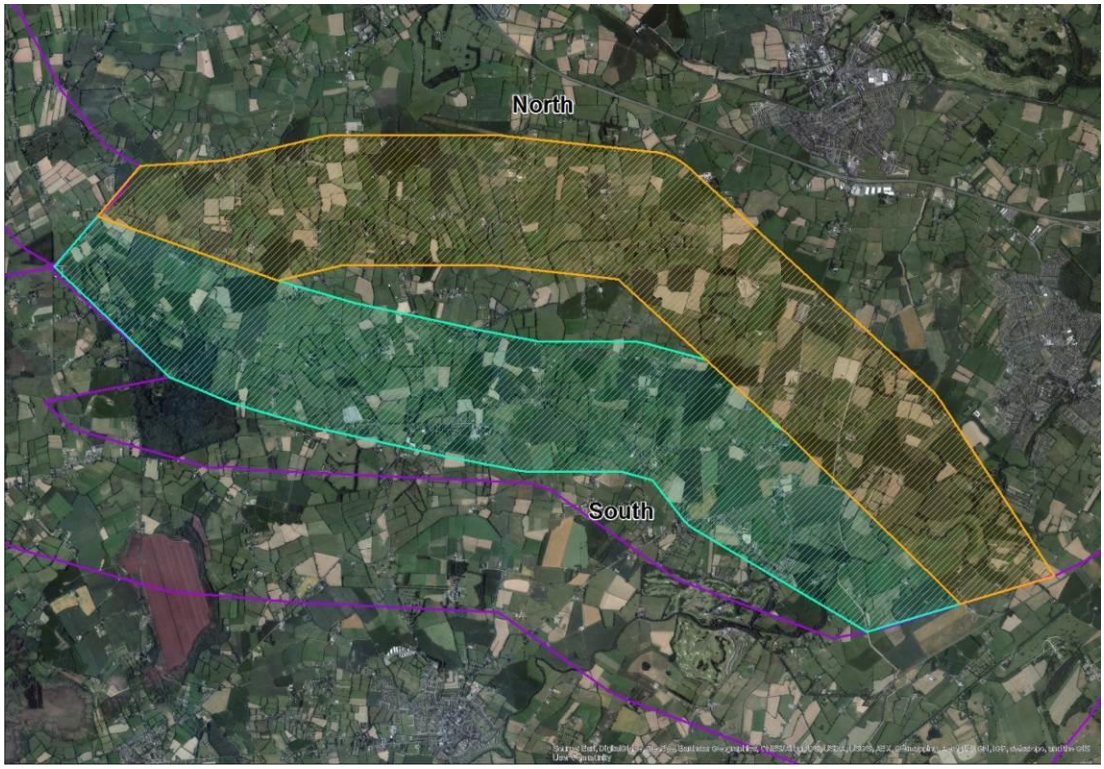


Figure F7 – 9 The Barreen Loop

4.7.1 Northern Branch

Criteria	Pipeline Loop 7 - "The Barreen Loop" North
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. It is considered that this loop option will have a **very low** noise impact.

4.7.2 Southern Branch

Criteria	Pipeline Loop 7 - "The Barreen Loop" South
Noise	Constraints include residential and cultural heritage areas in terms of short-term construction noise and vibration. There are slightly more residential dwellings in the southern loop. In addition there are slightly more Cultural Heritage areas in the southern loop that may have more stringent vibration criteria. It is considered that this loop option will have a **low** noise impact.

4.7.3 Conclusion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that both options can be developed whilst having a negligible noise impact.

The northern loop is considered to be slightly less constrained due to the number of noise sensitive properties located within this corridor.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna	Nenagh	Birr	Edenderry	Yellow River	Killinagh	Barreen
Noise							
Northern Loop	**Low:** See section 4.1.1	**Low:** See section 4.2.1	**Very low:** See section 4.3.1	**Low:** See section 4.4.1	**Very low:** See section 4.5.1	**Very low:** See section 4.6.1	**Very low:** See section 4.7.1
Southern Loop	**Very low:** See section 4.1.2	**Very low:** See section 4.2.2	**Very low:** See section 4.3.2	**Very low:** See section 4.4.2	**Very low:** See section 4.5.2	**Low:** See section 4.6.2	**Low:** See section 4.7.2

Table F7 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

There are marginal differences in the expected noise impact between the various loop options, which are typically dictated by the number of residential properties in the proximity of each corridor.

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in Section 1.2.2), it is considered that any of the proposed options can be developed whilst having a very low or low noise impact.

5 Preliminary Route Corridor AB

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F7 – 10 below.

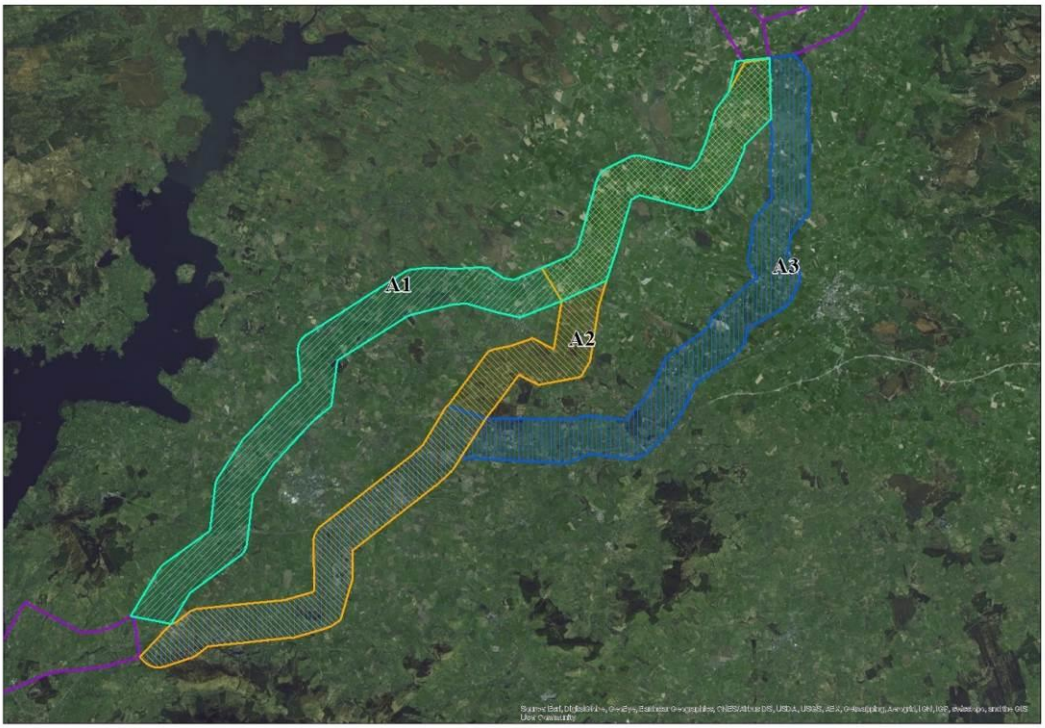


Figure F7 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Criteria	Corridor A1
Potential for Construction phase noise impact at Sensitive receptors	Low density residential. Noise impact transient & manageable
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Low density residential. Noise impact transient & manageable
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

5.3 Route Corridor A2

Criteria	Corridor A2
Potential for Construction phase noise impact at Sensitive receptors	Low density residential. Noise impact transient & manageable
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Low density residential. Noise impact transient & manageable
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

5.4 Route Corridor A3

Criteria	Corridor A3
Potential for Construction phase noise impact at Sensitive receptors	Appears slightly closer to more densely populated residential area
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Appears slightly closer to more densely populated residential area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

5.5 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Noise			
Potential for Construction phase noise impact at Sensitive receptors	Low density residential. Noise impact transient & manageable	Low density residential. Noise impact transient & manageable	Appears slightly closer to more densely populated residential area
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Low density residential. Noise impact transient & manageable	Low density residential. Noise impact transient & manageable	Appears slightly closer to more densely populated residential area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase

Table F7 - 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in section 1.2.2), it is considered that all options can be developed whilst having a negligible noise impact.

Corridors A1 and A2 are considered to be slightly less constrained due to the number of noise sensitive properties located within Corridor A3.

6 Preliminary Route Corridor BC

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F7 – 11 below.

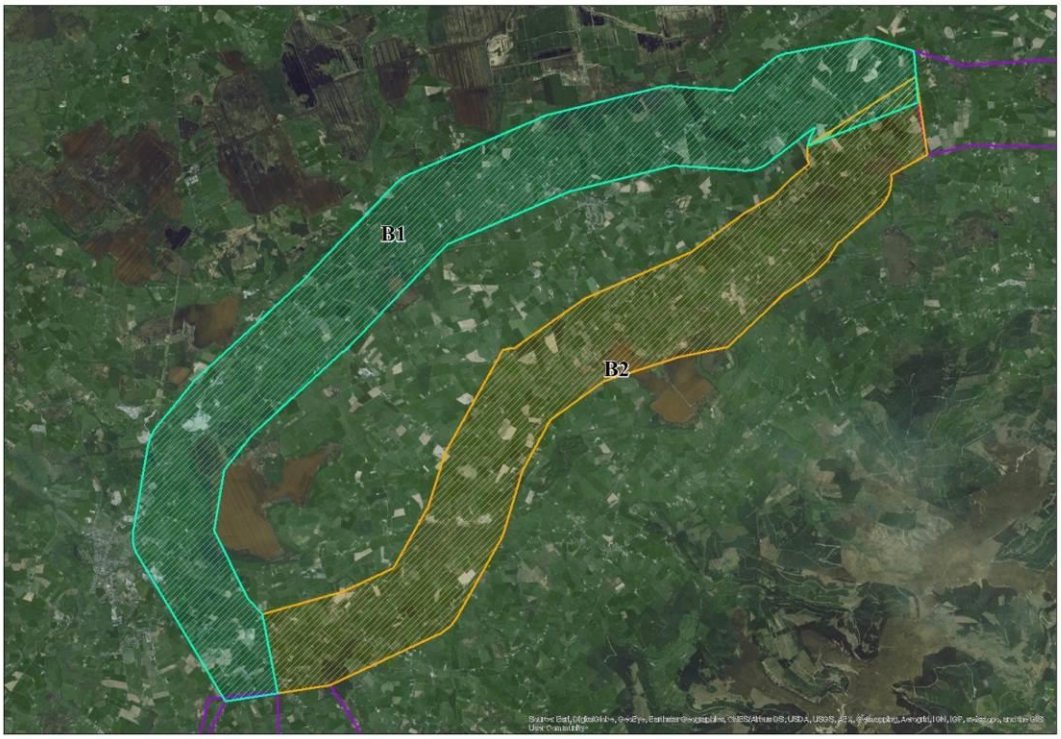


Figure F7 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

Criteria	Corridor B1
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to slightly higher Density Residential Receptors in area
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

6.3 Route Corridor B2

Criteria	Corridor B2
Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors in area
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

6.4 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Noise		
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to slightly higher Density Residential Receptors in area	Very low impact in construction phase due to low Density Residential Receptors in area
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase

Table F7 - 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in section 1.2.2), it is considered that either option can be developed whilst having a negligible noise impact.

Corridor B2 is considered to be slightly less constrained due to the number of noise sensitive properties located within Corridor B1.

7 Preliminary Route Corridor CD

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F7 – 12 below.

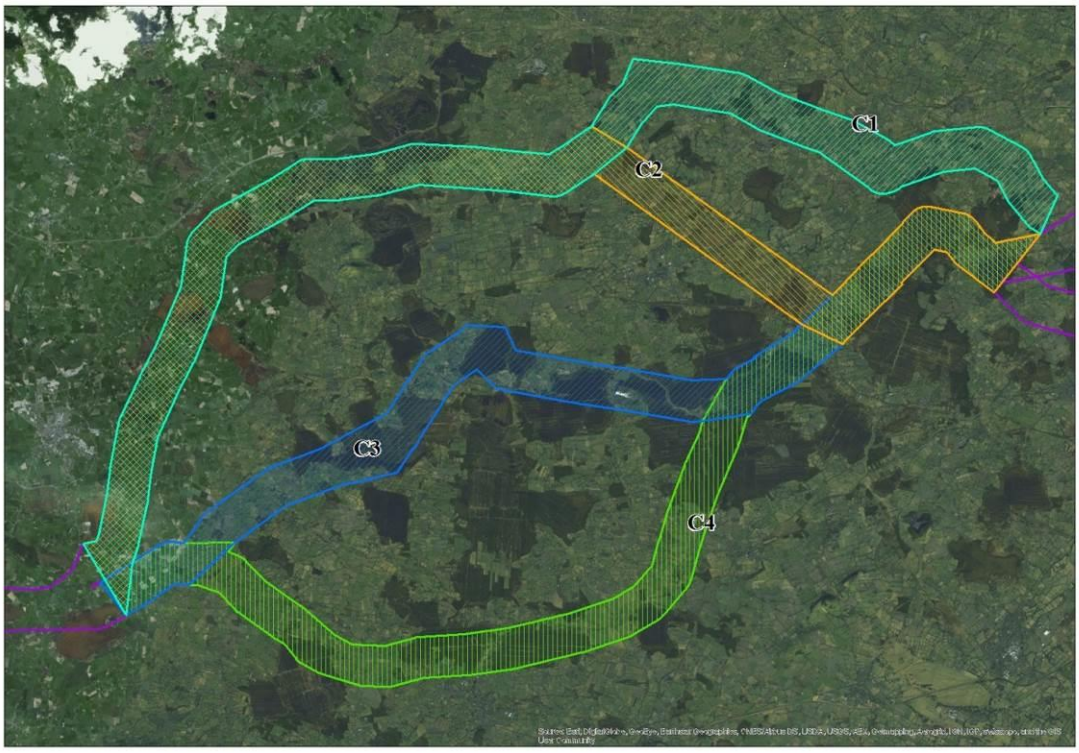


Figure F7 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

Criteria	Corridor C1
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Enfield)
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

7.3 Route Corridor C2

Criteria	Corridor C2
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry)
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

7.4 Route Corridor C3

Criteria	Corridor C3
Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors in the area (only dense residential south of Edenderry)
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

7.5 Route Corridor C4

Criteria	Corridor C4
Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors in area (only dense residential north of Portarlington).
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

7.6 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Noise				
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Enfield).	Low impact in construction phase due to higher Density Residential Receptors in area (outskirts of Tullamore, Castlejordan, Derrinturn, Edenderry).	Very low impact in construction phase due to low Density Residential Receptors in the area (only dense residential south of Edenderry).	Very low impact in construction phase due to low Density Residential Receptors in area (only dense residential north of Portarlington).
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria.
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area.	Very low impact in construction phase due to low Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.	Very low impacts expected due to nature of operational phase.

Table F7 - 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases (as outlined in section 1.2.2), it is considered that all options can be developed whilst having a negligible noise impact.

Corridors C3 and C4 are considered to be slightly less constrained due to the number of noise sensitive properties located within Corridors C1 and C2.

8 Preliminary Route Corridor DE

8.1 Route Corridor D1

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F7 – 13 below.

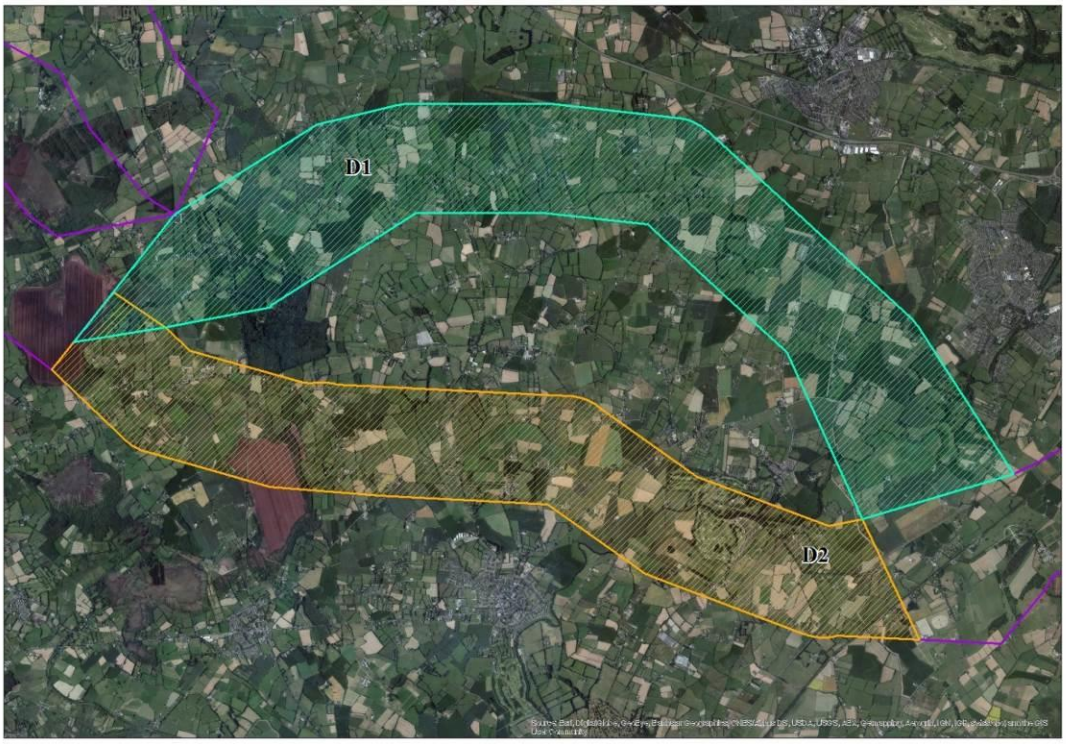


Figure F7 – 13 Preliminary Route Corridors and Loops

Criteria	Corridor D1
Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

8.2 Route Corridor D2

Criteria	Corridor D2
Potential for Construction phase noise impact at Sensitive receptors	Low impact in construction phase due to route passing slightly more densely populated Receptors in area (Clane) and the K Club
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase

8.3 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Noise		
Potential for Construction phase noise impact at Sensitive receptors	Very low impact in construction phase due to low Density Residential Receptors	Low impact in construction phase due to route passing slightly more densely populated Receptors in area (Clane) and the K Club
Potential for Operational phase noise impact at Sensitive receptors	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria	No significant impacts expected due to nature of operational phase. Any fixed plant / pumps can readily be mitigated to achieve relevant noise criteria
Existing Ambient Noise Climate in the Area (significant noise sources)	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.	Relatively low ambient noise climate expected in rural / semi-rural areas with traffic the likely dominant pre-existing noise source.
Construction Phase Impact rating	Very low impact in construction phase due to low Density Residential Receptors in area	Impacts are expected to be manageable. Low impact in construction phase due to slightly higher Density Residential Receptors in area.
Operational Phase Impact rating	Very low impacts expected due to nature of operational phase	Very low impacts expected due to nature of operational phase

Table F7 - 7 Summary of the MCA for Route Corridors DE

8.4 Comparative Discussion

Once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases, (as outlined in section 1.2.2) it is considered that either option can be developed whilst having a negligible noise impact.

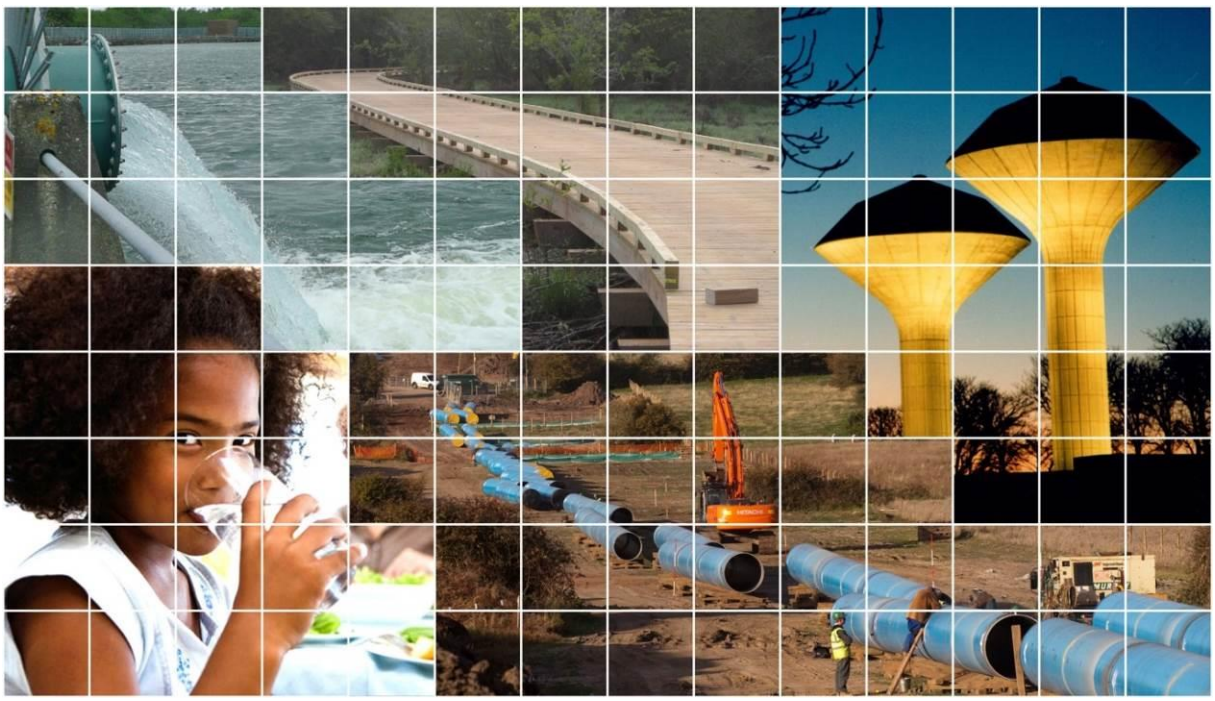
Corridor D1 is considered to be slightly less constrained due to the number of noise sensitive properties located within Corridor D2.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F8: Cultural Heritage

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria, see Table F8 - 1, within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F8 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F8 is a statement on the specialism Cultural Heritage and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under 7 no. Cultural Heritage sub-criteria.

- Potential to impact (direct/indirect) on National Monuments (designated sites)
- Potential to impact (direct/indirect) on RMPs (designated sites)
- Potential to impact (direct/indirect) on RPS (designated sites)
- Potential to impact (direct/indirect) on NIAH
- Potential to impact (direct/indirect) on historic designed landscapes
- Potential to impact on ACA
- Recorded shipwreck sites

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F8 – 1 Peamount

Table F8 - 2 details the Cultural Heritage constraints that has been identified within the Peamount terminal location

Site Type	ID Number	Classification	Statutory Protection
RMP	DU017-095	Enclosure	Yes
RPS/ NIAH	159/ 11208021	Church	Yes

RPS/ NIAH	166/ 11208017	Church	Yes
RPS/ NIAH	161/ 11208009	House	Yes
RPS/ NIAH	163/ 11208003	Peamount House	Yes
RPS/ NIAH	160/ 11208005	Gate way	Yes
RPS/ NIAH	155/ 11208015	House	Yes
RPS/ NIAH	131/ 11208014	Bridge	Yes
RPS/ NIAH	178/ 11208004	Kelloges House	Yes
NIAH	11208018	Church	No
NIAH	11208019	Tank/ silo	No
NIAH	11208020	Restaurant	No
NIAH	11208016	Public house	No
NIAH	11208006	Outbuilding	No
NIAH	11208001	Water pump	No
NIAH	11208002	House	No
NIAH	11208003	Reniskey House	No
Designed Landscape	50a	Demesne associated with Peamount House	Principal structure is in RPS
Designed Landscape	50b	Demesne associated with Kelloges House	Principal structure is in RPS

For the most part the Peamount area is relatively unconstrained with regards to the cultural heritage resource. There is only one recorded archaeological site located within the area. This is listed within the Record of Monuments of Places (RMP) but is not a National Monument and is not subject to a Preservation Order.

A large majority of the remaining constraints are located within the southern portion of the area. Whilst there are a number of protected structures (RPS) and National Inventory of Architectural Heritage (NIAH) structures, many of these are clustered around the already developed Peamount Hospital complex. This complex was development within a former designed landscape associated with Peamount House.

Further to the south a slightly smaller house (Kelloges), once possessed a demesne, although this has been impacted on by development. The main structure is still extant and included in the RPS/ NIAH.

There are no Architectural Conservation Areas (ACA's) within the Peamount area.

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present
Potential to impact (direct/indirect) on RMPs (designated sites)	**Very low** as only one RMP recorded in the study area
Potential to impact (direct/indirect) on RPS (designated sites)	**Low** as the 8 structures are mostly clustered around the existing hospital complex with remainder on the periphery of the study area
Potential to impact (direct/indirect) on NIAH	**Low** as the 16 structures are mostly clustered around the existing hospital complex with remainder on the periphery of the study area
Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as the two designed landscapes that were present within the landscape have already been subject to impacts from other developments
Potential to impact on ACA	**Very low** as none are present
Recorded shipwreck sites	N/A

Table E5 - 2 Summary of the MCA for Peamount Reservoir

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F8 – 2.

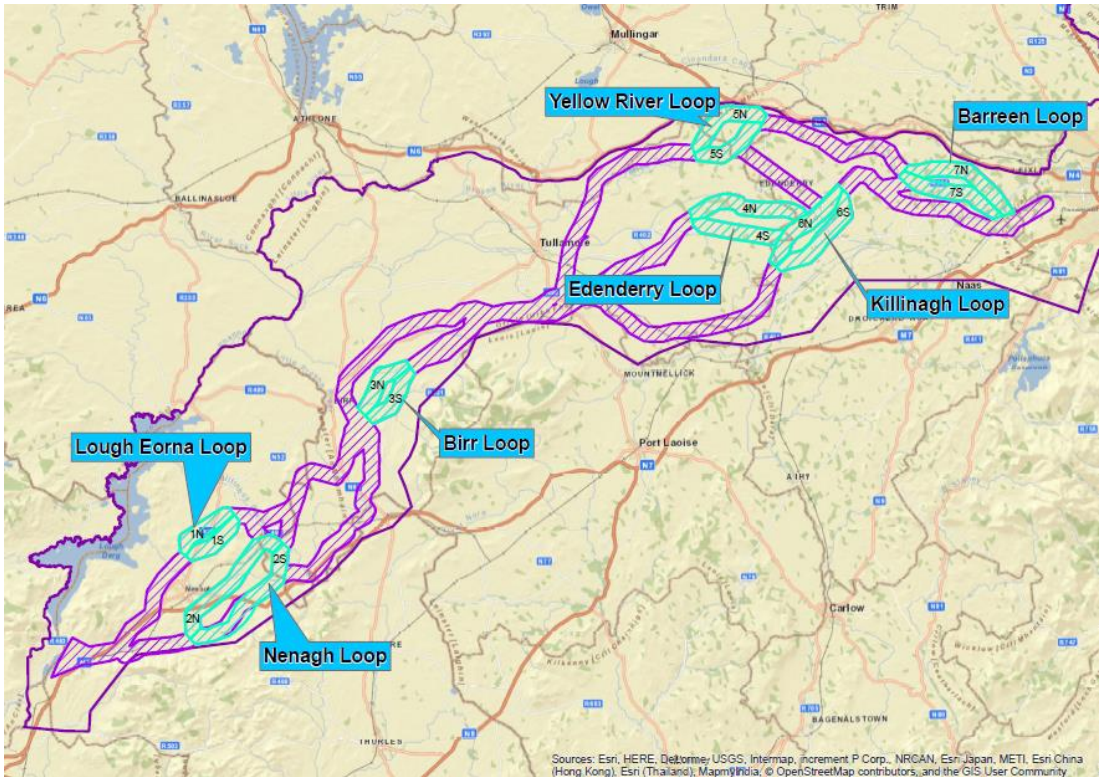


Figure F8 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify, and then appraise, “Preliminary Route Corridors” (approximately 2 km wide) from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

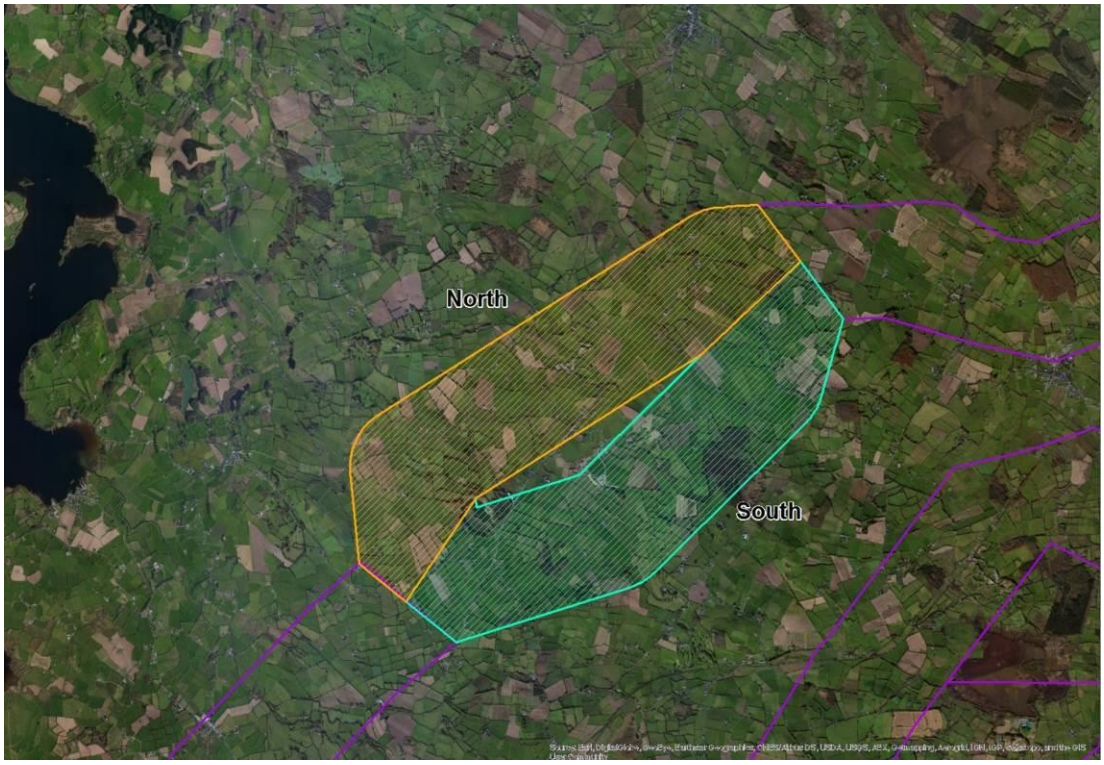


Figure F8 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

Table F8 - 3 details the Cultural Heritage constraints that has been identified within the Lough Eorna Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	TN010-045----	Enclosure	Yes
RMP	TN010-059----	Enclosure	Yes
RMP	TN010-037----	Enclosure	Yes
RMP	TN010-039----	Redundant record	No
RMP	TN010-040----	Enclosure	Yes
RMP	TN010-044----	Redundant record	No
RMP	TN010-058----	Ringfort - rath	Yes
RMP	TN010-060----	Enclosure	Yes
RMP	TN010-061----	Designed landscape - tree-ring	Yes
RMP	TN010-062----	Barrow - bowl-barrow	Yes
RMP	TN010-063----	Barrow - bowl-barrow	Yes
RMP	TN010-064----	Enclosure	Yes
RMP	TN010-065----	Ringfort - rath	Yes
RMP	TN010-066----	Earthwork	Yes
RMP	TN010-067----	Enclosure	Yes
RMP	TN010-069----	Megalithic tomb - unclassified	Yes

RMP	TN010-070----	Castle - hall-house	Yes
RMP	TN010-071----	Enclosure	Yes
RMP	TN010-093001/2	Castle – unclassified & bawn	Yes
RMP	TN010-104----	Enclosure	Yes
RMP	TN014-022----	Ringfort - rath	Yes
RMP	TN014-023----	Ringfort - rath	Yes
RMP	TN014-025----	Enclosure	Yes
RMP	TN014-026----	Ringfort - rath	Yes
RMP	TN014-030----	Ringfort - rath	Yes
RMP	TN014-031----	Enclosure	Yes
RMP	TN014-034----	Ringfort - rath	Yes
RMP	TN014-035----	Ringfort - rath	Yes
RMP	TN015-012----	Ringfort - rath	Yes
RMP	TN015-001----	Ringfort - rath	Yes
RMP	TN015-003----	Ringfort - rath	Yes
RMP	TN015-004----	Ringfort - rath	Yes
RMP	TN015-005----	Ringfort - rath	Yes
RMP	TN015-006----	Redundant record	No
RMP	TN015-007----	Ringfort - rath	Yes
RMP	TN015-008----	Ringfort - rath	Yes
RMP	TN015-010----	Ringfort - rath	Yes
RMP	TN015-011----	Ringfort - rath	Yes
National Monument & RMP	TN015-009----	Linkardstown burial	Yes
National Monument & RMP	TN015-013----	Linkardstown burial	Yes
RMP	TN015-014----	Ringfort - rath	Yes
RMP	TN015-015001-4	Church, tower house, redundant record, graveyard	Yes
RMP	TN015-016----	Ringfort - rath	Yes
RMP	TN015-017----	Ringfort - rath	Yes
RMP	TN015-018----	Ringfort - rath	Yes
RMP	TN015-020----	Castle - motte	Yes
RMP	TN015-022----	Megalithic tomb - portal tomb	Yes
RMP	TN015-044----	House - indeterminate date	Yes
RMP	TN015-041----	Ringfort - rath	Yes
RMP	TN015-042----	Megalithic structure	Yes
RMP	TN015-043001/2	Ringfort – rath & enclosure	Yes
RMP	TN015-045----	Moated site	Yes
RMP	TN015-046----	Enclosure	Yes
RMP	TN015-047----	Redundant record	No
RMP	TN015-049----	Enclosure	Yes
RMP	TN015-107----	Fulacht fia	Yes
RPS/ NIAH	S14/ 22401507	Ashleypark House	Yes
RPS	S15	H-plan House	Yes

RPS/ NIAH	S74/ 22401017	Ballyrickard House	Yes
RPS	S76	Ballythomas Cottage	Yes
RPS	S273	Merton Hall	Yes
RPS/ NIAH	S583/ 22401505	Ardcroney Church	Yes
Designed Landscape	1	Demesne associated with Ashleypark House	Principal structure is in RPS
Designed Landscape	2	Demesne associated with Willsborough House	No
Designed Landscape	3	Demesne associated with Whitstow House	No
Designed Landscape	4	Demesne associated with Ballyrickard House	Principal structure is in RPS
Designed Landscape	5	Demesne associated with Ballinderry House	No
Designed Landscape	6	Demesne associated with Congor House	No
Designed Landscape	7	Demesne associated with Merton Hall	Principal structure is in RPS

4.1.2 Southern Branch

Table F8 - 4 details the Cultural Heritage constraints that has been identified within the Lough Eorna Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	TN010-099----	Fulacht fia	Yes
RMP	TN010-100----	Redundant record	No
RMP	TN010-075----	Enclosure	Yes
RMP	TN010-072----	Well	Yes
RMP	TN010-073----	Earthwork	Yes
RMP	TN010-074----	Enclosure	Yes
RMP	TN010-076----	Children's burial ground	Yes
RMP	TN010-077----	Enclosure	Yes
RMP	TN010-078----	Enclosure	Yes
RMP	TN010-079----	Ringfort - rath	Yes
RMP	TN015-019----	Fulacht fia	Yes
RMP	TN015-021----	Enclosure	Yes
RMP	TN015-023----	Barrow - bowl-barrow	Yes
RMP	TN015-024----	Barrow - bowl-barrow	Yes
RMP	TN015-025----	Ringfort - cashel	Yes
RMP	TN015-026----	Ringfort - cashel	Yes
RMP	TN015-027----	Ringfort - cashel	Yes
RMP	TN015-028----	Ringfort - rath	Yes
RMP	TN015-031----	Ringfort - rath	Yes
RMP	TN015-048001-3	Tower house, crannog, ringfort - cashel	Yes
RMP	TN015-050----	Ringfort - rath	Yes
RMP	TN015-051----	Enclosure	Yes
RMP	TN015-052----	Redundant record	No
RMP	TN015-071----	Ringfort - rath	Yes

RMP	TN015-105----	Fulacht fia	Yes
RMP	TN015-106----	Fulacht fia	Yes
RMP	TN015-108----	Enclosure	Yes
RMP	TN015-110----	Redundant record	No
RMP	TN015-123----	Barrow - ring-barrow	Yes
RMP	TN015-124----	Fulacht fia	Yes
RPS	S135	Fort William	Yes
RPS	S348	Sedgemoor House	Yes
Designed Landscape	9	Demesne associated with Ballinwear House	No
Designed Landscape	8	Demesne associated with Corbally House	No
Designed Landscape	7	Demesne associated with Merton Hall	Principal structure is in RPS

4.2 The Nenagh Loop

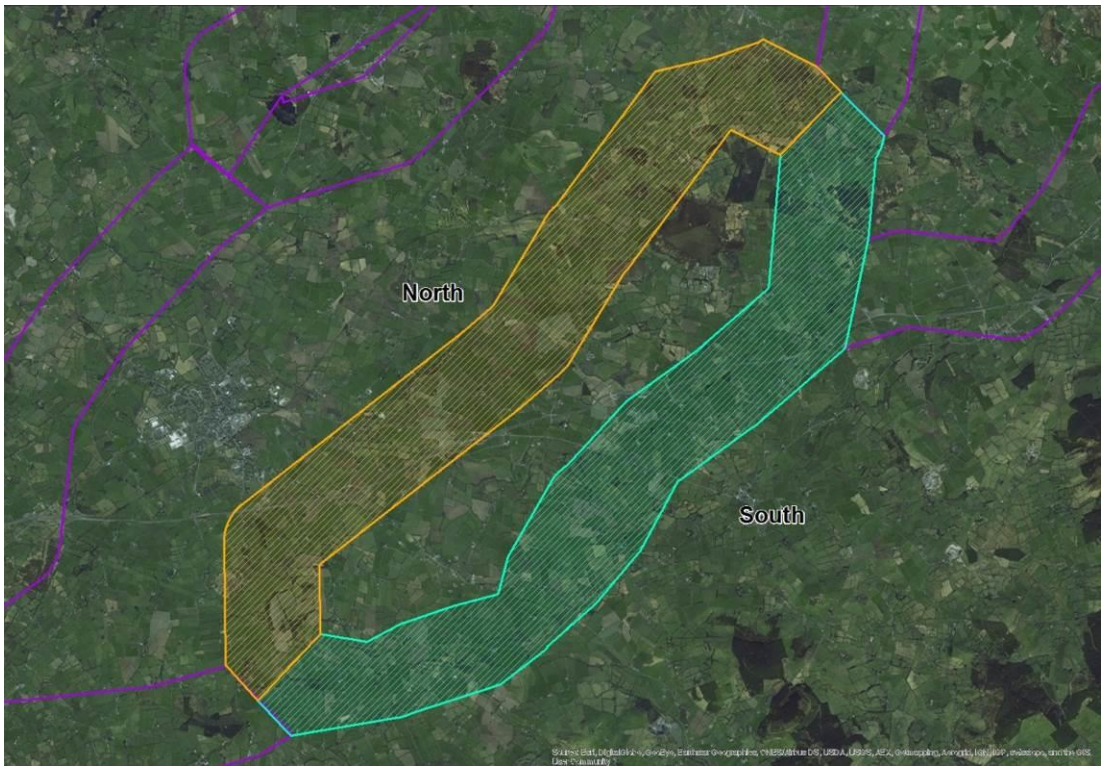


Figure F8 – 4 The Nenagh Loop

4.2.1 Northern Branch

Table F8 - 5 details the Cultural Heritage constraints that has been identified within the Nenagh Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF044-002----	Designed landscape - tree-ring	Yes
RMP	OF044-006----	Enclosure	Yes
RMP	OF044-007----	Enclosure	Yes

RMP	OF044-008----	Ringfort - rath	Yes
RMP	OF044-014----	Megalithic tomb - unclassified	Yes
RMP	TN021-094002-	Enclosure	Yes
RMP	TN021-096----	Excavation - miscellaneous	No
RMP	TN021-097----	Redundant record	No
RMP	TN015-087----	Ringfort - rath	Yes
RMP	TN015-088----	Enclosure	Yes
RMP	TN015-089----	Ringfort - rath	Yes
RMP	TN015-090----	Castle - tower house	Yes
RMP	TN015-103001/2	Ringfort – rath & enclosure	Yes
RMP	TN015-104----	Barrow - ring-barrow	Yes
RMP	TN021-014----	Ringfort - rath	Yes
RMP	TN021-015----	Castle - tower house	Yes
RMP	TN021-016----	Ringfort - rath	Yes
RMP	TN021-018----	Ringfort - rath	Yes
RMP	TN021-019----	Ringfort - rath	Yes
RMP	TN021-020001-	Church	Yes
RMP	TN021-031----	Ringfort - rath	Yes
RMP	OF044-002----	Designed landscape - tree-ring	Yes
RMP	TN021-032----	Castle - tower house	Yes
RMP	TN021-034----	Ringfort - rath	Yes
RMP	TN021-035----	Ringfort - rath	Yes
RMP	TN021-036----	Castle - motte and bailey	Yes
RMP	TN021-037----	Enclosure	Yes
RMP	TN021-038----	Ringfort - rath	Yes
RMP	TN021-045----	Ringfort - rath	Yes
RMP	TN021-046----	Standing stone	Yes
RMP	TN021-047----	Ringfort - rath	Yes
RMP	TN021-048----	Ringfort - rath	Yes
RMP	TN021-049----	Ringfort - rath	Yes
RMP	TN021-050----	Ringfort - rath	Yes
RMP	TN021-051----	Ringfort - rath	Yes
RMP	TN021-052001/2	Two Enclosures	Yes
RMP	TN021-053----	Ringfort - rath	Yes
RMP	TN021-054----	Enclosure	Yes
RMP	TN021-055----	Castle - tower house	Yes
RMP	TN021-057----	Ringfort - rath	Yes
RMP	TN021-067----	Ritual site - holy well	Yes
RMP	TN021-083----	Enclosure	Yes
RMP	TN021-094001-	House - indeterminate date	Yes
RMP	TN026-033----	Ringfort - rath	Yes
RMP	TN026-034----	Enclosure	Yes
RMP	TN026-050----	Ritual site - holy well	Yes
RMP	TN026-070----	Ecclesiastical enclosure	Yes
RMP	TN027-170----	Cursing stone	Yes
RMP	TN027-001----	Enclosure	Yes
RMP	TN021-098----	Burnt mound	Yes
RMP	TN021-100----	Fulacht fia	Yes

RMP	TN021-101----	Habitation site	Yes
RMP	TN021-099----	House - indeterminate date	Yes
RMP	TN021-055001-	Settlement deserted - medieval	Yes
RMP	TN021-020002-	Graveyard	Yes
RMP	TN027-170001-	Cross - High cross	Yes
RPS	S78	Bantis House	Yes
RPS	S177	Glenahilty	Yes
RPS	S190	Islandbawn House	Yes
RPS	S691	Debsborough House, Outbuilding	Yes
RPS/ NIAH	S61 22402122	Bayly Farm	Yes
RPS/ NIAH	S213 22402103	Castle Willington	Yes
RPS/ NIAH	S228 22402118	Knockalton House	Yes
RPS/ NIAH	S321 22402106	Rectory	Yes
RPS/ NIAH	S322 22402109	Rathurles Bridge	Yes
RPS/ NIAH	S326 22402107	Rathurles House	Yes
RPS/ NIAH	S641 22402104	Hermitage House	Yes
RPS/ NIAH	S642 22402105	CoI Church & Graveyard	Yes
RPS/ NIAH	S643 22402101	Bridge	Yes
RPS/ NIAH	S644 22402113	Liffey Mills	Yes
RPS/ NIAH	63-07 14944010	Springmount House	Yes
RPS/ NIAH	63-08 14944011	Springmount Mill	Yes
RPS/ NIAH	63-09 14944012	Mill Farm	Yes
NIAH	22401511	Glenahilty School	No
NIAH	22401520	Riverlawn House	No
Designed Landscape	10	Demesne associated with Desborough House	Principal structure is in RPS
Designed Landscape	11	Demesne associated with Islandbawn House	Principal structure is in RPS
Designed Landscape	12	Demesne associated with Rathurles House	Principal structure is in RPS
Designed Landscape	13	Demesne associated with Hermitage House	Principal structure is in RPS
Designed Landscape	14	Demesne associated with Castle Willington	Principal structure is in RPS
Designed Landscape	15	Demesne associated with Elmhill House	No

Designed Landscape	16	Demesne associated with Wilton House	No
Designed Landscape	17	Demesne associated with Riverlawn House	No
Designed Landscape	18	Demesne associated with Glenahilty	Principal structure is in RPS
Designed Landscape	19	Demesne associated with Bantis House	Principal structure is in RPS
Designed Landscape	20	Demesne associated with Coolnamunna House	Principal structure is in RPS
Designed Landscape	21	Demesne associated with Springmount House	Principal structure is in RPS
Designed Landscape	22	Demesne associated with Gorraun Park	No

4.2.2 Southern Branch

Table F8 - 6 details the Cultural Heritage constraints that has been identified within the Nenagh Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF044-009----	Ringfort - unclassified	Yes
RMP	OF044-011001-3	House - 17th century, church & graveyard	Yes
RMP	OF044-012001/2	Castle - tower house & House - 17th century	Yes
RMP	OF044-013----	Ringfort - unclassified	Yes
RMP	OF044-015----	House - 18th/19th century	Yes
RMP	OF044-016----	Fulacht fia	Yes
RMP	OF046-001----	Enclosure	Yes
RMP	OF046-003----	Enclosure	Yes
RMP	TN021-095----	Enclosure	Yes
RMP	TN022-001----	Moated site	Yes
RMP	TN022-002----	Ringfort - rath	Yes
RMP	TN022-003----	Redundant record	No
RMP	TN027-007----	Ringfort - rath	Yes
RMP	TN027-008----	Ringfort - rath	Yes
RMP	TN027-009----	Ringfort - rath	Yes
RMP	TN027-010----	Ringfort - rath	Yes
RMP	TN027-011----	Ringfort - rath	Yes
RMP	TN027-012----	Enclosure	Yes
RMP	TN021-063----	Enclosure	Yes
RMP	TN021-064----	Ringfort - rath	Yes
RMP	TN021-077----	Ringfort - rath	Yes
RMP	TN021-078001/2	Two Enclosures	Yes
RMP	TN021-079----	Ringfort - rath	Yes
RMP	TN021-080----	Ringfort - rath	Yes
RMP	TN021-081001/2	Castle – unclassified & House - indeterminate date	Yes
RMP	TN021-082----	Ringfort - rath	Yes
RMP	TN027-025----	House - indeterminate date	Yes

RMP	TN027-026----	Ringfort - rath	Yes
RMP	TN027-027----	Ringfort - rath	Yes
RMP	TN027-031----	Enclosure	Yes
RMP	TN027-050----	Earthwork	Yes
RMP	TN027-135----	Castle - unclassified	Yes
RMP	TN027-154----	House - indeterminate date	Yes
RMP	TN027-163----	Settlement deserted - medieval	Yes
RMP	TN027-163001-4	Field system, Castle - tower house, Road - hollow-way & Water mill	Yes
RMP	TN027-169----	House - indeterminate date	Yes
RPS/ NIAH	S40 22402707	Ballynaclogh Glebe	Yes
RPS/ NIAH	S650 22402126	Grennanstown House	Yes
RPS/ NIAH	S651 22402125	Grennanstown Church	Yes
RPS/ NIAH	S208 22402111	Glebe House	Yes
RPS	S41	Ballycrenode House	Yes
RPS	S52	Millgrove House	Yes
RPS	S71	Ballynaclogh School	Yes
RPS	S72	(walled garden ruins)	Yes
RPS	S73	(house)	Yes
RPS	S77	The Chalet	Yes
RPS	S113	Clash School	Yes
RPS	S130	Coolagh House	Yes
RPS	S161	Falleen House	Yes
RPS	S209	Killeisk House	Yes
RPS	S229	Knockane House	Yes
RPS	S250	Lismore House	Yes
RPS	S275	Milbrook House	Yes
RPS	S16	Ballinamona House	Yes
RPS/ NIAH	63-03 14944006	Ballintemple House	Yes
RPS/ NIAH	63-04 14944007	Templeharry Rectory	Yes
RPS/ NIAH	63-05 14944008	Mountain View	Yes
RPS/ NIAH	63-06 14944009	Templeharry Church of Ireland Church	Yes
RPS/ NIAH	63-10 14944013	Emmel Castle	Yes
RPS/ NIAH	63-13 14946001	Rathenny House	Yes
RPS/ NIAH	63-14 14946002	Rathenny Cottage	Yes
RPS/ NIAH	63-11 14944014	Rathenny House	Yes
NIAH	14944005	Post box	No

Designed Landscape	23	Demesne associated with Coolagh House	Principal structure is in RPS
Designed Landscape	24	Demesne associated with Millbrook House	Principal structure is in RPS
Designed Landscape	25	Demesne associated with Ballycrenode House	Principal structure is in RPS
Designed Landscape	26	Demesne associated with Glebe House (Ballycrenode)	Principal structure is in RPS
Designed Landscape	27	Demesne associated with Ballinamona House	Principal structure is in RPS
Designed Landscape	28	Demesne associated with Grennanstown House	Principal structure is in RPS
Designed Landscape	29	Demesne associated with Lissanisky House	No
Designed Landscape	30	Demesne associated with Shanbally House	No
Designed Landscape	31	Demesne associated with Lismore House	Principal structure is in RPS
Designed Landscape	32	Demesne associated with Pallas House	No
Designed Landscape	33	Demesne associated with Killeisk House	Principal structure is in RPS
Designed Landscape	34	Demesne associated with Glebe House (Killeisk)	Principal structure is in RPS
Designed Landscape	35	Demesne associated with Knockane House	Principal structure is in RPS
Designed Landscape	36	Demesne associated with Falleen House	Principal structure is in RPS
Designed Landscape	37	Demesne associated with Millgrove House	Principal structure is in RPS
Designed Landscape	38	Demesne associated with Silver Hill	No
Designed Landscape	39	Demesne associated with Rathenny Cottage	Principal structure is in RPS
Designed Landscape	40	Demesne associated with Rathenny House	Principal structure is in RPS
Designed Landscape	41	Demesne associated with Emmel Castle	Principal structure is in RPS
Designed Landscape	42	Demesne associated with Emmel House	No
Designed Landscape	43	Demesne associated with Glebe House (Templeharry)	Principal structure is in RPS
Designed Landscape	43	Demesne associated with Ballintemple House	Principal structure is in RPS

4.3 The Birr Loop

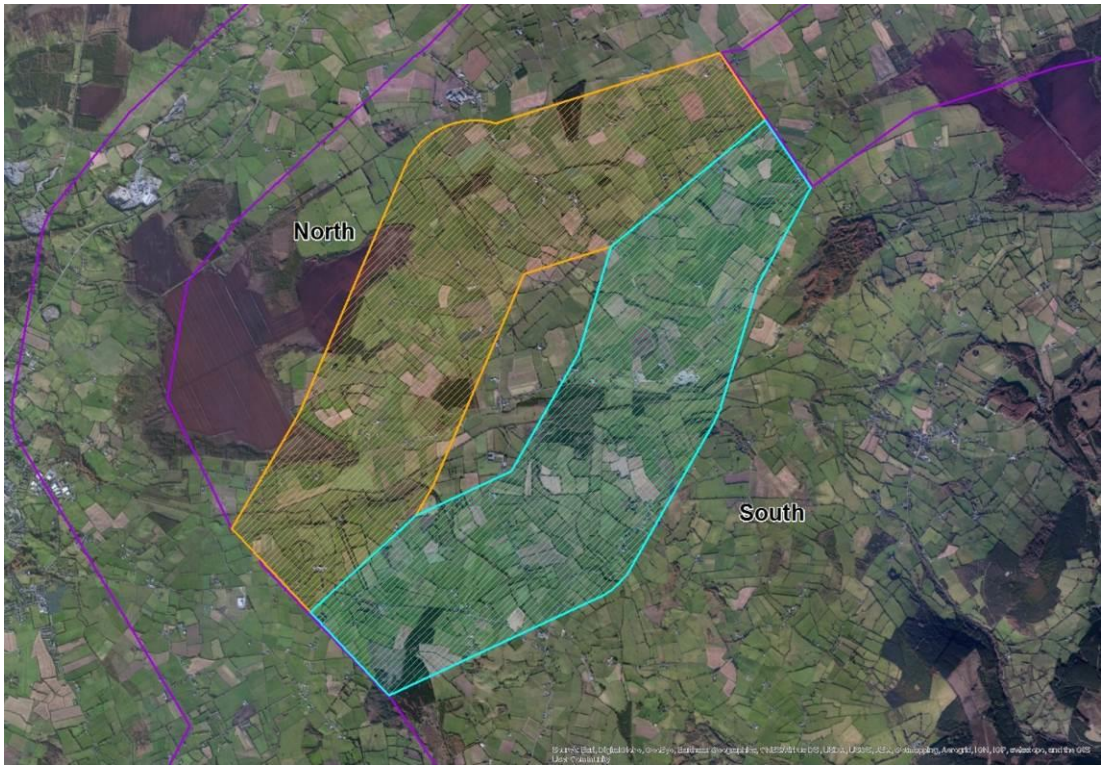


Figure F8 – 5 The Birr Loop

4.3.1 Northern Branch

Table F8 - 7 details the Cultural Heritage constraints that has been identified within the Birr Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF035-033----	Castle - tower house	Yes
RMP	OF036-001----	Enclosure	Yes
RMP	OF036-002----	Ringfort - rath	Yes
RMP	OF036-003----	Enclosure	Yes
RMP	OF036-004----	Enclosure	Yes
RMP	OF036-035001/2	Bawn & fortified house	Yes
RMP	OF031-034----	Enclosure	Yes
RMP	OF031-035----	Enclosure	Yes
RMP	OF031-036----	Moated site	Yes
RMP	OF035-006----	Enclosure	Yes
RMP	OF035-007----	Ringfort - rath	Yes
RMP	OF035-008----	Enclosure	Yes
RMP	OF035-009----	Redundant record	No
RMP	OF035-010----	Enclosure	Yes
RMP	OF035-011----	Ringfort - rath	Yes
RMP	OF036-005----	Enclosure	Yes
RMP	OF036-006----	Ringfort - unclassified	Yes
RMP	OF036-007----	Enclosure	Yes
RMP	OF036-020----	Moated site	Yes
RMP	OF036-019----	Ringfort - rath	Yes
RMP	OF036-081----	Barrow - ring-barrow	Yes
RMP	OF035-038----	Redundant record	No

RMP	OF035-039----	Redundant record	No
RMP	OF035-040----	Redundant record	No
RMP	OF035-041----	Redundant record	No
RMP	OF035-042----	Redundant record	No
RMP	OF035-043----	Redundant record	No
RMP	OF035-044----	Redundant record	No
RMP	OF035-045----	Redundant record	No
RMP	OF035-046----	Redundant record	No
RMP	OF035-047----	Redundant record	No
RMP	OF035-048----	Redundant record	No
RMP	OF035-050----	Road - class 3 togher	Yes
RMP	OF035-051----	Road - class 3 togher	Yes
RMP	OF035-061----	Redundant record	No
RMP	OF035-062----	Redundant record	No
RPS/ NIAH	50-24 14936018	House	Yes
RPS/ NIAH	50-17 14931001	Thomastown Park House	Yes
NIAH	14936001	Water pump	No
Designed Landscape	44	Demesne associated with Fortel Castle	No
Designed Landscape	45	Demesne associated with Thomastown House	Principal structure is in RPS

4.3.2 Southern Branch

Table F8 - 8 details the Cultural Heritage constraints that has been identified within the Birr Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF036-036----	Enclosure	Yes
RMP	OF036-037----	Designed landscape - tree-ring	Yes
RMP	OF036-038----	Enclosure	Yes
RMP	OF036-008----	Enclosure	Yes
RMP	OF036-009----	Ringfort - rath	Yes
RMP	OF036-010----	Enclosure	Yes
RMP	OF036-011----	Ringfort - rath	Yes
RMP	OF036-012----	Enclosure	Yes
RMP	OF036-013----	Enclosure	Yes
RMP	OF036-022----	Enclosure	Yes
RMP	OF036-025----	Ringfort - rath	Yes
RMP	OF036-048----	Designed landscape - tree-ring	Yes
RMP	OF036-049----	Fulacht fia	Yes
RMP	OF036-082----	Mound	Yes
RPS/ NIAH	50-21 14936004	Cloganmore House	Yes
RPS/ NIAH	50-22 14936005	Heath Lodge	Yes
RPS/ NIAH	54-01	Breaghmore Bridge	Yes

	14936007		
NIAH	14936003	Streamstown House	No
Designed Landscape	46	Demesne associated with Oakley Park	No
Designed Landscape	47	Demesne associated with Kilmaine House	No
Designed Landscape	48	Demesne associated with Steamstown House	No
Designed Landscape	49	Demesne associated with Osierbrook House	No
Designed Landscape	50	Demesne associated with Cloghan House	Principal structure is in RPS
Designed Landscape	51	Demesne associated with Droughville House	No
Designed Landscape	52	Demesne associated with Heath Lodge	Principal structure is in RPS

4.4 The Edenderry Loop

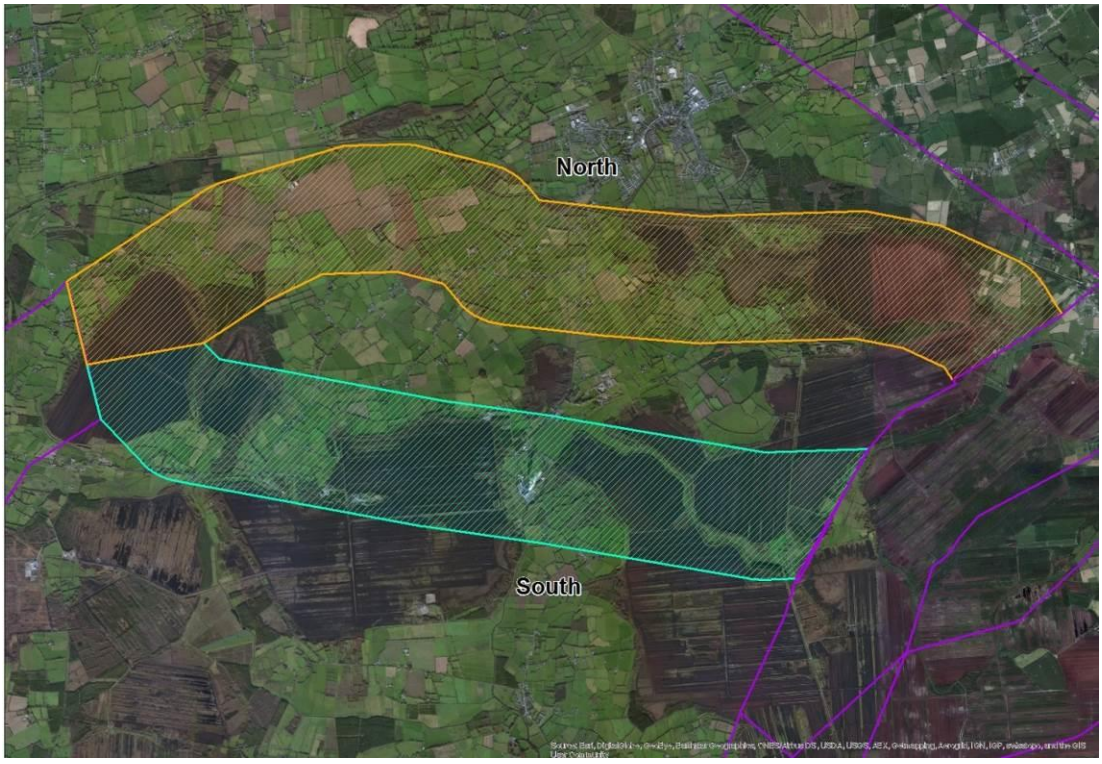


Figure F8 – 6 The Edenderry Loop

4.4.1 Northern Branch

Table F8 - 9 details the Cultural Heritage constraints that has been identified within the Edenderry Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF011-020----	Enclosure	Yes
RMP	OF011-022----	Barrow - ring-barrow	Yes
RMP	OF011-024----	Enclosure	Yes
RMP	OF011-025----	Enclosure	Yes

RMP	OF011-031----	Enclosure	Yes
RMP	OF011-053----	Enclosure	Yes
RMP	OF011-054----	Barrow - ring-barrow	Yes
RMP	OF012-005001/2	Church & graveyard	Yes
RMP	OF012-006001/2	Castle - motte and bailey & enclosure	Yes
RMP	OF012-008----	Standing stone	Yes
RMP	OF012-009----	Enclosure	Yes
RMP	OF011-062----	Redundant record	No
RPS/ NIAH	16-09 14911007	Cartland Bridge	Yes
RPS/ NIAH	16-15 14911015	Ballinla House	Yes
RPS/ NIAH	17-59 14911021	Rathmore Bridge	Yes
RPS/ NIAH	17-61 14912004	Colgan's Bridge	Yes
RPS/ NIAH	17-62 14912005	Downshire Bridge	Yes
RPS/ NIAH	17-63 14912006	Drumcooly Park	Yes
RPS/ NIAH	17-64 14912007	House	Yes
RPS/ NIAH	17-65 14912008	Blundell Aqueduct	Yes
RPS/ NIAH	17-66 14912010	Mile stone	Yes
NIAH	14912011	Little Tunnel	No
NIAH	14912003	Drumcooly House	No
Designed Landscape	53	Demesne associated with Ballinla House	Principal structure is in RPS
Designed Landscape	54	Demesne associated with Lumville House	No
Designed Landscape	55	Demesne associated with Ballycolgan House	No
Designed Landscape	56	Demesne associated with Clarkville House	No
Designed Landscape	57	Demesne associated with Rathgreedan House	No
Designed Landscape	58	Demesne associated with Drumcooly Park	Principal structure is in RPS

4.4.2 Southern Branch

Table F8 - 10 details the Cultural Heritage constraints that has been identified within the Edenderry Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF019-002----	Enclosure	Yes
RMP	OF019-003----	Enclosure	Yes
RMP	OF019-009----	Road - unclassified togher	Yes
RMP	OF019-020----	Road - class 3 togher	Yes

RMP	OF019-021----	Road - class 3 togher	Yes
RMP	OF019-022----	Redundant record	No
RMP	OF019-023----	Redundant record	No
RMP	OF019-024----	Redundant record	No
RMP	OF019-025----	Redundant record	No
RMP	OF019-026----	Road - class 3 togher	Yes
RMP	OF019-027----	Redundant record	No
RMP	OF019-029----	Redundant record	No
RMP	OF019-028----	Road - class 3 togher	Yes
RMP	OF019-030----	Redundant record	No
RMP	OF019-031----	Redundant record	No
RMP	OF019-032----	Road - class 2 togher	Yes
RMP	OF019-033----	Redundant record	No
RMP	OF019-034----	Redundant record	No
RMP	OF019-035----	Road - class 3 togher	Yes
RMP	OF019-036----	Redundant record	No
RMP	OF019-038----	Redundant record	No
RMP	OF019-037----	Road - class 3 togher	Yes
RMP	OF019-039----	Road - class 3 togher	Yes
RMP	OF019-040----	Redundant record	No
RMP	OF019-041----	Road - class 1 togher	Yes
RMP	OF019-042----	Road - class 3 togher	Yes
RMP	OF019-043----	Road - class 3 togher	Yes
RMP	OF019-044----	Redundant record	No
RMP	OF019-045----	Redundant record	No
RMP	OF019-046----	Road - class 3 togher	Yes
RMP	OF019-047----	Redundant record	No
RMP	OF019-048----	Road - class 2 togher	Yes
RMP	OF019-049----	Redundant record	No
RMP	OF019-050----	Road - class 3 togher	Yes
RMP	OF019-051----	Road - class 3 togher	Yes
RMP	OF019-052----	Redundant record	No
RMP	OF019-053----	Redundant record	No
RMP	OF019-054----	Road - class 3 togher	Yes
RMP	OF019-055----	Redundant record	No
RMP	OF019-056----	Redundant record	No
RMP	OF019-057----	Redundant record	No
RMP	OF019-058----	Redundant record	No
RMP	OF019-059----	Road - class 3 togher	Yes
RMP	OF019-060----	Redundant record	No
RMP	OF019-061----	Redundant record	No
RMP	OF019-062----	Road - class 1 togher	Yes
RMP	OF019-063----	Road - class 3 togher	Yes
RMP	OF019-064----	Road - class 3 togher	Yes
RMP	OF019-065----	Road - class 3 togher	Yes
RMP	OF019-066----	Road - class 3 togher	Yes
RMP	OF019-067----	Road - class 3 togher	Yes
RMP	OF019-068----	Redundant record	No
RMP	OF019-069----	Road - class 3 togher	Yes
RMP	OF019-070----	Redundant record	No
RMP	OF019-071----	Redundant record	No
RMP	OF019-072----	Redundant record	No
RMP	OF019-073----	Road - class 3 togher	Yes

RMP	OF019-074----	Road - class 3 togher	Yes
RMP	OF019-075----	Redundant record	No
RMP	OF019-076----	Road - class 3 togher	Yes
RMP	OF019-077----	Road - class 3 togher	Yes
RMP	OF019-078----	Redundant record	No
RMP	OF019-079----	Road - class 3 togher	Yes
RMP	OF019-080----	Redundant record	No
RMP	OF019-081----	Redundant record	No
RMP	OF019-082----	Redundant record	No
RMP	OF019-083----	Redundant record	No
RMP	OF019-084----	Redundant record	No
RMP	OF019-085----	Redundant record	No
RMP	OF019-086----	Redundant record	No
RMP	OF019-087----	Redundant record	No
RMP	OF019-088----	Road - class 3 togher	Yes
RMP	OF019-089----	Road - class 3 togher	Yes
RMP	OF019-090----	Redundant record	No
RMP	OF019-091----	Road - class 3 togher	Yes
RMP	OF019-092----	Road - class 3 togher	Yes
RMP	OF019-093----	Redundant record	No
RMP	OF019-095----	Redundant record	No
RMP	OF019-096----	Redundant record	No
RMP	OF019-097----	Redundant record	No
RMP	OF019-098----	Road - class 3 togher	Yes
RMP	OF019-099----	Road - class 3 togher	Yes
RMP	OF019-100----	Redundant record	No
RMP	OF019-101----	Redundant record	No
RMP	OF019-102----	Road - class 3 togher	Yes
RMP	OF019-103----	Redundant record	No
RMP	OF019-104----	Redundant record	No
RMP	OF019-105----	Redundant record	No
RMP	OF019-106----	Redundant record	No
RMP	OF019-107----	Road - class 3 togher	Yes
RMP	OF019-108----	Road - class 3 togher	Yes
RMP	OF019-110----	Road - class 3 togher	Yes
RMP	OF019-109----	Road - class 2 togher	Yes
RMP	OF019-111----	Road - class 3 togher	Yes
RMP	OF019-112----	Redundant record	No
RMP	OF019-113----	Road - class 3 togher	Yes
RMP	OF019-114----	Redundant record	No
RMP	OF019-115----	Redundant record	No
RMP	OF019-116----	Redundant record	No
RMP	OF019-117----	Post row - peatland	Yes
RMP	OF019-118----	Redundant record	No
RMP	OF019-119----	Redundant record	No
RMP	OF019-120----	Road - class 2 togher	Yes
RMP	OF019-121----	Redundant record	No
RMP	OF019-122----	Redundant record	No
RMP	OF019-123----	Road - class 3 togher	Yes
RMP	OF019-124----	Road - class 3 togher	Yes
RPS/ NIAH	27-13 14919004	Kilcumber Bridge	Yes

4.5 The Yellow River Loop

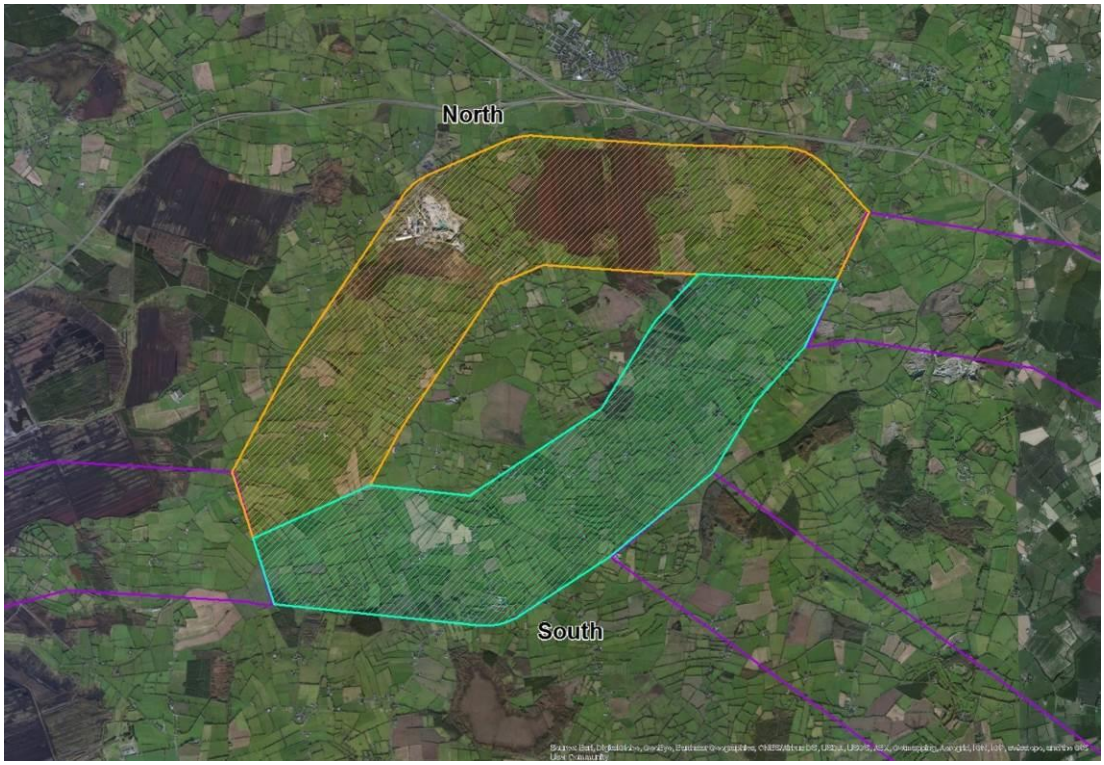


Figure F8 – 7 The Yellow River Loop

4.5.1 Northern Branch

Table F8 - 11 details the Cultural Heritage constraints that has been identified within the Yellow River Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	ME046-008----	Moated site	Yes
RMP	ME046-009----	Church	Yes
RMP	ME046-010----	Bastioned fort	Yes
RMP	ME046-011----	Enclosure	Yes
RMP	ME046-012----	Church	Yes
RMP	ME046-013----	Tomb - chest tomb	Yes
RMP	ME046-028----	Road - class 1 togher	Yes
RMP	ME046-029----	Road - class 1 togher	Yes
RMP	ME046-030----	Road - class 1 togher	Yes
RMP	ME046-031----	Redundant record	No
RMP	ME046-032----	Structure - peatland	Yes
RMP	ME046-033----	Platform - peatland	Yes
RMP	ME046-034----	Platform - peatland	Yes
RMP	ME046-035----	Redundant record	No
RMP	ME046-036----	Platform - peatland	Yes
RMP	ME046-037----	Platform - peatland	Yes
RMP	ME046-038----	Structure - peatland	Yes
RMP	ME046-039----	Structure - peatland	Yes
RMP	ME046-040----	Structure - peatland	Yes
RMP	ME046-041----	Platform - peatland	Yes
RMP	ME046-042----	Platform - peatland	Yes

RMP	ME046-043----	Structure - peatland	Yes
RMP	ME046-044----	Redundant record	No
RMP	ME046-045----	Platform - peatland	Yes
RMP	ME046-046----	Structure - peatland	Yes
RMP	ME046-047----	Structure - peatland	Yes
RMP	ME046-048----	Structure - peatland	Yes
RMP	ME046-049----	Structure - peatland	Yes
RMP	ME046-050----	Road - class 3 togher	Yes
RMP	ME046-051----	Structure - peatland	Yes
RMP	ME046-053----	Structure - peatland	Yes
RMP	ME046-054----	Structure - peatland	Yes
RMP	ME046-055----	Road - class 3 togher	Yes
RMP	ME046-056----	Structure - peatland	Yes
RMP	ME046-057----	Structure - peatland	Yes
RMP	ME046-058----	Structure - peatland	Yes
RMP	ME046-059----	Road - class 3 togher	Yes
RMP	ME046-060----	Road - class 3 togher	Yes
RMP	ME046-061----	Structure - peatland	Yes
RMP	ME046-062----	Structure - peatland	Yes
RMP	ME046-063----	Road - class 1 togher	Yes
RMP	ME046-064----	Road - class 2 togher	Yes
RMP	ME046-065----	Structure - peatland	Yes
RMP	ME046-066----	Structure - peatland	Yes
RMP	ME046-067----	Structure - peatland	Yes
RMP	ME046-068----	Structure - peatland	Yes
RMP	ME046-069----	Structure - peatland	Yes
RMP	ME046-070----	Structure - peatland	Yes
RMP	ME046-071----	Road - class 2 togher	Yes
RMP	ME046-072----	Structure - peatland	Yes
RMP	ME046-073----	Structure - peatland	Yes
RMP	ME046-074----	Structure - peatland	Yes
RMP	ME046-075----	Structure - peatland	Yes
RMP	ME046-076----	Road - class 2 togher	Yes
RMP	ME046-077----	Structure - peatland	Yes
RMP	ME046-078----	Road - class 3 togher	Yes
RMP	ME046-079----	Structure - peatland	Yes
RMP	ME046-080----	Structure - peatland	Yes
RMP	ME046-081----	Structure - peatland	Yes
RMP	ME046-082----	Structure - peatland	Yes
RMP	ME046-083----	Structure - peatland	Yes
RMP	ME046-084----	Burial	Yes
RMP	ME046-085----	Burial	Yes
RMP	ME046-052----	Structure - peatland	Yes
RMP	ME046-009001-	Graveyard	Yes
RMP	ME046-012001-	Graveyard	Yes
RPS/ NIAH	07-01 14904001	Baltinoran Bridge	Yes
NIAH	14904002	Water pump	No
NIAH	14904003	Stonehouse	No
Designed Landscape	59	Demesne associated with Killaskillen House	No

4.5.2 Southern Branch

Table F8 - 12 details the Cultural Heritage constraints that has been identified within the Yellow River Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	OF004-004----	Hilltop enclosure	Yes
RMP	OF004-009----	Moated site	Yes
RMP	OF004-010/001	Castle - tower house & bawn	Yes
RMP	ME046-016----	Enclosure	Yes
RMP	ME052-001----	Ringfort - rath	Yes
RMP	ME052-002----	Castle - motte and bailey	Yes
RMP	ME052-003----	Church	Yes
RMP	ME052-004----	Castle - tower house	Yes
RMP	ME052-005----	Castle - tower house	Yes
RMP	ME052-006----	Bridge	Yes
RMP	ME052-002001-3	Castle - tower house, graveyard & headstone	Yes
RPS/ NIAH	07-04 14904011	Post box	Yes
NIAH	14904004	Sheep Bridge	No
NIAH	14904010	The Harrow (house)	No
NIAH	14904012	Water pump	No
NIAH	14904013	Clongall Bridge	No
RPS/ NIAH	MH046-101/102 14404601/2	Harristown House & outbuildings	Yes
RPS/ NIAH	MH052-101 14338002	Church	Yes
RPS/ NIAH	MH052-100 14338001	Water pump	Yes
RPS/ NIAH	MH052-101 14338004	Church & graveyard	Yes
RPS/ NIAH	MH052-104 14338005	Bridge	Yes
NIAH	14338003	Telephone box	No
Designed Landscape	59	Demesne associated with Greenhills House	Outbuildings are in RPS
Designed Landscape	60	Demesne associated with Harristown House	Principal structure is in RPS
Designed Landscape	61	Demesne associated with Park House	No

4.6 The Killinagh Loop

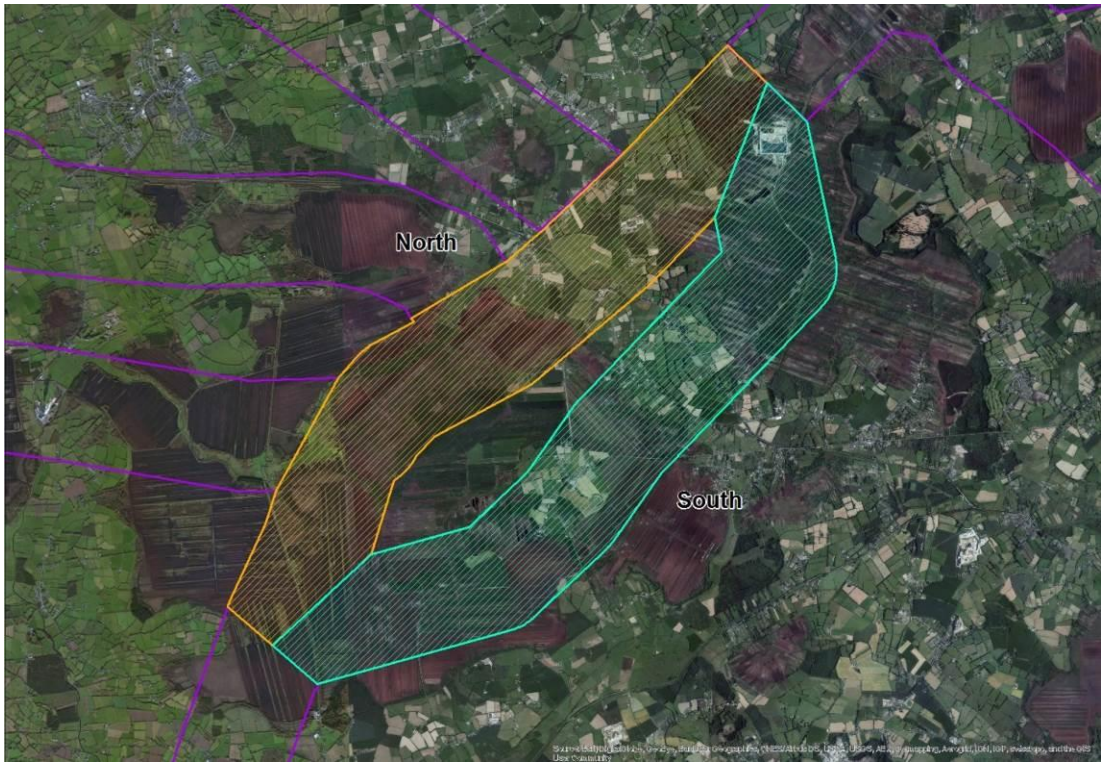


Figure F8– 8 The Killinagh Loop

4.6.1 Northern Branch

Table F8 - 13 details the Cultural Heritage constraints that has been identified within the Killinagh Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	KD012-002001-	Road - class 1 togher	Yes
RMP	KD012-001----	Burial ground	Yes
RMP	KD012-012001/2	Church & graveyard	Yes
RPS	B08-12	Drummin House	Yes
Designed Landscape	62	Demesne associated with Drummond House	Principal structure is in RPS

4.6.2 Southern Branch

Table F8 - 14 details the Cultural Heritage constraints that has been identified within the Killinagh Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	KD012-005----	Moated site	Yes

RMP	KD012-006---- KD012-006001- KD012-006002- KD012-006003- KD012-006004- KD012-006005- KD012-006006- KD012-006007- KD012-006009- KD012-006010- KD012-006011- KD012-006012- KD012-006013- KD012-006014- KD012-006015- KD012-006016- KD012-006017- KD012-006018- KD012-006019- KD012-006020- KD012-006021-	Ecclesiastical site Ecclesiastical enclosure Ecclesiastical enclosure Enclosure Church Graveyard Field system Bullaun stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross-inscribed stone Cross Cross Cross-inscribed stone Cross-inscribed stone	Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes
RMP	KD008-029001-	Road - class 1 togher	Yes
RMP	KD008-030----	Road - class 1 togher	Yes
RMP	KD008-038----	Road - unclassified togher	Yes
RMP	KD012-014----	Road - class 1 togher	Yes
RMP	KD012-015----	Road - gravel/stone trackway - peatland	Yes
RMP	KD012-016----	Road - gravel/stone trackway - peatland	Yes
RMP	KD012-014001/2	2 Roads - class 1 togher	Yes
RMP	KD012-006020-	Cross-inscribed stone	Yes
RMP	KD012-010001-8	7 Cross-inscribed stones (present location) & 2 Crosses (present location	Yes
RPS	B12-01	Lullymore Monastic Enclosure	Yes
Designed Landscape	63	Demesne associated with Lullymore Lodge	No

4.7 The Barreen Loop

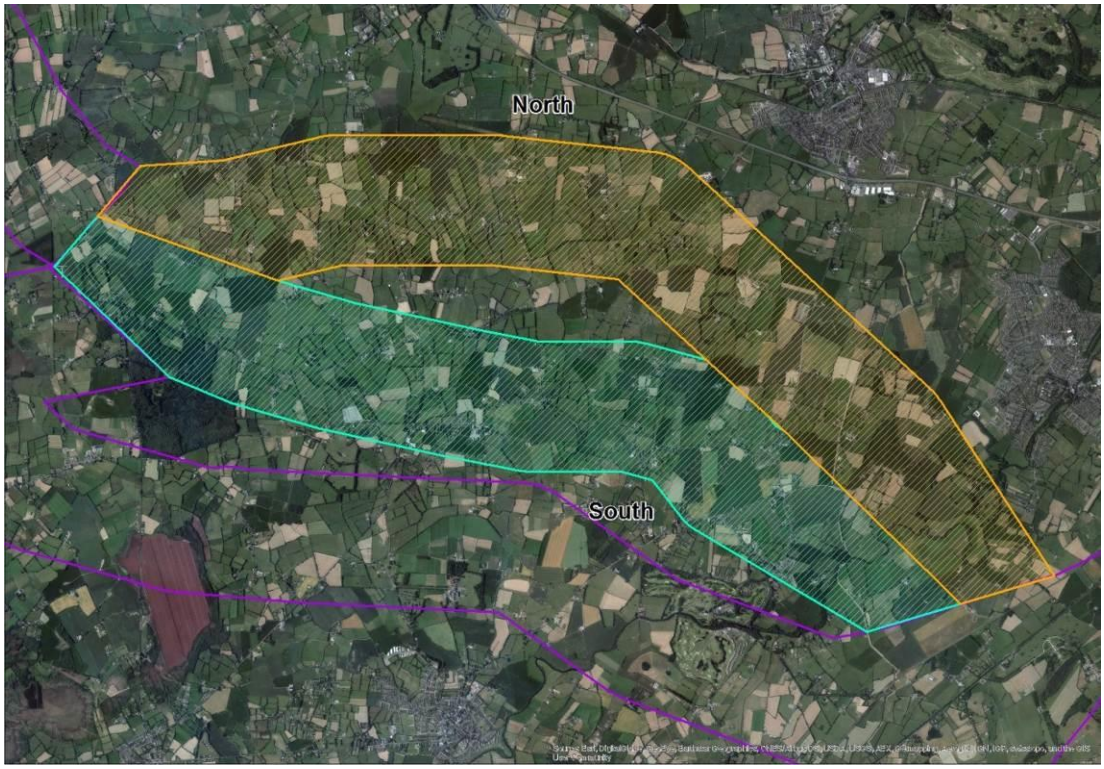


Figure F8 – 9 The Barreen Loop

4.7.1 Northern Branch

Table F8 - 15 details the Cultural Heritage constraints that has been identified within the Barreen Northern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	KD011-005----	Ringfort - unclassified	Yes
RMP	KD010-025----	Ringfort - rath	Yes
RMP	KD010-023----	Enclosure	Yes
RMP	KD010-024----	Ritual site - holy well	Yes
RMP	KD010-036----	Redundant record	No
RMP	KD011-006/001	Church & graveyard	Yes
RMP	KD011-015001/2	Church & Ecclesiastical enclosure	Yes
RMP	KD009-003----	Ringfort - unclassified	Yes
RMP	KD010-001001-	Linear earthwork	Yes
RMP	KD010-002----	Ringfort - rath	Yes
RMP	KD010-003----	Enclosure	Yes
RMP	KD010-004----	Ringfort - rath	Yes
RMP	KD010-005----	Ringfort - rath	Yes
RMP	KD010-006----	Enclosure	Yes
National Monument & RMP	KD010-014/001	Ecclesiastical site & enclosure	Yes
RPS	B10-01	Round Tower	Yes
RPS	B10-03	Church and Graveyard	Yes
RPS	B10-04A	Surviving Portions of the	Yes

		Pale:	
RPS	B10-04B-1	Surviving Portions of the Pale:	Yes
RPS	B10-05	Holy Well	Yes
RPS/ NIAH	B10-10 11901005	Church	Yes
RPS	B10-15	House	Yes
RPS/ NIAH	B10-20 11901006	House	Yes
RPS	B10-21	House	Yes
RPS	B10-22	House	Yes
RPS	B11-01	Chapel	Yes
RPS	B11-07	House	Yes
RPS	B11-21	Estate Cottage	Yes
RPS	B11-121	House	Yes
RPS	B10-04B-2	Surviving Portions of the Pale:	Yes
Designed Landscape	64	Demesne associated with Laragh House	Principal structure is in RPS
Designed Landscape	65	Demesne associated with Rose Lawn	Principal structure is in RPS
Designed Landscape	66	Demesne associated with Killadoon	Principal structure is in RPS

4.7.2 Southern Branch

Table F8 - 16 details the Cultural Heritage constraints that has been identified within the Barreen Southern Loop

Site Type	ID Number	Classification	Statutory Protection
RMP	KD010-029----	Enclosure	Yes
RMP	KD010-027----	Enclosure	Yes
RMP	KD010-028----	Enclosure	Yes
National Monument & RMP	KD010-018001-5	Castle - Anglo-Norman masonry castle, gate house, formal garden, house & 18th/19th C house	Yes
RMP	KD010-019----	Ritual site - holy well	Yes
RMP	KD010-020----	Cist	Yes
RMP	KD010-022/001	Castle - tower house & bawn	Yes
RMP	KD010-034----	House - 17th century	Yes
RMP	KD014-015----	Castle - unclassified	Yes
RMP	KD014-016----	Church	Yes
RMP	KD009-004----	Ringfort - rath	Yes
RMP	KD009-005----	Ringfort - rath	Yes
RMP	KD010-009001/2	Church & graveyard	Yes
RMP	KD010-015----	Barrow - ring-barrow	Yes
RMP	KD010-016----	Ringfort - unclassified	Yes
RMP	KD009-014001-6	Church, graveyard, fonts & effigial tomb	Yes
RMP	KD014-016001-5	Graveyard, Tomb – effigial, ecclesiastical site	Yes

		& enclosure, children's burial ground	
RMP	KD010-041----	Habitation site	Yes
RPS	B09-01	Donadea Canopied tomb & Medieval Church in Ruins	Yes
RPS	B09-05	Ringfort	Yes
RPS	B09-09	Newpark House	Yes
RPS	B09-12	Hillview (former Post Office)	Yes
RPS	B09-13	The Rectory	Yes
RPS/ NIAH	B09-16 11900901	Connolly's	Yes
RPS/ NIAH	B09-18 11900905	Saint Peter's Church	Yes
RPS	B09-19	Ballagh Lodge	Yes
RPS	B10-07	Killeen Moat	Yes
RPS/ NIAH	B10-14 11901001	Thatched Dwelling, Painestown Cross	Yes
RPS	B10-02	Castle	Yes
RPS	B10-08	Barberstown Castle	Yes
RPS/ NIAH	B10-09 11901002	Rathcoffey Catholic Church	Yes
RPS	B10-12	Barberstown House	Yes
RPS	B10-17	Greygates"" (house)	Yes
RPS/ NIAH	B10-19 11901003	Baltracey House	Yes
RPS	B14-03	Castledillon Graveyard and Early Church Site	Yes
RPS/ NIAH	B14-22 11809013	Old RIC Barracks	Yes
RPS/ NIAH	B14-23 11809006	Glebe House	Yes
RPS	B14-24	Lodge Park and Demesne	Yes
RPS	B14-31	West Lodge (gate Lodge)	Yes
RPS/ NIAH	B14-44 11809015	Straffan Inn	Yes
RPS/ NIAH	B14-52 11809014	St. Brigid's Catholic Church, Straffan, Co. Kildare	Yes
RPS/ NIAH	B14-53 11809016	Straffan, Co. Kildare	Yes
Designed Landscape	67	Demesne associated with Newpark	Principal structure is in RPS
Designed Landscape	68	Demesne associated with Donadea Castle	Principal structure is in RPS
Designed Landscape	69	Demesne associated with Painestown House	No
Designed Landscape	70	Demesne associated with Rathcoffey House	Principal structure is in RPS

Designed Landscape	71	Demesne associated with Glebe House (Straffan)	Principal structure is in RPS
Designed Landscape	72	Demesne associated with Lodge Park	Principal structure is in RPS

The Matrix of Multi Criteria analysis below summarises the assessment of all loop/branch options.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna		Nenagh		Birr		Edenderry		Yellow River		Killinagh		Barreen	
	N	S	N	S	N	S	N	S	N	S	N	S	N	S
Cultural Heritage (including Architecture & Archaeology)	Mid-range	Low	Mid-range	Mid-range	Mid-range	Low	Mid-range	High	High	Low	High	High	Mid-range	Mid-range

Table E5 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

Lough Eorna Loop
Both pipeline corridors are of similar size and cross a similar agricultural landscape. However, the north loop contains a total of 52 sites that are recorded within the RMP, including two National Monuments (TN015-009, TN015-013). A total of four of the sites are listed as redundant records. The southern loop contains only 29 recorded sites (and no National Monuments) and therefore the likely hood of impacting on recorded sites within the southern corridor is less. In addition three of the sites are listed as redundant records.

Regarding the built heritage resource, six protected structures are located within the northern corridor, three of which are also listed in the NIAH survey. There are two protected structures recorded within the southern corridor and no NIAH survey buildings. This trend is also reflected within the location of designed landscapes. Seven landscapes are located in the northern corridor, three of which are associated with protected structures. However, only three are located within the southern corridor, one of which is associated with a protected structure. A review of the aerial photographic coverage of both corridors show that neither contain significant stretches of bogland. The southern loop is preferable in terms of containing a proposed pipeline route.

Nenagh Loop
Both pipeline corridors are of similar size and cross a similar agricultural landscape. However, the north loop contains a total of 56 sites that are recorded within the RMP, although none of these are listed as National Monuments or within the Preservation Orders list. A total of two of the sites are listed a redundant record and archaeological excavation. The southern loop contains 36 recorded sites (and no National Monuments/ Preservation Orders) and therefore the likely hood of impacting on recorded sites within the southern corridor is less. In addition one further site is listed as a redundant record.

Regarding the built heritage resource, 17 protected structures are located within the northern corridor, with 13 of these also listed in the NIAH survey. An additional building is listed within the NIAH that is not a protected structure. There are 26 protected structures recorded within the southern corridor and of which 12 are also recorded within the NIAH survey. One further NIAH building is also located within this area that is not recorded in the RPS. A total of 12 designed landscapes are located in the northern corridor, nine of which are associated with protected structures. There are 22 designed landscapes located within the southern corridor, 17 of which are associated with a protected structure. A review of the aerial photographic coverage of both corridors show that neither contain significant stretches of bogland. Although similar in terms of constraints, the southern corridor is considered to be slightly more preferable.

Birr Loop
Both pipeline corridors are of similar size and cross a similar agricultural landscape. However, the north loop contains a total of 22 sites that are recorded within the RMP, although none of these are listed as National Monuments or within the Preservation Orders list. A further 14 sites are listed as redundant records. The southern loop contains 14 recorded sites (and no National Monuments/ Preservation Orders) and therefore the likely hood of impacting on recorded sites within the southern corridor is less.

Regarding the built heritage resource, two protected structures are located within the northern corridor, with these also listed in the NIAH survey. An additional building is listed within the NIAH that is not a protected structure. There are three protected structures recorded within the southern corridor and these are also recorded within the NIAH survey. One further NIAH building is also located within this area that is not recorded in the RPS. A total of two designed landscapes are located in the northern corridor, one of which is associated with protected structures. There are seven designed landscapes located within the southern corridor, two of which are associated with a protected structure. A review of the aerial photographic coverage of both corridors shows that the western part of the northern corridor contains a small amount of bogland that could potentially be avoided by the pipeline route. There is no obvious bogland in the southern corridor. Based on the constraints identified, the southern corridor would be slightly more preferable.

Edenderry Loop

The two pipeline corridors are of similar size but cross differing landscapes and this is reflected within the archaeological constraints identified. The northern loop contains a total of 12 sites that are recorded within the RMP, although none of these are listed as National Monuments or within the Preservation Orders list. A further site is also listed as a redundant record. The southern loop contains 107 recorded sites (no National Monuments/ Preservation Orders), although 58 of these sites are now listed as redundant records. The large amount of sites are due to the presence of bogland that takes up much of the southern corridor.

Regarding the built heritage resource, there are nine protected structures located within the northern corridor, with these also listed in the NIAH survey. A further two structures are listed within the NIAH that are not protected structures. There are no protected structures recorded within the southern corridor and one building recorded within the NIAH survey. A total of six designed landscapes are located in the northern corridor, two of which are associated with protected structures. There are no designed landscapes located in the southern corridor and this is due in most part to the proliferation of bogland. A review of the aerial photographic coverage of both corridors shows that whilst the western portions of both corridors are located within boglands, much of the southern corridor is also located within a bogland landscape. Due to the high archaeological potential of bogland, the northern route would be more preferable in terms of routing a pipeline through this landscape.

Yellow River Loop

The two pipeline corridors are of similar size but cross slightly differing landscapes and this is reflected within the archaeological constraints identified. The northern loop contains a total of 66 sites that are recorded within the RMP, although none of these are listed as National Monuments or within the Preservation Orders list. Of these sites three are listed as redundant records. The southern loop contains 11 recorded sites (no National Monuments/ Preservation Orders). The large amount of sites in the northern corridor is due to the presence of bogland that takes up approximately a fifth of the corridor. It should also be noted that the majority of the bogland site in the northern corridor have been subject to archaeological excavation.

Regarding the built heritage resource, there is only one protected structure located within the northern corridor, and this is also listed in the NIAH survey. A further three structures are listed within the NIAH that are not protected structures. There are six protected structures recorded within the southern corridor. These are all included in the NIAH survey along with five additional buildings. Only one designed landscape is present in the northern corridor and this is not associated with a protected

structure. There are three designed landscapes located in the southern corridor. One of these is associated with a protected structure, whilst the other forms the setting for outbuildings that were once associated with a large house that has now been listed as a protected structure. A review of the aerial photographic coverage of both corridors shows that approximately one fifth of the northern corridor is located within boglands, whilst the southern corridor avoids this terrain. The southern corridor is more preferable in terms of routing a pipeline through this area.

Killinagh Loop

The two pipeline corridors are of similar size and cross similar landscapes that is characterised for the most part by boglands. This is reflected within the archaeological constraints identified. The northern loop contains a total three RMPs and none of these are listed as National Monuments or within the Preservation Orders list. The southern loop contains 11 recorded sites (no National Monuments/ Preservation Orders). The relative scarcity of recorded archaeological sites is due to the presence of bogland where it is likely that archaeological surveys have yet to take place in any great detail.

Regarding the built heritage resource, there is only one protected structure located within both the northern and southern corridors. No NIAH buildings are recorded in either corridor. Again this is due to the topography of the landscape, which was not wholly conducive for settlement.

There is one designed landscape present in the northern corridor and this is associated with a protected structure. There is one designed landscape within the southern corridor, but this is not associated with a protected structure. A review of the aerial photographic coverage of both corridors shows that approximately 60 percent of the northern corridor is located within boglands, whilst the southern corridor covers c. 80 percent. The northern corridor is more preferable in terms of routing a pipeline through this area.

Barreen Loop

Both pipeline corridors are of similar size and cross a similar agricultural landscape. The north loop contains a total of 15 sites that are recorded within the RMP, with one of these being listed as a National Monument (KD010-014). The southern loop contains 18 recorded sites and one of these sites is also recorded as a National Monument (KD010-018001). Both corridors are very similar when the archaeological constraints alone are collated.

Regarding the built heritage resource, 15 protected structures are located within the northern corridor, with only two of these also listed in the NIAH survey. A total of 18 protected structures are located in the southern corridor and ten of these are included in the NIAH survey. Three designed landscapes are located in the northern corridor, all of which are associated with protected structures. There are six designed landscapes located within the southern corridor, five of which are associated with a protected structure. A review of the aerial photographic coverage of both corridors show that neither contain significant stretches of bogland. Although similar in terms of constraints, the northern corridor is considered to be slightly more preferable.

5 Preliminary Route Corridor AB

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F8 – 10 below.

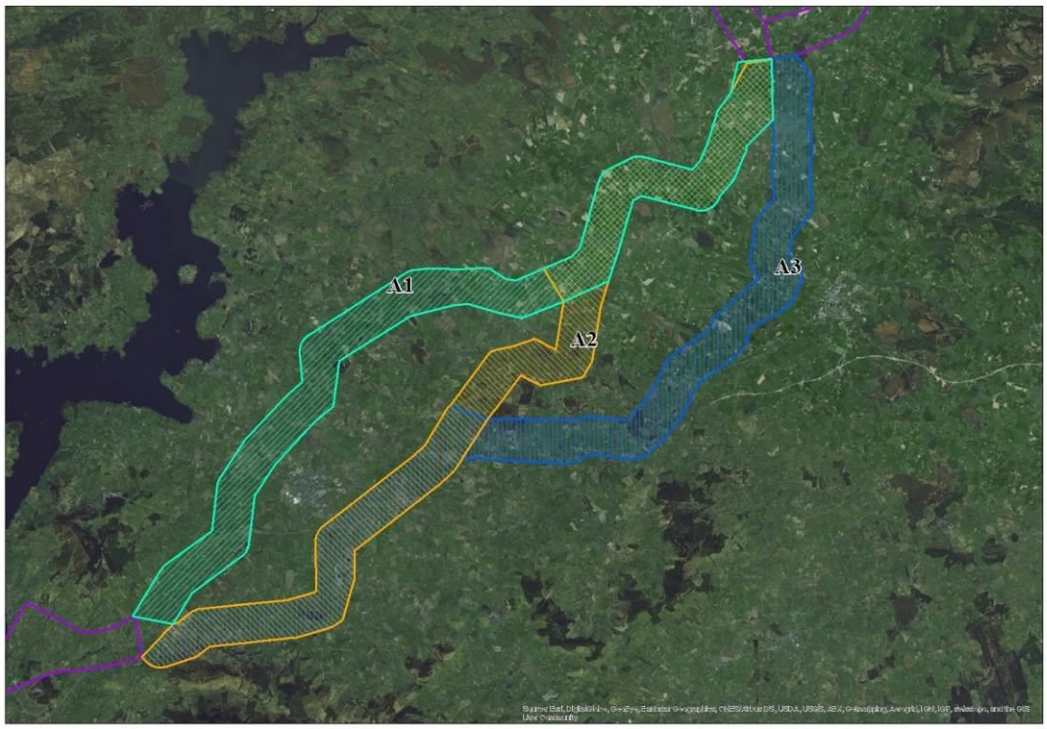


Figure F8 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Table F8 - 17 details the Cultural Heritage constraints that has been identified within Route Corridor A1

Site Type	ID Number	Classification	Statutory Protection
RMP	TN020-044001-3	Castle - tower house, well & bawn	Yes
RMP	TN020-045----	Ringfort - rath	Yes
RMP	TN020-057001-3	Castle - tower house, Bawn & House - indeterminate date	Yes
RMP	TN025-012----	Enclosure	Yes
RMP	TN025-013----	Enclosure	Yes
RMP	TN025-014----	Souterrain	Yes
RMP	TN010-099----	Fulacht fia	Yes
RMP	TN010-100----	Redundant record	No
RMP	TN025-061----	Ringfort - rath	Yes

RMP	TN014-077----	Moated site	Yes
RMP	TN010-045----	Enclosure	Yes
RMP	TN010-059----	Enclosure	Yes
RMP	TN010-075----	Enclosure	Yes
RMP	TN010-091----	Ringfort - rath	Yes
RMP	TN010-092----	Enclosure	Yes
RMP	TN010-101----	Fulacht fia	Yes
RMP	TN008-049----	Moated site	Yes
RMP	TN008-053----	Enclosure	Yes
RMP	TN010-037----	Enclosure	Yes
RMP	TN010-039----	Redundant record	No
RMP	TN010-040----	Enclosure	Yes
RMP	TN010-042----	Redundant record	No
RMP	TN010-044----	Redundant record	No
RMP	TN010-046/001	Castle - hall-house & bawn	Yes
RMP	TN010-047001/2	Ringfort – rath & sweathouse	Yes
RMP	TN010-048----	Redundant record	No
RMP	TN010-051----	Moated site	Yes
RMP	TN010-058----	Ringfort - rath	Yes
RMP	TN010-060----	Enclosure	Yes
RMP	TN010-061----	Designed landscape - tree-ring	Yes
RMP	TN010-062----	Barrow - bowl-barrow	Yes
RMP	TN010-063----	Barrow - bowl-barrow	Yes
RMP	TN010-064----	Enclosure	Yes
RMP	TN010-065----	Ringfort - rath	Yes
RMP	TN010-066----	Earthwork	Yes
RMP	TN010-067----	Enclosure	Yes
RMP	TN010-069----	Megalithic tomb - unclassified	Yes
RMP	TN010-072----	Well	Yes
RMP	TN010-073----	Earthwork	Yes
RMP	TN010-074----	Enclosure	Yes
RMP	TN010-070----	Castle - hall-house	Yes
RMP	TN010-071----	Enclosure	Yes
RMP	TN010-078----	Enclosure	Yes
RMP	TN010-082----	Enclosure	Yes
RMP	TN010-090----	Moated site	Yes
RMP	TN010-083----	Enclosure	Yes
RMP	TN010-084001-5	Settlement deserted – medieval, Church, castle, bawn, graveyard & Bullaun stone	Yes
RMP	TN010-085----	Ringfort - rath	Yes
RMP	TN010-086----	Enclosure	Yes
RMP	TN010-087----	Ringfort - rath	Yes
RMP	TN010-093001/2	Castle – unclassified & bawn	Yes
RMP	TN010-103----	Fulacht fia	Yes
RMP	TN010-104----	Enclosure	Yes
RMP	TN010-113----	Redundant record	No
RMP	TN011-009----	Ringfort - rath	Yes

RMP	TN011-011001-	Ringfort – rath, Meeting-house & burial ground	Yes
RMP	TN011-016----	Earthwork	Yes
RMP	TN011-017----	Redundant record	No
RMP	TN011-018----	Ringfort - rath	Yes
RMP	TN011-019----	Barrow - stepped barrow	Yes
RMP	TN011-020001/2	Castle - tower house & Designed landscape - tree-ring	Yes
RMP	TN011-021----	Enclosure	Yes
RMP	TN011-022----	Enclosure	Yes
RMP	TN011-023----	Earthwork	Yes
RMP	TN011-024----	Ringfort - rath	Yes
RMP	TN011-025----	Castle - ringwork	Yes
RMP	TN011-026----	Enclosure	Yes
RMP	TN011-027----	Moated site	Yes
RMP	TN011-028001/2	Moated site & Fulacht fia	Yes
RMP	TN011-029----	Enclosure	Yes
RMP	TN011-032----	Fulacht fia	Yes
RMP	TN014-022----	Ringfort - rath	Yes
RMP	TN014-023----	Ringfort - rath	Yes
RMP	TN014-025----	Enclosure	Yes
RMP	TN014-026----	Ringfort - rath	Yes
RMP	TN014-030----	Ringfort - rath	Yes
RMP	TN014-031----	Enclosure	Yes
RMP	TN014-034----	Ringfort - rath	Yes
RMP	TN014-035----	Ringfort - rath	Yes
RMP	TN015-012----	Ringfort - rath	Yes
RMP	TN014-051001/2	Church & graveyard	Yes
RMP	TN014-052----	Barrow - bowl-barrow	Yes
RMP	TN014-053----	Ringfort - rath	Yes
RMP	TN014-054----	Ringfort - rath	Yes
RMP	TN014-055----	Enclosure	Yes
RMP	TN014-059----	Enclosure	Yes
RMP	TN014-060----	Barrow - mound barrow	Yes
RMP	TN014-063----	Water mill - unclassified	Yes
RMP	TN014-064----	Enclosure	Yes
RMP	TN015-001----	Ringfort - rath	Yes
RMP	TN015-003----	Ringfort - rath	Yes
RMP	TN015-004----	Ringfort - rath	Yes
RMP	TN015-005----	Ringfort - rath	Yes
RMP	TN015-006----	Redundant record	Yes
RMP	TN015-007----	Ringfort - rath	Yes
RMP	TN015-008----	Ringfort - rath	Yes
RMP	TN015-010----	Ringfort - rath	Yes
RMP	TN015-011----	Ringfort - rath	Yes
National Monument & RMP	TN015-009----	Linkardstown burial	Yes
National Monument & RMP	TN015-013----	Linkardstown burial	Yes
RMP	TN015-014----	Ringfort - rath	Yes
RMP	TN015-	Church & Castle - tower	Yes

	015001/2/4	house & graveyard	
RMP	TN015-016----	Ringfort - rath	Yes
RMP	TN015-017----	Ringfort - rath	Yes
RMP	TN015-018----	Ringfort - rath	Yes
RMP	TN015-020----	Castle - motte	Yes
RMP	TN015-044----	House - indeterminate date	Yes
RMP	TN015-041----	Ringfort - rath	Yes
RMP	TN015-042----	Megalithic structure	Yes
RMP	TN015-043001/2	Ringfort – rath & enclosure	Yes
RMP	TN015-046----	Enclosure	Yes
RMP	TN015-047----	Redundant record	No
RMP	TN015-048001 & 3	Castle - tower house & Ringfort - cashel	Yes
RMP	TN015-049----	Enclosure	Yes
RMP	TN015-071----	Ringfort - rath	Yes
RMP	TN015-107----	Fulacht fia	Yes
RMP	TN020-021----	Ringfort - rath	Yes
RMP	TN020-026----	Ritual site - holy well	Yes
RMP	TN020-027----	Designed landscape feature	Yes
RMP	TN020-028001/2	Church & Graveyard	Yes
RMP	TN020-030----	House - fortified house	Yes
RMP	TN020-034001/3	Ford & bridge	Yes
RMP	TN020-071----	Ringfort - rath	Yes
RMP	TN020-043----	Ringfort - rath	Yes
RMP	TN020-065----	Bridge	Yes
RMP	TN020-066001/3	Children's burial ground & enclosure	Yes
RMP	TN020-067----	Enclosure	Yes
RMP	TN020-069----	Ringfort - rath	Yes
RMP	TN020-072----	Castle - ringwork	Yes
RMP	TN020-073----	Enclosure	Yes
RMP	TN020-098----	Enclosure	Yes
RMP	TN020-113----	Redundant record	No
RMP	TN020-114----	Redundant record	No
RMP	TN025-071----	Fulacht fia	Yes
RMP	TN025-025----	Standing stone	Yes
RMP	TN025-062----	Ringfort - rath	Yes
RMP	TN025-017----	Ringfort - rath	Yes
RMP	TN025-020001/2	Two Ringforts - rath	Yes
RMP	TN025-023----	Ringfort - rath	Yes
RMP	TN025-024----	Enclosure	Yes
RMP	TN025-026----	Enclosure	Yes
RMP	TN025-027----	Enclosure	Yes
RMP	TN025-028----	Enclosure	Yes
RMP	TN025-047----	Ringfort - rath	Yes
RMP	TN025-048----	Ringfort - rath	Yes
RMP	TN025-051----	Ringfort - rath	Yes
RMP	TN025-054----	Enclosure	Yes
RMP	TN025-056----	Ringfort - rath	Yes
RMP	TN025-057----	Earthwork	Yes

RMP	TN025-058----	Ringfort - rath	Yes
RMP	TN025-059----	Enclosure	Yes
RMP	TN025-060----	Ringfort - rath	Yes
RMP	TN025-063----	Enclosure	Yes
RMP	TN025-064----	Ringfort - rath	Yes
RMP	TN025-065----	Enclosure	Yes
RMP	TN025-066----	Enclosure	Yes
RMP	TN025-067----	Ringfort - rath	Yes
RMP	TN025-068001/2	Ringfort – rath & Standing stone	Yes
RMP	TN025-069----	Enclosure	Yes
RMP	TN025-070----	Fulacht fia	Yes
RMP	TN025-072----	Fulacht fia	Yes
RMP	TN025-073----	Redundant record	No
RMP	TN025-074----	House - indeterminate date	Yes
RMP	TN025-077001/2	Church & graveyard	Yes
RMP	TN026-004----	Enclosure	Yes
RMP	TN026-007----	Enclosure	Yes
RMP	TN026-008----	Ringfort - rath	Yes
RMP	TN026-010----	Enclosure	Yes
RMP	TN026-035----	Castle - unclassified	Yes
RMP	TN026-072001-2	Ritual site - holy tree/bush & Children's burial ground	Yes
RMP	OF041-002----	Ringfort - rath	Yes
RMP	OF042-001----	Designed landscape feature	Yes
RMP	OF042-002----	House - fortified house	Yes
RMP	OF042-003----	Moated site	Yes
RMP	OF042-004----	Fulacht fia	Yes
RMP	OF042-005----	Mound	Yes
RMP	OF042-006----	Ringfort - rath	Yes
RMP	OF042-015----	Enclosure	Yes
RMP	OF038-006----	Enclosure	Yes
RMP	OF038-007----	Ecclesiastical enclosure	Yes
RMP	OF038-007001-5	Church, holy well, church, graveyard & bullaun stone	Yes
RMP	OF038-008----	Well	Yes
RMP	OF038-009----	Enclosure	Yes
RMP	OF038-016001/2	Castle - tower house, bawn	Yes
RMP	OF038-019001/2	Castle – unclassified, bawn	Yes
RMP	OF038-017----	Cairn - unclassified	Yes
RMP	OF038-018----	Enclosure	Yes
RMP	OF038-020----	Enclosure	Yes
RMP	OF038-021----	House - 16th/17th century	Yes
RMP	OF038-022----	Enclosure	Yes
RMP	OF038-030----	Barrow - ring-barrow	Yes
RMP	OF038-031----	Ringfort - rath	Yes
RMP	OF042-004002-6	Five Fulacht fia	Yes

RPS/ NIAH	S14/ 22401507	Ashleypark House	Yes
RPS	S15	H-plan House	Yes
RPS/ NIAH	S45/6 22401443/4	Rockford House & outbuildings	Yes
RPS/ NIAH	S74/ 22401017	Ballyrickard House	Yes
RPS	S76	Ballythomas Cottage	Yes
RPS	S86	Behamore House	Yes
RPS	S88	House	Yes
RPS/ NIAH	S117 22304027	Deerpark House	Yes
RPS/ NIAH	S160 22401021-3	Modreeny House	Yes
RPS	S187	Hilton House	Yes
RPS	S221	Castleview House	Yes
RPS	S223	Republican Monument	Yes
RPS	S224	Knigh Dispensary	Yes
RPS	S225	House	Yes
RPS	S273	Merton Hall	Yes
RPS/ NIAH	S280 22401022	Modreeny Church	Yes
RPS/ NIAH	S282 22401023/ 28	Historical House & gate lodge	Yes
RPS	S288	Monsea House	Yes
RPS	S303	Newtown School	Yes
RPS	S333	Richmond House	Yes
RPS/ NIAH	S388 22402016	Tullamore Park	Yes
RPS	S281	House	Yes
RPS/ NIAH	S579 22401441	House	Yes
RPS/ NIAH	S580 22401440	Mill	Yes
RPS	S582	Ballyhimikin Bridge	Yes
RPS/ NIAH	S583/ 22401505	Ardcroney Church	Yes
RPS	S637	Fatthen House	Yes
RPS	S638	Kilcolman House	Yes
RPS	S640	Ballyhogan Church (Burgess)	Yes
RPS	S679	Fort Henry	Yes
RPS	S680	Fort Henry Lodge	Yes
RPS	S681	Bushfield House	Yes
NIAH	22401442	Thatched cottage	No
NIAH	22402015	House	No
RPS/ NIAH	60-01 14941001/2/3	Cangort Park & outbuildings	Yes
RPS/ NIAH	60-04 14941004	Cottage	Yes
RPS/ NIAH	57-05 14942001	Corolanty House	Yes
RPS/ NIAH	57-07	Clareen House	Yes

	14942009		
RPS/ NIAH	53-15 14938003	Saint Colman's Church of Ireland Church	Yes
NIAH	14938004	Cree House	No
RPS/ NIAH	56-03 14938019	Ballincor House	Yes
Designed Landscape	62	Demesne associated with Fort Henry	Principal structure is an RPS
Designed Landscape	72	Demesne associated with Kilmastulla House	No
Designed Landscape	73	Demesne associated with Bushfield House	No
Designed Landscape	75	Demesne associated with Kilcolman House	Principal structure is an RPS
Designed Landscape	74	Demesne associated with Cranna House	No
Designed Landscape	76	Demesne associated with Tullamore Park	Principal structure is an RPS
Designed Landscape	77	Demesne associated with Richmond House	Principal structure is an RPS
Designed Landscape	78	Demesne associated with Rockford House	Principal structure is an RPS
Designed Landscape	79	Demesne associated with Ballyanny House	No
Designed Landscape	80	Demesne associated with Castleview House	Principal structure is an RPS
Designed Landscape	81	Demesne associated with Greenhall House	No
Designed Landscape	87	Demesne associated with Cloghkeating Castle	Principal structure is an RPS
Designed Landscape	88	Demesne associated with Merton Hall	Principal structure is an RPS
Designed Landscape	89	Demesne associated with Fort William	Principal structure is an RPS
Designed Landscape	90	Demesne associated with Modreeny House	Principal structure is an RPS
Designed Landscape	91	Demesne associated with Hilton House	Principal structure is an RPS
Designed Landscape	92	Demesne associated with Modreeny	Principal structure is an RPS
Designed Landscape	93	Demesne associated with Northland	No
Designed Landscape	94	Demesne associated with Cloughjordan House	No
Designed Landscape	95	Demesne associated with Deerpark House	Principal structure is an RPS
Designed Landscape	95a	Demesne associated with Knockanacree Wood House	No
Designed Landscape	96	Demesne associated with Behamore House	Principal structure is an RPS
Designed Landscape	98	Demesne associated with Cangort Park	Principal structure is an RPS

Designed Landscape	99	Demesne associated with Springpark	No
Designed Landscape	100	Demesne associated with Fairyhill House	No
Designed Landscape	101	Demesne associated with Clifton House	No
Designed Landscape	102	Demesne associated with Wingfield House	No
Designed Landscape	103	Demesne associated with Ballincor House	Principal structure is an RPS
Designed Landscape	104	Demesne associated with Rathcahill	No
Designed Landscape	105	Demesne associated with Glebe House	No
Designed Landscape	107	Demesne associated with Clareen	Principal structure is an RPS
Designed Landscape	108	Demesne associated with Derry House	No
Designed Landscape	109	Demesne associated with Rathmore	No
Designed Landscape	119	Demesne associated with Willsborough House	No
Designed Landscape	120	Demesne associated with Ashleypark House	Principal structure is an RPS
Designed Landscape	121	Demesne associated with Prospect House	Principal structure is an RPS
Designed Landscape	122	Demesne associated with Woodpark	No
Designed Landscape	123	Demesne associated with Knigh Cottage	Principal structure is an RPS
Designed Landscape	124	Demesne associated with Ballinderry House	Principal structure is an RPS
Designed Landscape	125	Demesne associated with Ballyrickard House	Principal structure is an RPS
Designed Landscape	126	Demesne associated with Congor House	No
Designed Landscape	127	Demesne associated with Kylebeg House	No
Designed Landscape	128	Demesne associated with Ballynavin Castle	Principal structure is an RPS
Designed Landscape	148	Demesne associated with Corolanty House	Principal structure is in RPS

5.3 Route Corridor A2

Table F8 - 18 details the Cultural Heritage constraints that has been identified within Route Corridor A2

Site Type	ID Number	Classification	Statutory Protection
RMP	OF041-002----	Ringfort - rath	Yes
RMP	OF042-001----	Designed landscape feature	Yes
RMP	OF042-002----	House - fortified house	Yes

RMP	OF042-003----	Moated site	Yes
RMP	OF042-004----	Fulacht fia	Yes
RMP	OF042-005----	Mound	Yes
RMP	OF042-006----	Ringfort - rath	Yes
RMP	OF042-015----	Enclosure	Yes
RMP	OF044-001001/2	Castle & bawn	Yes
RMP	OF044-002----	Designed landscape - tree-ring	Yes
RMP	OF044-006----	Enclosure	Yes
RMP	OF044-007----	Enclosure	Yes
RMP	OF044-008----	Ringfort - rath	Yes
RMP	OF044-009----	Ringfort - unclassified	Yes
RMP	OF044-010----	Ringfort - unclassified	Yes
RMP	OF044-011001/2	House - 17th century & church	Yes
RMP	OF044-013----	Ringfort - unclassified	Yes
RMP	OF044-014----	Megalithic tomb - unclassified	Yes
RMP	OF044-015----	House - 18th/19th century	Yes
RMP	OF044-016----	Fulacht fia	Yes
RMP	OF038-006----	Enclosure	Yes
RMP	OF038-007----	Ecclesiastical enclosure	Yes
RMP	OF038-007001-5	Church, holy well, church, graveyard & bullaun stone	Yes
RMP	OF038-008----	Well	Yes
RMP	OF038-009----	Enclosure	Yes
RMP	OF038-016001-2	Castle - tower house & bawn	Yes
RMP	OF038-019001/2	Castle & bawn	Yes
RMP	OF038-017----	Cairn - unclassified	Yes
RMP	OF038-018----	Enclosure	Yes
RMP	OF038-020----	Enclosure	Yes
RMP	OF038-021----	House - 16th/17th century	Yes
RMP	OF038-022----	Enclosure	Yes
RMP	OF038-030----	Barrow - ring-barrow	Yes
RMP	OF038-031----	Ringfort - rath	Yes
RMP	OF044-011003-	Graveyard	Yes
RMP	OF042-004002-6	Five Fulachta fia	Yes
RMP	TN008-049----	Moated site	Yes
RMP	TN008-053----	Enclosure	Yes
RMP	TN011-009----	Ringfort - rath	Yes
RMP	TN011-011001-	Ringfort – rath, Meeting-house & burial ground	Yes
RMP	TN011-021----	Enclosure	Yes
RMP	TN015-087----	Ringfort - rath	Yes
RMP	TN015-088----	Enclosure	Yes
RMP	TN015-089----	Ringfort - rath	Yes
RMP	TN015-090----	Castle - tower house	Yes
RMP	TN015-103001/2	Ringfort – rath & ringfort	Yes
RMP	TN015-104----	Barrow - ring-barrow	Yes
RMP	TN021-014----	Ringfort - rath	Yes

RMP	TN021-015----	Castle - tower house	Yes
RMP	TN021-016----	Ringfort - rath	Yes
RMP	TN021-018----	Ringfort - rath	Yes
RMP	TN021-019----	Ringfort - rath	Yes
RMP	TN021-020001/2	Church & graveyard	Yes
RMP	TN021-031----	Ringfort - rath	Yes
RMP	TN021-032----	Castle - tower house	Yes
RMP	TN021-034----	Ringfort - rath	Yes
RMP	TN021-035----	Ringfort - rath	Yes
RMP	TN021-036----	Castle - motte and bailey	Yes
RMP	TN021-037----	Enclosure	Yes
RMP	TN021-038----	Ringfort - rath	Yes
RMP	TN021-045----	Ringfort - rath	Yes
RMP	TN021-046----	Standing stone	Yes
RMP	TN021-047----	Ringfort - rath	Yes
RMP	TN021-048----	Ringfort - rath	Yes
RMP	TN021-049----	Ringfort - rath	Yes
RMP	TN021-050----	Ringfort - rath	Yes
RMP	TN021-051----	Ringfort - rath	Yes
RMP	TN021-052001/2	Two enclosures	Yes
RMP	TN021-053----	Ringfort - rath	Yes
RMP	TN021-054----	Enclosure	Yes
RMP	TN021-055/001	Castle - tower house & Settlement deserted - medieval	Yes
RMP	TN021-057----	Ringfort - rath	Yes
RMP	TN021-067----	Ritual site - holy well	Yes
RMP	TN021-083----	Enclosure	Yes
RMP	TN021-094001/2	House - indeterminate date & enclosure	Yes
RMP	TN021-096----	Excavation	No
RMP	TN021-097----	Redundant record	No
RMP	TN026-033----	Ringfort - rath	Yes
RMP	TN026-034----	Enclosure	Yes
RMP	TN026-036001-	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-037----	Redundant record	No
RMP	TN026-041001/2	Church & graveyard	Yes
RMP	TN026-042----	Enclosure	Yes
RMP	TN026-043001/2	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-044----	Castle - unclassified	Yes
RMP	TN026-045001/2	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-046----	Ringfort - rath	Yes
RMP	TN026-047----	Earthwork	Yes
RMP	TN026-049----	Ringfort - rath	Yes
RMP	TN026-050----	Ritual site - holy well	Yes
RMP	TN026-051----	Megalithic tomb - wedge tomb	Yes
RMP	TN026-052----	Enclosure	Yes
RMP	TN026-053----	Earthwork	Yes
RMP	TN026-054----	Enclosure	Yes
RMP	TN026-055----	Road - road/trackway	Yes

RMP	TN026-057----	Ringfort - rath	Yes
RMP	TN026-060----	Castle - unclassified	Yes
RMP	TN026-070----	Ecclesiastical enclosure	Yes
RMP	TN026-071----	Redundant record	Yes
RMP	TN027-170----	Cursing stone	Yes
RMP	TN026-086----	Redundant record	No
RMP	TN027-001----	Enclosure	Yes
RMP	TN027-029----	Earthwork	Yes
RMP	TN027-050----	Earthwork	Yes
RMP	TN027-060----	Ringfort - rath	Yes
RMP	TN027-163----	Settlement deserted - medieval	Yes
RMP	TN027-163001-4	Field system, tower house, hollow-way & Water mill	Yes
RMP	TN021-098----	Burnt mound	Yes
RMP	TN021-100----	Fulacht fia	Yes
RMP	TN021-101----	Habitation site	Yes
RMP	TN021-099----	House - indeterminate date	Yes
RMP	TN027-170001-	Cross - High cross	Yes
RPS/ NIAH	60-01 14941001/2/3	Cangort Park & outbuildings	Yes
RPS/ NIAH	60-04 14941004	Cottage	Yes
RPS/ NIAH	57-05 14942001	Corolanty House	Yes
RPS/ NIAH	57-07 14942009	Clareen House	Yes
RPS/ NIAH	63-02 14944004	Templepark House	Yes
RPS/ NIAH	63-03 14944006	Ballintemple House	Yes
RPS/ NIAH	63-04 14944007	Templeharry Rectory	Yes
RPS/ NIAH	63-07 14944010	Springmount House	Yes
RPS/ NIAH	63-08 14944011	Springmount Mill	Yes
RPS/ NIAH	63-09 14944012	Mill Farm	Yes
RPS/ NIAH	53-15 14938003	Saint Colman's Church of Ireland Church	Yes
NIAH	14938004	Cree House	No
RPS/ NIAH	56-03 14938019	Ballincor House	Yes
RPS	S78	Bantis House	Yes
RPS	S177	Glenahilty	Yes
RPS	S190	Islandbawn House	Yes
RPS	S691	Debsborough House, Outbuilding	Yes
RPS/ NIAH	S61 22402122	Bayly Farm	Yes

RPS/ NIAH	S213 22402103	Castle Willington	Yes
RPS/ NIAH	S228 22402118	Knockalton House	Yes
RPS/ NIAH	S321 22402106	Rectory	Yes
RPS/ NIAH	S322 22402109	Rathurles Bridge	Yes
RPS/ NIAH	S326 22402107	Rathurles House	Yes
RPS/ NIAH	S641 22402104	Hermitage House	Yes
RPS/ NIAH	S642 22402105	CoI Church & Graveyard	Yes
RPS/ NIAH	S643 22402101	Bridge	Yes
RPS/ NIAH	S644 22402113	Liffey Mills	Yes
NIAH	22401511	Glenahilty School	No
NIAH	22401520	Riverlawn House	No
RPS/ NIAH	S198 22492605/10	Kilboy House & entrance	Yes
RPS	S31	Kilmore Church	Yes
RPS	S86	Behamore House	Yes
RPS	S122	Cottage	Yes
RPS	S123	Kilmore Glebe House	Yes
RPS	S171	Garryard House	Yes
RPS	S349	Minestack & smelting house	Yes
RPS/ NIAH	S686 22402602/3/4	Shallee Mine Works	Yes
RPS	S678	Water pump	Yes
RPS	S473	House	Yes
RPS	S475	House	Yes
RPS	S476	House	Yes
Designed Landscape	74	Demesne associated with Cranna House	No
Designed Landscape	82	Demesne associated with Shallee House (Lower)	No
Designed Landscape	83	Demesne associated with Shallee House	No
Designed Landscape	84	Demesne associated with Kilmore Glebe House	Principal structure is an RPS
Designed Landscape	85	Demesne associated with Sragh House	No
Designed Landscape	86	Demesne associated with Desborough House	Principal structure is in RPS
Designed Landscape	96	Demesne associated with Behamore House	Principal structure is an RPS
Designed Landscape	97	Demesne associated with Cangort Park	No

Designed Landscape	98	Demesne associated with Springpark	Principal structure is an RPS
Designed Landscape	99	Demesne associated with Fairyhill House	No
Designed Landscape	100	Demesne associated with Clifton House	No
Designed Landscape	101	Demesne associated with Wingfield House	No
Designed Landscape	102	Demesne associated with Behamore House	No
Designed Landscape	103	Demesne associated with Ballincor House	Principal structure is an RPS
Designed Landscape	104	Demesne associated with Rathcahill	Principal structure is an RPS
Designed Landscape	105	Demesne associated with Glebe House	No
Designed Landscape	107	Demesne associated with Clareen	No
Designed Landscape	108	Demesne associated with Derry House	Principal structure is an RPS
Designed Landscape	109	Demesne associated with Rathmore	No
Designed Landscape	129	Demesne associated with Islandbawn House	Principal structure is an RPS
Designed Landscape	130	Demesne associated with Rathurles House	Principal structure is an RPS
Designed Landscape	131	Demesne associated with Knockalton Lower	Principal structure is an RPS
Designed Landscape	133	Demesne associated with Ballynaclough	No
Designed Landscape	134	Demesne associated with Carranthurles	No
Designed Landscape	135	Demesne associated with Castle Wellington	Principal structure is an RPS
Designed Landscape	136	Demesne associated with Cloonmore	No
Designed Landscape	138	Demesne associated with Tooreigh	No
Designed Landscape	137	Demesne associated with Ballinahemrey	No
Designed Landscape	139	Demesne associated with Elmhill	No
Designed Landscape	140	Demesne associated with Riverlawn	No
Designed Landscape	141	Demesne associated with Donnybrook	Principal structure is in RPS
Designed Landscape	142	Demesne associated with Wilton House	No
Designed Landscape	143	Demesne associated with Glenahilty	Principal structure is in RPS
Designed Landscape	144	Demesne associated with Bantis House	Principal structure is in RPS
Designed Landscape	146	Demesne associated with Coolnamunna	Principal structure is in RPS

		House	
Designed Landscape	147	Demesne associated with Emmel Castle	Principal structure is in RPS
Designed Landscape	148	Demesne associated with Corolanty House	Principal structure is in RPS

5.4 Route Corridor A3

Table F8 - 19 details the Cultural Heritage constraints that has been identified within Route Corridor A3

Site Type	ID Number	Classification	Statutory Protection
RMP	OF042-011----	Ringfort - rath	Yes
RMP	OF042-012----	Enclosure	Yes
RMP	OF042-010001/2	Castle - tower house & bawn	Yes
RMP	OF042-020----	Redundant record	No
RMP	OF042-021001/2	Castle - tower house & bawn	Yes
RMP	OF042-022----	Church	Yes
RMP	OF042-023----	Ringfort - rath	Yes
RMP	OF042-036----	Designed landscape - tree-ring	Yes
RMP	OF042-037----	Castle - unclassified	Yes
RMP	OF045-006----	Ringfort - rath	Yes
RMP	OF045-007001/2	Church & enclosure	Yes
RMP	OF045-008----	Ringfort - unclassified	Yes
RMP	OF045-012----	Ringfort - unclassified	Yes
RMP	OF045-009001/2	House - 17th century	Yes
RMP	OF045-010----	Ringfort - unclassified	Yes
RMP	OF045-011----	Ringfort - rath	Yes
RMP	OF045-017----	Ringfort - rath	Yes
RMP	OF045-018----	Ringfort - rath	Yes
RMP	OF045-019----	Ringfort - unclassified	Yes
RMP	OF045-020----	Ringfort - rath	Yes
RMP	OF045-021----	Ringfort - rath	Yes
RMP	OF045-022----	Settlement deserted - medieval	Yes
RMP	OF045-025----	Ringfort - rath	Yes
RMP	OF045-026----	Enclosure	Yes
RMP	OF045-030----	Ringfort - rath	Yes
RMP	OF045-031----	Enclosure	Yes
RMP	OF045-032001-5	Church, bullaun stone, graveyard and cross	Yes
RMP	OF045-033----	Ritual site - holy well	Yes
RMP	OF045-034----	Ringfort - rath	Yes
RMP	OF045-041----	Castle - unclassified	Yes
RMP	OF045-045----	Castle - unclassified	Yes
RMP	OF046-001----	Enclosure	Yes
RMP	OF046-002----	Ringfort - unclassified	Yes
RMP	OF046-003----	Enclosure	Yes
RMP	OF046-004----	Enclosure	Yes
RMP	OF046-005----	Ringfort - rath	Yes
RMP	OF046-006----	Church	Yes
RMP	OF046-007----	Mound	Yes

RMP	OF046-008001-	Castle - tower house, bawn & House - 17th century	Yes
RMP	OF046-009----	Enclosure	Yes
RMP	OF046-010----	Ringfort - rath	Yes
RMP	OF046-011----	Enclosure	Yes
RMP	OF046-012----	Enclosure	Yes
RMP	OF046-013----	Ringfort - rath	Yes
RMP	OF046-017001-3	Enclosure, Fulacht fia & Charcoal-making site	Yes
RMP	OF046-028001-	Burnt mound	Yes
RMP	OF047-005----	Ringfort - unclassified	Yes
RMP	OF047-001----	Ringfort - rath	Yes
RMP	OF047-002----	Castle - unclassified	Yes
RMP	OF047-003----	Enclosure	Yes
RMP	OF047-004----	Ringfort - rath	Yes
RMP	OF038-013----	Castle - unclassified	Yes
RMP	OF038-010----	Enclosure	Yes
RMP	OF038-011----	Ringfort - rath	Yes
RMP	OF038-012----	Enclosure	Yes
RMP	OF038-023----	Ringfort - cashel	Yes
RMP	OF038-024----	Ringfort - rath	Yes
RMP	OF038-025----	Ringfort - rath	Yes
RMP	OF038-034----	Ringfort - rath	Yes
RMP	OF038-035----	Ringfort - rath	Yes
RMP	OF038-036----	Ringfort - rath	Yes
RMP	OF046-006001-	Graveyard	Yes
RMP	OF045-007003-	Graveyard	Yes
RMP	OF045-022002-5	Graveyard, church, graveslab, field system	Yes
RMP	OF046-029001/2	Burial ground & Metalworking site	Yes
RMP	OF046-028002-5	Four Cremation pits	Yes
RMP	OF045-049----	Redundant record	No
RMP	TN021-096----	Excavation	No
RMP	TN021-097----	Redundant record	No
RMP	TN022-001----	Moated site	Yes
RMP	TN022-002----	Ringfort - rath	Yes
RMP	TN022-003----	Redundant record	No
RMP	TN022-005----	Ringfort - rath	Yes
RMP	TN012-002----	Ritual site - holy well	Yes
RMP	TN012-003----	Ringfort - rath	Yes
RMP	TN012-004----	Barrow - ring-barrow	Yes
RMP	TN015-087----	Ringfort - rath	Yes
RMP	TN015-088----	Enclosure	Yes
RMP	TN015-103001/2	Ringfort – rath & enclosure	Yes
RMP	TN021-014----	Ringfort - rath	Yes
RMP	TN021-015----	Castle - tower house	Yes
RMP	TN021-016----	Ringfort - rath	Yes
RMP	TN021-018----	Ringfort - rath	Yes
RMP	TN021-019----	Ringfort - rath	Yes
RMP	TN021-020001/2	Church & graveyard	Yes

RMP	TN021-024001/2	Castle - tower house & moated site	Yes
RMP	TN021-031----	Ringfort - rath	Yes
RMP	TN021-032----	Castle - tower house	Yes
RMP	TN021-034----	Ringfort - rath	Yes
RMP	TN021-035----	Ringfort - rath	Yes
RMP	TN021-036----	Castle - motte and bailey	Yes
RMP	TN021-037----	Enclosure	Yes
RMP	TN021-038----	Ringfort - rath	Yes
RMP	TN021-045----	Ringfort - rath	Yes
RMP	TN021-046----	Standing stone	Yes
RMP	TN021-047----	Ringfort - rath	Yes
RMP	TN021-048----	Ringfort - rath	Yes
RMP	TN021-049----	Ringfort - rath	Yes
RMP	TN021-050----	Ringfort - rath	Yes
RMP	TN021-051----	Ringfort - rath	Yes
RMP	TN021-052001/2	Two enclosure	Yes
RMP	TN021-053----	Ringfort - rath	Yes
RMP	TN021-054----	Enclosure	Yes
RMP	TN021-055/001	Castle - tower house & deserted medieval settlement	Yes
RMP	TN021-057----	Ringfort - rath	Yes
RMP	TN021-067----	Ritual site - holy well	Yes
RMP	TN021-083----	Enclosure	Yes
RMP	TN021-094001/2	House - indeterminate date & enclosure	Yes
RMP	TN026-033----	Ringfort - rath	Yes
RMP	TN026-034----	Enclosure	Yes
RMP	TN026-036001/2	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-037----	Redundant record	No
RMP	TN026-041001/2	Church & graveyard	Yes
RMP	TN026-042----	Enclosure	Yes
RMP	TN026-043001/2	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-044----	Castle - unclassified	Yes
RMP	TN026-045001/2	Ringfort – rath & Children's burial ground	Yes
RMP	TN026-046----	Ringfort - rath	Yes
RMP	TN026-047----	Earthwork	Yes
RMP	TN026-049----	Ringfort - rath	Yes
RMP	TN026-050----	Ritual site - holy well	Yes
RMP	TN026-051----	Megalithic tomb - wedge tomb	Yes
RMP	TN026-052----	Enclosure	Yes
RMP	TN026-053----	Earthwork	Yes
RMP	TN026-054----	Enclosure	Yes
RMP	TN026-055----	Road - road/trackway	Yes
RMP	TN026-057----	Ringfort - rath	Yes
RMP	TN026-060----	Castle - unclassified	Yes
RMP	TN026-070----	Ecclesiastical enclosure	Yes
RMP	TN026-071----	Redundant record	No
RMP	TN027-170/001	Cursing stone & high	Yes

		cross	
RMP	TN026-086----	Redundant record	No
RMP	TN027-001----	Enclosure	Yes
RMP	TN027-029----	Earthwork	Yes
RMP	TN027-050----	Earthwork	Yes
RMP	TN027-060----	Ringfort - rath	Yes
RMP	TN027-163----	Settlement deserted - medieval	Yes
RMP	TN027-163001-4	Field system, tower house, hollow way, water mill	Yes
RMP	TN021-098----	Burnt mound	Yes
RMP	TN021-100----	Fulacht fia	Yes
RMP	TN021-101----	Habitation site	Yes
RMP	TN021-099----	House - indeterminate date	Yes
RMP	TN022-071----	Burnt mound	Yes
RMP	TN022-072----	Designed landscape feature	Yes
RMP	TN022-073----	Burnt mound	Yes
RMP	TN022-074----	Burnt mound	Yes
RPS/ NIAH	S61 22402122	Bayly Farm	Yes
RPS	S31	Kilmore Church	Yes
RPS	S122	Cottage	Yes
RPS	S190	Islandbawn House	Yes
RPS/ NIAH	S213 22402103	Castle Willington	Yes
RPS/ NIAH	S228 22402118	Knockalton House	Yes
RPS/ NIAH	S198 22492605/10	Kilboy House & entrance	Yes
RPS	S123	Kilmore Glebe House	Yes
RPS	S171	Garryard House	Yes
RPS/ NIAH	S321 22402106	Rectory	Yes
RPS/ NIAH	S322 22402109	Rathurles Bridge	Yes
RPS/ NIAH	S326 22402107	Rathurles House	Yes
RPS	S349	Minestack & smelting house	Yes
RPS/ NIAH	S686 22402602/3/4	Shallee Mine Works	Yes
RPS	S678	Water pump	Yes
RPS	S691	Debsborough House, Outbuilding	Yes
RPS	S473	House	Yes
RPS	S474	House	Yes
RPS	S475	House	Yes
RPS	S476	House	Yes
RPS/ NIAH	S644 22402113	Liffey Mills	Yes

RPS/ NIAH	S643 22402101	Bridge	Yes
RPS/ NIAH	S642 22402105	CoI Church & Graveyard	Yes
RPS/ NIAH	S641 22402104	Hermitage House	Yes
RPS	S52	Millgrove House	Yes
RPS/ NIAH	S93 22402102	Bessborough House	Yes
RPS/ NIAH	S153 22401521	Donnybrook House	Yes
RPS/ NIAH	S404 22401522	Woodville House	Yes
RPS/ NIAH	S557 22401203	Former creamery	Yes
NIAH	22401520	Riverlawn House	No
RPS	S380	St. Bernard's Park	Yes
RPS/ NIAH	61-31 14945003	Clyduff House	Yes
RPS/ NIAH	61-32 14945004	Anne Grove House	Yes
RPS/ NIAH	61-33 14945005	Bridge	Yes
RPS/ NIAH	64-01 14945009	Myrtlegrove House	Yes
NIAH	14945010	House	No
RPS/ NIAH	64-03 14945011	Frankfort Castle	Yes
RPS/ NIAH	64-04 14945012	Dunkerrin Church of Ireland Church	Yes
NIAH	14945013	Water pump	No
RPS/ NIAH	64-05 14945014	The Ink Pot	Yes
RPS/ NIAH	64-07 14947001	Busherstown House	Yes
RPS/ NIAH	64-07 14947002	Busherstown House gate lodge	Yes
RPS/ NIAH	65-08 14947003	Moneygall former Chapel of Ease	Yes
RPS/ NIAH	64-09 14947004	Busherstown Tower	Yes
RPS/ NIAH	61-21 14942026	The Pavillion	Yes
RPS/ NIAH	61-20 14942025	Mount Saint Joseph's College Chapel	Yes
RPS/ NIAH	61-24 14942029	Mount Heaton House	Yes
RPS/ NIAH	61-27 14942032	Mount Saint Joseph's Abbey gate lodge	Yes
NIAH	14942020	Hillsborough House	Yes
RPS/ NIAH	61-18 14942021	Hillsborough Corn Mills	Yes
RPS/ NIAH	61-19 14942024	Post box	Yes

RPS/ NIAH	61-22 14942027	Mount Saint Joseph Abbey School	Yes
RPS/ NIAH	63-13 14946001	Rathenny House gate lodge	Yes
RPS/ NIAH	63-14 14946002	Rathenny Cottage	Yes
RPS/ NIAH	63-15 14946004	Hayes	Yes
RPS/ NIAH	65-02 14946005	Collison	Yes
RPS/ NIAH	53-13 14938001	Castletown House	Yes
RPS/ NIAH	53-14 14938002	House	Yes
NIAH	14938020	Knock House	No
Designed Landscape	74	Demesne associated with Cranna House	No
Designed Landscape	82	Demesne associated with Shallee House (Lower)	No
Designed Landscape	83	Demesne associated with Shallee House	No
Designed Landscape	84	Demesne associated with Kilmore Glebe House	Principal structure is an RPS
Designed Landscape	85	Demesne associated with Sragh House	No
Designed Landscape	86	Demesne associated with Desborough House	Principal structure is in RPS
Designed Landscape	129	Demesne associated with Islandbawn House	Principal structure is an RPS
Designed Landscape	130	Demesne associated with Rathurles House	Principal structure is an RPS
Designed Landscape	131	Demesne associated with Knockalton Lower	Principal structure is an RPS
Designed Landscape	133	Demesne associated with Ballynaclough	No
Designed Landscape	134	Demesne associated with Carranthurles	No
Designed Landscape	135	Demesne associated with Castle Wellington	Principal structure is an RPS
Designed Landscape	136	Demesne associated with Cloonmore	No
Designed Landscape	138	Demesne associated with Tooreigh	No
Designed Landscape	137	Demesne associated with Ballinahemrey	No
Designed Landscape	139	Demesne associated with Elmhill	No
Designed Landscape	140	Demesne associated with Riverlawn	No
Designed Landscape	141	Demesne associated with Donnybrook	Principal structure is in RPS

Designed Landscape	142	Demesne associated with Wilton House	No
Designed Landscape	143	Demesne associated with Glenahilty	Principal structure is in RPS
Designed Landscape	144	Demesne associated with Bantis House	Principal structure is in RPS
Designed Landscape	110	Demesne associated with Dromoyle House	No
Designed Landscape	111	Demesne associated with Glenacurragh Castle	No
Designed Landscape	112	Demesne associated with Cloghan House	No
Designed Landscape	113	Demesne associated with Ciarragh House	No
Designed Landscape	114	Demesne associated with Ballybrickard	No
Designed Landscape	115	Demesne associated with Goldengrove	No
Designed Landscape	116	Demesne associated with Hillsborough	No
Designed Landscape	117	Demesne associated with High Park	Principal structure is in RPS
Designed Landscape	118	Demesne associated with Mount Heaton	Principal structure is in RPS
Designed Landscape	151	Demesne associated with Bessborough House	Principal structure is in RPS
Designed Landscape	150	Demesne associated with Woodville House	Principal structure is in RPS
Designed Landscape	152	Demesne associated with Ballyknockane House	No
Designed Landscape	153	Demesne associated with Falleen House	Principal structure is in RPS
Designed Landscape	154	Demesne associated with Silver Hill	No
Designed Landscape	155	Demesne associated with Cloynoe House	No
Designed Landscape	156	Demesne associated with Larch Vale	No
Designed Landscape	157	Demesne associated with Greenhills House	Outbuildings are in RPS
Designed Landscape	158	Demesne associated with Drumbaun House	Principal structure is in RPS
Designed Landscape	159	Demesne associated with Busherstown House	Principal structure is in RPS
Designed Landscape	160	Demesne associated with Dunkerrin Glebe	No
Designed Landscape	161	Demesne associated with Ballyrihy House	Farmhouse is in RPS
Designed Landscape	162	Demesne associated with Frankfort Castle	Principal structure is in RPS
Designed Landscape	163	Demesne associated with Brooklawn	No
Designed	164	Demesne associated	No

Landscape		with Ballystanley House	
Designed Landscape	165	Demesne associated with Corball	No
Designed Landscape	166	Demesne associated with Ann Grove	No
Designed Landscape	167	Demesne associated with Clyduff House	Principal structure is in RPS

5.5 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Cultural Heritage (including Architecture & Archaeology)			
Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as only two are recorded within the corridor, which covers a large area	**Very low** as none are present	**Very low** as none are present
Potential to impact (direct/indirect) on RMPs (designated sites)	**Mid-range** as a large amount of sites (193) are recorded within the corridor although the areas itself is large	**Low** as although there are a large amount of sites (112) recorded within the corridor the area itself is relatively large	**Mid-range** as a large amount of sites (146) are recorded within the corridor although the areas itself is large
Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (38). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (38). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (54). This is low relative to the size of the area
Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (18). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (27). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (44). This is low relative to the size of the area
Potential to impact (direct/indirect) on historic designed landscapes	**High** due to multiple landscapes (43), some of which survive as open spaces or in association with protected structures	**High** due to multiple landscapes (36), some of which survive as open spaces or in association with protected structures	**High** due to multiple landscapes (48), some of which survive as open spaces or in association with protected structures
Potential to impact on ACA	**Very low** as none are present	**Very low** as none are present	**Very low** as none are present
Recorded shipwreck sites	**Very low** as none are present	**Very low** as none are present	**Very low** as none are present

Table E5 - 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

The three route options are all similar in size and cross a landscape characterised by arable and pastoral farming. The pipeline corridors cover a large area with a width of c. 2km. Corridor A1 is considered to be the least preferable of the route options based on the fact that there are 193 recorded sites or groups of sites located within its area. These include two National Monuments. It should be noted that of the 193 sites, 11 are listed as redundant records. With regards to the built heritage resource a total of 38 protected structures are located within the corridor. Of these, 15 are also recorded in the NIAH survey, with an additional three NIAH structures that are not included in the RPS. A total of 44 designed landscapes have been identified within the corridor, 24 of which are associated directly with protected structures.

Corridor A3 is considered to be the second least preferable. This is based on the presence of 146 recorded monuments (eight of which are listed as redundant records). There are no National Monuments or sites with Preservation Orders within this corridor. With regards to the built heritage resource a total of 54 protected structures are located within the corridor. Of these, 39 are also recorded in the NIAH survey, with an additional five NIAH structures that are not included in the RPS. A total of 48 designed landscapes have been identified within the corridor, 20 of which are associated directly with protected structures.

The most preferable route from a cultural heritage perspective is A2. Only 112 monuments are recorded within this corridor, of which four are listed as redundant records. There are no National Monuments or sites with Preservation Orders located within this corridor. A total of 38 protected structures are recorded, 24 of which are also recorded within the NIAH survey. In addition, there are three NIAH structures listed that are not included in the RPS. A total of 36 designed landscapes have been recorded within the corridor, 17 of which are directly associated with protected structures.

A review of the aerial photographic coverage has shown that there are no substantial areas of bogland located within any of the route corridors.

6 Preliminary Route Corridor BC

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F8 – 11 below.

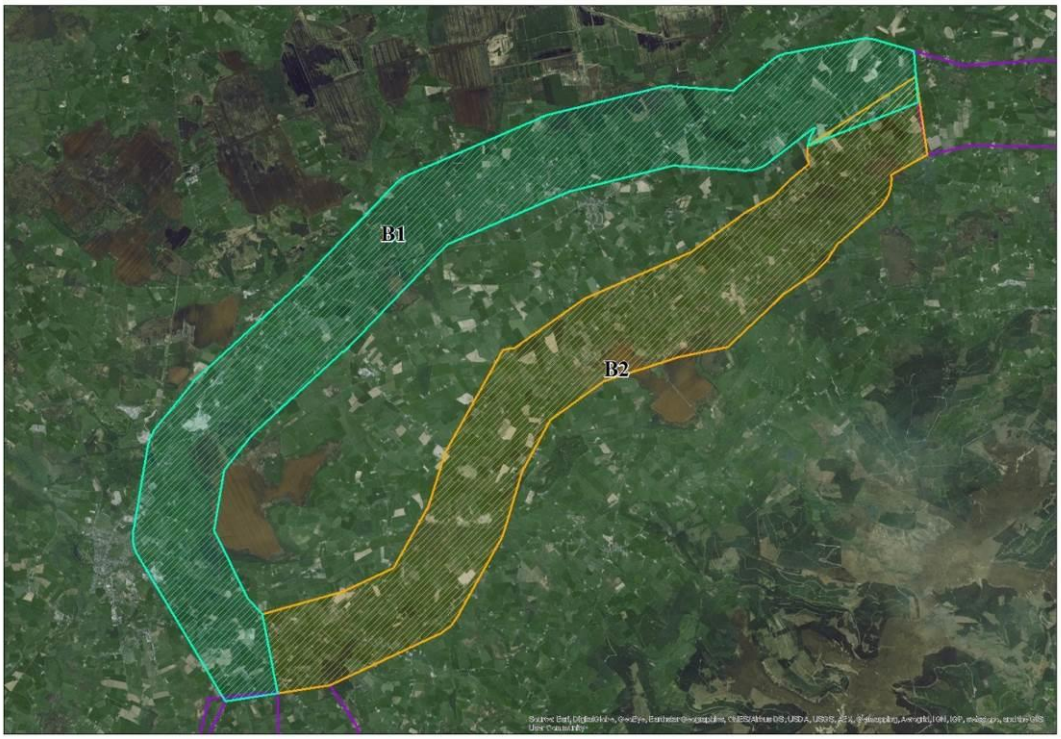


Figure F8 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

Table F8 - 20 details the Cultural Heritage constraints that has been identified within Route Corridor B1

Site Type	ID Number	Classification	Statutory Protection
RMP	OF035-014001/4	Castle - tower house & bawn	Yes
RMP	OF035-015----	Enclosure	Yes
RMP	OF035-026----	Enclosure	Yes
RMP	OF035-028----	Enclosure	Yes
RMP	OF035-034----	House - 18th/19th century	Yes
RMP	OF023-008----	Enclosure	Yes
RMP	OF023-009----	Ringfort - rath	Yes
RMP	OF023-010----	Ringfort - rath	Yes
RMP	OF023-011001/2	Castle – unclassified & Armorial plaque	Yes
RMP	OF024-029----	Cairn - wayside cairn	Yes
RMP	OF024-035----	Ringfort - rath	Yes

RMP	OF024-036----	Church	Yes
RMP	OF024-036001-7	Graveyard, tower house, Castle - motte and bailey, Fulacht fia & ring-barrow	Yes
RMP	OF024-039----	Ringfort - rath	Yes
RMP	OF024-043----	Enclosure	Yes
RMP	OF024-040001/2	Ritual site - holy well & standing stone	Yes
RMP	OF030-009----	Ringfort - rath	Yes
RMP	OF030-010----	Enclosure	Yes
RMP	OF030-011----	Enclosure	Yes
RMP	OF030-013----	Enclosure	Yes
RMP	OF030-015----	Castle - tower house	Yes
RMP	OF030-016----	Church	Yes
RMP	OF030-017----	Ritual site - holy well	Yes
RMP	OF030-018----	Enclosure	Yes
RMP	OF030-019----	Enclosure	Yes
RMP	OF030-023----	Mass-rock	Yes
RMP	OF031-001----	Enclosure	Yes
RMP	OF031-002----	Enclosure	Yes
RMP	OF031-003----	Enclosure	Yes
RMP	OF031-004----	Enclosure	Yes
RMP	OF031-006----	Castle - unclassified	Yes
RMP	OF031-007----	Enclosure	Yes
RMP	OF031-008----	Ringfort - rath	Yes
RMP	OF031-009----	Ritual site - holy well	Yes
RMP	OF031-010----	Enclosure	Yes
RMP	OF031-049----	Castle - unclassified	Yes
RMP	OF032-001----	Ringfort - rath	Yes
RMP	OF035-002001/2	Settlement deserted – medieval & Castle	Yes
RMP	OF035-003----	Ringfort - rath	Yes
RMP	OF035-004----	Enclosure	Yes
RMP	OF035-013----	Enclosure	Yes
RMP	OF030-016001-	Graveyard	Yes
RMP	OF030-015001-	Bawn	Yes
RMP	OF035-068----	Exhibitionist figure (present location)	Yes
RMP	OF031-070----	Burial	Yes
RMP	OF032-001----	Ringfort - rath	Yes
RPS	41-22	Tithe Barn	Yes
RPS	41-22	Barnaboy House	Yes
NIAH	14935005	Syngefield House	No
RPS/ NIAH	53-11 14935008	Thatched house	Yes
RPS/ NIAH	53-12 14935009	Boherboy House	Yes
RPS/ NIAH	52-10 14935007	Thatched house	Yes
RPS/ NIAH	49-01 14930003	Saint James's Roman Catholic Church	Yes
RPS/ NIAH	49-02	Eglish Castle	Yes

	14930004		
RPS/ NIAH	49-03 14930005	Eglish Church of Ireland Church	Yes
RPS/ NIAH	49-05 14930009	Eglish Cottage	Yes
NIAH	14930008	Eglish Lodge	No
RPS/ NIAH	41-18 14931004	Ballynacard House	Yes
RPS/ NIAH	53-08 14820022	Clonoghill Cemetery	Yes
Designed Landscape	169	Demesne associated with Clonoghil	No
Designed Landscape	170	Demesne associated with Eglish	Principal structure is in RPS
Designed Landscape	171	Demesne associated with Whigsborough House	Principal structure is in RPS
Designed Landscape	172	Demesne associated with Ballynacard House	Principal structure is in RPS
Designed Landscape	173	Demesne associated with Davistown House	No
Designed Landscape	174	Demesne associated with Temora House	No
Designed Landscape	175	Demesne associated with Broughal Castle	No
Designed Landscape	176	Demesne associated with Barnaboy House	Principal structure is in RPS
Designed Landscape	177	Demesne associated with Spring Garden House	Principal structure is in RPS
Designed Landscape	179	Demesne associated with Ridgemount	No

6.3 Route Corridor B2

Table F8 - 21 details the Cultural Heritage constraints that has been identified within Route Corridor B2

Site Type	ID Number	Classification	Statutory Protection
RMP	OF036-036----	Enclosure	Yes
RMP	OF036-037----	Designed landscape - tree-ring	Yes
RMP	OF036-038----	Enclosure	Yes
RMP	OF024-042001/2	Enclosure & ringfort	Yes
RMP	OF038-045001/2	Castle – unclassified & bawn	Yes
RMP	OF031-022----	Earthwork	Yes
RMP	OF031-023----	Enclosure	Yes
RMP	OF031-032----	Redundant record	Yes
RMP	OF031-036----	Moated site	Yes
RMP	OF031-037----	Moated site	Yes
RMP	OF031-038----	Moated site	Yes
RMP	OF031-039----	Designed landscape - tree-ring	Yes

RMP	OF031-040----	Ringfort - unclassified	Yes
RMP	OF031-041----	Enclosure	Yes
RMP	OF031-042----	Enclosure	Yes
RMP	OF031-060----	Enclosure	Yes
RMP	OF032-007001/2	Water mill & bridge	Yes
RMP	OF032-008----	Enclosure	Yes
RMP	OF032-009----	Ringfort - rath	Yes
RMP	OF032-010----	Ringfort - rath	Yes
RMP	OF032-025----	House - 17th century	Yes
RMP	OF036-007----	Enclosure	Yes
RMP	OF036-008----	Enclosure	Yes
RMP	OF036-009----	Ringfort - rath	Yes
RMP	OF036-010----	Enclosure	Yes
RMP	OF036-011----	Ringfort - rath	Yes
RMP	OF036-012----	Enclosure	Yes
RMP	OF036-013----	Enclosure	Yes
RMP	OF036-022----	Enclosure	Yes
RMP	OF036-025----	Ringfort - rath	Yes
RMP	OF036-048----	Designed landscape - tree-ring	Yes
RMP	OF036-049----	Fulacht fia	Yes
RMP	OF036-082----	Mound	Yes
RPS/ NIAH	42-07 14932002	Ballinacarrig Mill	Yes
NIAH	14932001	Ballinacarrig Bridge	No
RPS/ NIAH	42-08 14932003	Ballinacarrig Mill	Yes
RPS/ NIAH	42-09 14932004	Cappagowlan House	Yes
RPS/ NIAH	14936003	Streamstown House	Yes
RPS/ NIAH	50-21 14936004	Cloganmore House	Yes
RPS/ NIAH	50-22 14936005	Heath Lodge	Yes
RPS/ NIAH	54-01 14936007	Breaghmore Bridge	Yes
RPS/ NIAH	53-13 14938001	Castletown House	Yes
RPS/ NIAH	42-06 14924006	Saint Mary's Roman Catholic Church	Yes
Designed Landscape	180	Demesne associated with Cappagowlan House	Principal structure is in RPS
Designed Landscape	181	Demesne associated with Derrinboy House	No
Designed Landscape	182	Demesne associated with Heath Lodge	Principal structure is in RPS
Designed Landscape	183	Demesne associated with Osierbrook	No
Designed Landscape	184	Demesne associated with Streamstown	No

Designed Landscape	185	Demesne associated with Kilmaine House	No
Designed Landscape	186	Demesne associated with Fortel Castle	No
Designed Landscape	187	Demesne associated with Oakley Park	No

6.4 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Cultural Heritage (including Architecture & Archaeology)		
Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Very low** as none are present
Potential to impact (direct/indirect) on RMPs (designated sites)	**Low** as although there 46 sites recorded within the corridor the area itself is relatively large	**Low** as although there 33 sites recorded within the corridor the area itself is relatively large
Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (11). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (9). This is low relative to the size of the area
Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (11). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (10) though this is low relative to the size of the area
Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as a number of demesne are recorded within the area (10), although many are no longer extant	**Low** as although a number of demesne are recorded within the area (10), many are no longer extant and are located on the edge of the corridor
Potential to impact on ACA	**Very low** as none are present	**Very low** as none are present
Recorded shipwreck sites	**Very low** as none are present	**Very low** as none are present

Table E5 - 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

The two route options are all similar in size and cross a landscape characterised by arable and pastoral farming. The pipeline corridors cover a large area with a width of c. 2km. Corridor B1 is considered to be the least preferable of the route options based on the fact that there are 46 recorded sites or groups of sites located within its area. None of these are listed as National Monuments or as sites with Preservation Orders. With regards to the built heritage resource a total of 11 protected structures are located within the corridor. Of these, nine are also recorded in the NIAH survey, with an additional two NIAH structures that are not included in the RPS. A total of 10 designed landscapes have been identified within the corridor, five of which are associated directly with protected structures.

The most preferable route from a cultural heritage perspective is B2. Only 33 monuments are recorded within this corridor. There are no National Monuments or sites with Preservation Orders located within this corridor. A total of nine protected structures are recorded, nine of which are also recorded within the NIAH survey. In addition, there is one further NIAH structure listed that are not included in the RPS. A total of eight designed landscapes have been recorded within the corridor, two of which are directly associated with protected structures.

A review of the aerial photographic coverage has shown that there are no substantial areas of bogland located within either of the route corridors.

7 Preliminary Route Corridor CD

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F8 – 12 below.

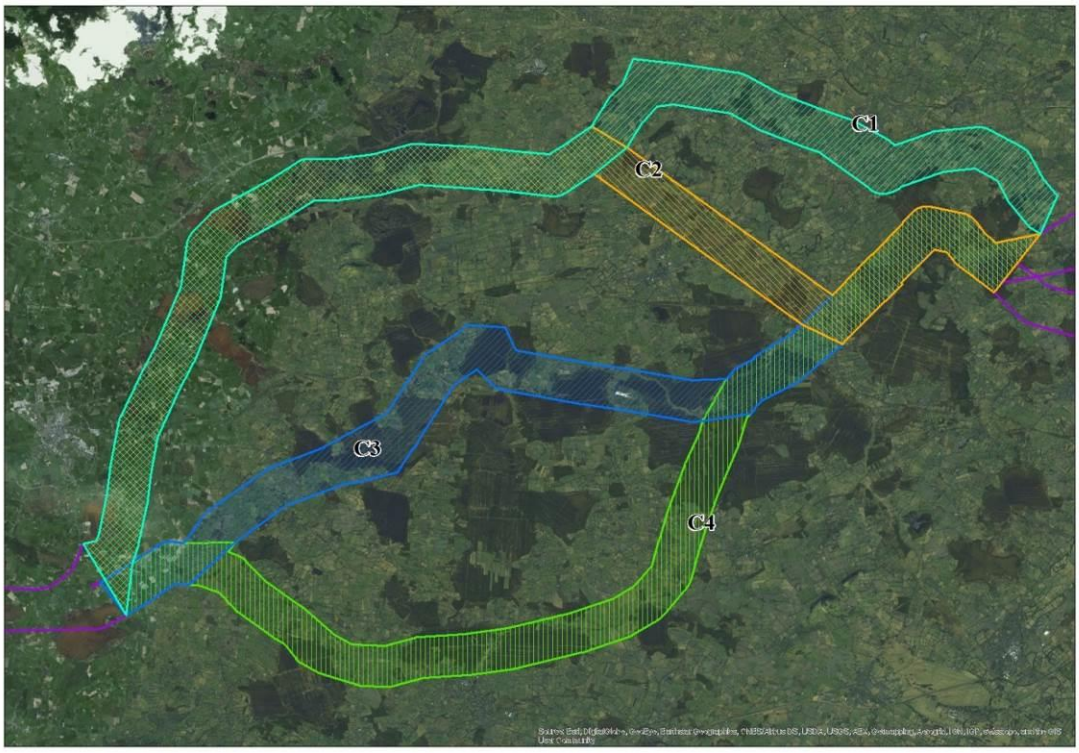


Figure F8 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

Table F8 - 22 details the Cultural Heritage constraints that has been identified within Route Corridor C1

Site Type	ID Number	Classification	Statutory Protection
RMP	KD002-001----	Moated site	Yes
RMP	KD003-014001-3	Church, graveyard & wall monument	Yes
RMP	KD004-007----	Ritual site - holy well	Yes
RMP	KD003-015001/2	Children's burial ground & cross	Yes
RMP	KD003-016001/2	Cross & burial ground	Yes
RMP	KD004-006----	Castle - unclassified	Yes
RMP	KD003-017/002/3	Castle - tower house, armorial plaque & architectural fragment	Yes
RMP	KD003-018----	Ringfort - rath	Yes
RMP	KD003-025----	Moated site	Yes
RMP	KD004-004----	Stone head	Yes

RMP	KD004-008----	Ringfort - rath	Yes
RMP	KD004-009----	Ringfort - rath	Yes
RMP	KD004-005001-4	Church, Tomb – effigial, graveyard & chest tomb	Yes
RMP	KD004-013----	Redundant record	No
RMP	KD004-014/001	Crannog & road	Yes
RMP	KD004-015----	Ringfort - rath	Yes
RMP	KD004-017----	Castle - motte	Yes
RMP	KD004-018001-4	Ecclesiastical enclosure church, graveyard & font	Yes
RMP	KD004-032----	Moated site	Yes
RMP	KD004-033----	Moated site	Yes
RMP	KD004-036----	Enclosure	Yes
RMP	KD009-002----	Ringfort - unclassified	Yes
RMP	KD003-001001-3	Ringfort, graveyard & House - indeterminate date	Yes
RMP	KD004-042----	Burial	Yes
RMP	OF025-002----	Enclosure	Yes
RMP	OF003-001----	Enclosure	Yes
RMP	OF004-001----	Redundant record	Yes
RMP	OF004-002----	Burial ground	Yes
RMP	OF004-004----	Hilltop enclosure	Yes
RMP	OF004-005----	Earthwork	Yes
RMP	OF004-006----	Castle - motte	Yes
RMP	OF004-008----	Enclosure	Yes
RMP	OF004-009----	Moated site	Yes
RMP	OF004-010/001	Castle - tower house & bawn	Yes
RMP	OF004-021----	Fulacht fia	Yes
RMP	OF004-017----	Fulacht fia	Yes
RMP	OF004-018----	Fulacht fia	Yes
RMP	OF004-019----	Fulacht fia	Yes
RMP	OF004-020----	Fulacht fia	Yes
RMP	OF017-007----	Enclosure	Yes
RMP	OF017-011----	Hut site	Yes
RMP	OF017-008001-3	Church, graveyard & ecclesiastical enclosure	Yes
RMP	OF017-013----	Mound	Yes
RMP	OF017-014----	Ringfort - unclassified	Yes
RMP	OF017-015----	Enclosure	Yes
RMP	OF017-016----	Earthwork	Yes
RMP	OF017-018----	Bullaun stone	Yes
RMP	OF017-019----	Cross	Yes
RMP	OF017-027----	Bullaun stone	Yes
RMP	OF017-036----	Barrow - ring-barrow	Yes
RMP	OF025-008----	Enclosure	Yes
RMP	OF025-016----	Enclosure	Yes

RMP	OF025-017001- OF025-017002- OF025-017003- OF025-017004- OF025-017005- OF025-017006- OF025-017007- OF025-017008- OF025-017009- OF025-017010- OF025-017011- OF025-017012- OF025-017015- OF025-017016- OF025-017017- OF025-017018- OF025-017019- OF025-017020- OF025-017021- OF025-017022- OF025-017023- OF025-017024- OF025-017025-	Religious house - Franciscan friars Religious house - Augustinian nuns Religious house - Augustinian canons Graveyard Graveslab Ritual site - holy well Redundant record Ringfort - rath Souterrain Stone head Ecclesiastical enclosure Mound Castle - unclassified Architectural fragment Architectural fragment Bullaun stone Cross-slab Cross-slab Stone sculpture Graveslab Graveslab Graveslab Graveslab	Yes
RMP	OF025-030----	House - 17th century	Yes
RMP	OF003-054----	Post row - peatland	Yes
RMP	OF025-032----	Road - class 1 togher	Yes
RMP	OF003-011----	Road - class 2 togher	Yes
RMP	OF003-013----	Road - class 3 togher	Yes
RMP	OF003-014----	Road - class 3 togher	Yes
RMP	OF003-015----	Road - class 3 togher	Yes
RMP	OF003-020----	Road - class 2 togher	Yes
RMP	OF003-021----	Road - class 2 togher	Yes
RMP	OF003-027----	Road - class 3 togher	Yes
RMP	OF003-033----	Road - class 1 togher	Yes
RMP	OF003-036----	Road - class 3 togher	Yes
RMP	OF003-038----	Road - class 2 togher	Yes
RMP	OF003-039----	Post row - peatland	Yes
RMP	OF003-040----	Road - class 3 togher	Yes
RMP	OF003-042----	Road - class 3 togher	Yes
RMP	OF003-043----	Road - class 3 togher	Yes
RMP	OF003-045----	Road - class 3 togher	Yes
RMP	OF003-046----	Road - class 2 togher	Yes
RMP	OF003-048----	Post row - peatland	Yes
RMP	OF003-049----	Road - class 3 togher	Yes
RMP	OF003-050----	Road - class 3 togher	Yes
RMP	OF003-051----	Post row - peatland	Yes
RMP	OF003-052----	Post row - peatland	Yes
RMP	OF025-033----	Burial ground	Yes
RMP	WM038-034----	Barrow - ring-barrow	Yes
RMP	WM039-240----	Road - class 3 togher	Yes
RMP	WM033-070----	Ringfort - rath	Yes

RMP	WM039-146----	Structure - peatland	Yes
RMP	WM039-232----	Road - class 2 togher	Yes
RMP	WM039-238----	Structure - peatland	Yes
RMP	WM039-248----	Structure - peatland	Yes
RMP	WM039-262----	Road - class 3 togher	Yes
RMP	WM039-264----	Structure - peatland	Yes
RMP	WM039-265----	Structure - peatland	Yes
RMP	WM039-267----	Structure - peatland	Yes
RMP	WM039-268----	Road - class 3 togher	Yes
RMP	WM039-269----	Structure - peatland	Yes
RMP	WM039-270----	Structure - peatland	Yes
RMP	WM039-271----	Road - class 3 togher	Yes
RMP	WM039-273----	Structure - peatland	Yes
RMP	WM039-274----	Structure - peatland	Yes
RMP	WM039-275----	Structure - peatland	Yes
RMP	WM039-276----	Road - class 3 togher	Yes
RMP	WM039-277----	Structure - peatland	Yes
RMP	WM039-278----	Structure - peatland	Yes
RMP	WM039-281----	Structure - peatland	Yes
RMP	WM039-282----	Structure - peatland	Yes
RMP	WM039-285----	Structure - peatland	Yes
RMP	WM039-286----	Road - class 3 togher	Yes
RMP	WM039-289----	Road - class 3 togher	Yes
RMP	WM039-290----	Structure - peatland	Yes
RMP	WM039-292----	Structure - peatland	Yes
RMP	WM039-293----	Structure - peatland	Yes
RMP	WM039-294----	Structure - peatland	Yes
RMP	WM039-295----	Road - class 3 togher	Yes
RMP	WM039-296----	Road - class 2 togher	Yes
RMP	WM039-297----	Structure - peatland	Yes
RMP	WM039-300----	Structure - peatland	Yes
RMP	WM039-302----	Structure - peatland	Yes
RMP	WM039-306----	Structure - peatland	Yes
RMP	WM039-309----	Road - class 3 togher	Yes
RMP	WM039-310----	Road - class 3 togher	Yes
RMP	WM039-311----	Structure - peatland	Yes
RMP	WM039-312----	Structure - peatland	Yes
RMP	WM039-314----	Structure - peatland	Yes
RMP	WM039-317----	Structure - peatland	Yes
RMP	WM039-319----	Structure - peatland	Yes
RMP	WM039-320----	Structure - peatland	Yes
RMP	WM039-321----	Structure - peatland	Yes
RMP	WM039-355----	Structure - peatland	Yes
RMP	WM039-372----	Structure - peatland	Yes
RMP	WM039-377----	Structure - peatland	Yes
RMP	WM039-378----	Structure - peatland	Yes
RMP	WM039-381----	Structure - peatland	Yes
RMP	WM039-383----	Structure - peatland	Yes
RMP	WM039-385----	Structure - peatland	Yes
RMP	WM039-386----	Structure - peatland	Yes
RMP	WM039-387----	Road - class 3 togher	Yes
RMP	WM039-388----	Structure - peatland	Yes
RMP	WM039-389----	Structure - peatland	Yes

RMP	WM039-390----	Road - class 3 togher	Yes
RMP	WM039-391----	Structure - peatland	Yes
RMP	WM039-392----	Road - class 3 togher	Yes
RMP	WM039-012----	Barrow - unclassified	Yes
RMP	WM039-013----	Moated site	Yes
RMP	WM039-014----	Castle - tower house	Yes
RMP	WM039-015----	Ringfort - unclassified	Yes
RMP	WM039-007----	Ringfort - rath	Yes
RMP	WM039-009----	Flat cemetery	Yes
RMP	WM039-010----	Barrow - ring-barrow	Yes
NIAH	14904004	Sheep Bridge	No
NIAH	14904010	The Harrow	No
NIAH	14904012	Water pump	No
NIAH	14904013	Clongall Bridge	No
NIAH	14909003	House	No
RPS/ NIAH	07-04 14904011	Post box	Yes
RPS/ NIAH	14-02 14909002	Kilmurry House	Yes
RPS/ NIAH	34-01 14813001	Killeigh Church of Ireland Church	Yes
RPS/ NIAH	34-02 14813002	The Abbey Farm	Yes
RPS/ NIAH	34-03 14813003	Stables	Yes
RPS/ NIAH	34-03 14813004	The Old Forge	Yes
RPS/ NIAH	34-05 14813005	Parochial House	Yes
RPS/ NIAH	34-06 14813006	House	Yes
RPS/ NIAH	34-07 14813007	Brewery outbuildings	Yes
RPS/ NIAH	34-08 14813008	Cottage	Yes
RPS/ NIAH	34-09 14813009	Boundary wall and gates to graveyard	Yes
RPS/ NIAH	34-10 14813010	Handball alley	Yes
RPS/ NIAH	24-06 14917026	Cappancur House	Yes
RPS/ NIAH	24-10 14917031	Saints Francis of Assisi and Bridget	Yes
RPS/ NIAH	24-11 14917032	Tong's Bridge	Yes
RPS/ NIAH	24-12 14917033	Wood of O Bridge	Yes
RPS/ NIAH	34-11 14813012	Tarleton Family Mausoleum	Yes
RPS/ NIAH	039-030 15403901	Maryville House	Yes
RPS/ NIAH	039-031 15403902	House	Yes

RPS/ NIAH	B03-08 11900308	Kilglass House	Yes
NIAH	11900309	Post box	No
NIAH	11900311	Kilshanchoe Catholic Church	No
NIAH	11900406	Water pump	No
RPS/ NIAH	B04-10 11900407	Knockanally House	Yes
NIAH	11801010	Water pump	No
RPS/ NIAH	B04-24 11801011	Fear English Bridge	Yes
RPS/ NIAH	B04-17 11801012	Metcalfe Park gate lodge	Yes
RPS/ NIAH	B04-17 11801018	Metcalfe Park entrance	Yes
RPS/ NIAH	B04-17 11801014	Metcalfe Park	Yes
NIAH	11801013	House	No
RPS	B03-01	Cadamstown Medieval Cross	Yes
RPS	B03-02	Kilshancoe Triangular Earthworks	Yes
RPS	B03-03	Base of Cross	Yes
RPS	B03-04	Church (in ruins)	Yes
RPS	B03-10	Bell Tower in grounds of Garrisker House	Yes
RPS	B04-04	Dunfierth Church Ruins	Yes
RPS	B04-05	Colree Fort	Yes
RPS	B04-08	Moat at Hortland	Yes
RPS	B04-09	Plaque on Bishops Chair Bridge	Yes
RPS	B04-11	Hortland House	Yes
Designed Landscape	188 (E)	Demesne associated with Millbrook House	No
Designed Landscape	190	Demesne associated with Wood of O House	No
Designed Landscape	191	Demesne associated with Maryville	Principal structure is in RPS
Designed Landscape	192	Demesne associated with Toor House	No
Designed Landscape	193	Demesne associated with Greenhills House	Outbuildings are in RPS
Designed Landscape	194	Demesne associated with Newpark	Principal structure is in RPS
Designed Landscape	195	Demesne associated with Garrisker House	No
Designed Landscape	195a	Demesne associated with Kilglass House	Principal structure is in RPS
Designed Landscape	196	Demesne associated with Dunfierth House	No
Designed Landscape	196a	Demesne associated with Metcalf Park	Principal structure is in RPS
Designed	197	Demesne associated	Principal structure

Landscape		with Knockanally House	is in RPS
Designed Landscape	198	Demesne associated with Hortland House	Principal structure is in RPS

7.3 Route Corridor C2

Table F8 - 23 details the Cultural Heritage constraints that has been identified within Route Corridor C2

Site Type	ID Number	Classification	Statutory Protection
RMP	KD002-006----	Ritual site - holy well	Yes
RMP	KD002-007/001	Castle - tower house & bawn	Yes
RMP	KD002-008----	Ritual site - holy well	Yes
RMP	KD002-009/001	Castle - hall-house & Sheela-na-gig	Yes
RMP	KD002-010001-3	Ecclesiastical enclosure, Church & graveyard	Yes
RMP	KD008-013----	Ringfort - unclassified	Yes
RMP	KD008-015----	Ringfort - rath	Yes
RMP	KD008-019----	Moated site	Yes
RMP	KD008-022----	Ringfort - unclassified	Yes
RMP	KD008-025----	Road - unclassified togher	Yes
RMP	KD008-026----	Road - unclassified togher	Yes
RMP	KD008-027----	Road - unclassified togher	Yes
RMP	KD008-029001-	Road - class 1 togher	Yes
RMP	KD008-030----	Road - class 1 togher	Yes
RMP	KD008-036----	Road - class 2 togher	Yes
RMP	KD008-037002-	Road - class 2 togher	Yes
RMP	KD009-001----	Ringfort - unclassified	Yes
RMP	KD008-039----	Road - gravel/stone trackway - peatland	Yes
RMP	KD008-019001-	Icehouse	Yes
RMP	KD009-032----	Road - class 1 togher	Yes
RMP	KD008-043----	Structure - peatland	Yes
RMP	KD002-016----	Enclosure	Yes
RMP	ME052-001----	Ringfort - rath	Yes
RMP	ME052-002001-3	Castle - motte and bailey, Castle - tower house, graveyard & headstone	Yes
RMP	ME052-003----	Church	Yes
RMP	ME052-004----	Castle - tower house	Yes
RMP	ME052-005----	Castle - tower house	Yes
RMP	ME052-006----	Bridge	Yes
RMP	OF025-002----	Enclosure	Yes
RMP	OF003-001----	Enclosure	Yes
RMP	OF004-002----	Burial ground	Yes
RMP	OF004-004----	Hilltop enclosure	Yes
RMP	OF004-005----	Earthwork	Yes
RMP	OF004-006----	Castle - motte	Yes
RMP	OF004-008----	Enclosure	Yes

RMP	OF004-009----	Moated site	Yes
RMP	OF004-010/001	Castle - tower house & bawn	Yes
RMP	OF004-021----	Fulacht fia	Yes
RMP	OF004-017----	Fulacht fia	Yes
RMP	OF004-018----	Fulacht fia	Yes
RMP	OF025-017001- OF025-017002- OF025-017003- OF025-017004- OF025-017005- OF025-017006- OF025-017007- OF025-017008- OF025-017009- OF025-017010- OF025-017011- OF025-017012- OF025-017015- OF025-017016- OF025-017017- OF025-017018- OF025-017019- OF025-017020- OF025-017021- OF025-017022- OF025-017023- OF025-017024- OF025-017025-	Religious house - Franciscan friars Religious house - Augustinian nuns Religious house - Augustinian canons Graveyard Graveslab Ritual site - holy well Redundant record Ringfort - rath Souterrain Stone head Ecclesiastical enclosure Mound Castle - unclassified Architectural fragment Architectural fragment Bullaun stone Cross-slab Cross-slab Stone sculpture Graveslab Graveslab Graveslab Graveslab	Yes
RMP	OF004-019----	Fulacht fia	Yes
RMP	OF004-020----	Fulacht fia	Yes
RMP	OF017-007----	Enclosure	Yes
RMP	OF017-011----	Hut site	Yes
RMP	OF017-008001/2	Church & Graveyard	Yes
RMP	OF017-013----	Mound	Yes
RMP	OF017-014----	Ringfort - unclassified	Yes
RMP	OF017-015----	Enclosure	Yes
RMP	OF017-016----	Earthwork	Yes
RMP	OF017-018----	Bullaun stone	Yes
RMP	OF017-019----	Cross	Yes
RMP	OF017-027----	Bullaun stone	Yes
RMP	OF017-036----	Barrow - ring-barrow	Yes
RMP	OF025-008----	Enclosure	Yes
RMP	OF025-016----	Enclosure	Yes
RMP	OF025-030----	House - 17th century	Yes
RMP	OF003-054----	Post row - peatland	Yes
RMP	OF025-032----	Road - class 1 togher	Yes
RMP	OF003-011----	Road - class 2 togher	Yes
RMP	OF003-013----	Road - class 3 togher	Yes
RMP	OF003-014----	Road - class 3 togher	Yes
RMP	OF003-015----	Road - class 3 togher	Yes

RMP	OF003-020----	Road - class 2 togher	Yes
RMP	OF003-021----	Road - class 2 togher	Yes
RMP	OF003-027----	Road - class 3 togher	Yes
RMP	OF003-033----	Road - class 1 togher	Yes
RMP	OF003-036----	Road - class 3 togher	Yes
RMP	OF003-038----	Road - class 2 togher	Yes
RMP	OF003-039----	Post row - peatland	Yes
RMP	OF003-040----	Road - class 3 togher	Yes
RMP	OF003-042----	Road - class 3 togher	Yes
RMP	OF003-043----	Road - class 3 togher	Yes
RMP	OF003-045----	Road - class 3 togher	Yes
RMP	OF003-046----	Road - class 2 togher	Yes
RMP	OF003-048----	Post row - peatland	Yes
RMP	OF003-049----	Road - class 3 togher	Yes
RMP	OF003-050----	Road - class 3 togher	Yes
RMP	OF003-051----	Post row - peatland	Yes
RMP	OF003-052----	Post row - peatland	Yes
RMP	OF025-033----	Burial ground	Yes
RMP	WM038-034----	Barrow - ring-barrow	Yes
RMP	WM039-240----	Road - class 3 togher	Yes
RMP	WM033-070----	Ringfort - rath	Yes
RMP	WM039-146----	Structure - peatland	Yes
RMP	WM039-212----	Structure - peatland	Yes
RMP	WM039-232----	Road - class 2 togher	Yes
RMP	WM039-233----	Structure - peatland	Yes
RMP	WM039-237----	Structure - peatland	Yes
RMP	WM039-238----	Structure - peatland	Yes
RMP	WM039-244----	Structure - peatland	Yes
RMP	WM039-248----	Structure - peatland	Yes
RMP	WM039-250----	Structure - peatland	Yes
RMP	WM039-251----	Structure - peatland	Yes
RMP	WM039-262----	Road - class 3 togher	Yes
RMP	WM039-264----	Structure - peatland	Yes
RMP	WM039-265----	Structure - peatland	Yes
RMP	WM039-267----	Structure - peatland	Yes
RMP	WM039-268----	Road - class 3 togher	Yes
RMP	WM039-269----	Structure - peatland	Yes
RMP	WM039-270----	Structure - peatland	Yes
RMP	WM039-271----	Road - class 3 togher	Yes
RMP	WM039-273----	Structure - peatland	Yes
RMP	WM039-274----	Structure - peatland	Yes
RMP	WM039-275----	Structure - peatland	Yes
RMP	WM039-276----	Road - class 3 togher	Yes
RMP	WM039-277----	Structure - peatland	Yes
RMP	WM039-278----	Structure - peatland	Yes
RMP	WM039-279----	Structure - peatland	Yes
RMP	WM039-281----	Structure - peatland	Yes
RMP	WM039-282----	Structure - peatland	Yes
RMP	WM039-285----	Structure - peatland	Yes
RMP	WM039-286----	Road - class 3 togher	Yes
RMP	WM039-289----	Road - class 3 togher	Yes
RMP	WM039-290----	Structure - peatland	Yes
RMP	WM039-292----	Structure - peatland	Yes

RMP	WM039-293----	Structure - peatland	Yes
RMP	WM039-294----	Structure - peatland	Yes
RMP	WM039-295----	Road - class 3 togher	Yes
RMP	WM039-296----	Road - class 2 togher	Yes
RMP	WM039-297----	Structure - peatland	Yes
RMP	WM039-300----	Structure - peatland	Yes
RMP	WM039-302----	Structure - peatland	Yes
RMP	WM039-306----	Structure - peatland	Yes
RMP	WM039-309----	Road - class 3 togher	Yes
RMP	WM039-310----	Road - class 3 togher	Yes
RMP	WM039-311----	Structure - peatland	Yes
RMP	WM039-312----	Structure - peatland	Yes
RMP	WM039-314----	Structure - peatland	Yes
RMP	WM039-317----	Structure - peatland	Yes
RMP	WM039-319----	Structure - peatland	Yes
RMP	WM039-320----	Structure - peatland	Yes
RMP	WM039-321----	Structure - peatland	Yes
RMP	WM039-355----	Structure - peatland	Yes
RMP	WM039-372----	Structure - peatland	Yes
RMP	WM039-377----	Structure - peatland	Yes
RMP	WM039-378----	Structure - peatland	Yes
RMP	WM039-381----	Structure - peatland	Yes
RMP	WM039-383----	Structure - peatland	Yes
RMP	WM039-385----	Structure - peatland	Yes
RMP	WM039-386----	Structure - peatland	Yes
RMP	WM039-387----	Road - class 3 togher	Yes
RMP	WM039-388----	Structure - peatland	Yes
RMP	WM039-389----	Structure - peatland	Yes
RMP	WM039-390----	Road - class 3 togher	Yes
RMP	WM039-391----	Structure - peatland	Yes
RMP	WM039-392----	Road - class 3 togher	Yes
RMP	WM039-393----	Redundant record	Yes
RMP	WM039-012----	Barrow - unclassified	Yes
RMP	WM039-013----	Moated site	Yes
RMP	WM039-014----	Castle - tower house	Yes
RMP	WM039-015----	Ringfort - unclassified	Yes
RMP	WM039-009----	Flat cemetery	Yes
RMP	WM039-010----	Barrow - ring-barrow	Yes
NIAH	14904004	Sheep Bridge	No
NIAH	14904010	The Harrow	No
NIAH	14904012	Water pump	No
NIAH	14904013	Clongall Bridge	No
NIAH	14909003	House	No
RPS/ NIAH	07-04 14904011	Post box	Yes
RPS/ NIAH	14-02 14909002	Kilmurry House	Yes
RPS/ NIAH	34-01 14813001	Killeigh Church of Ireland Church	Yes
RPS/ NIAH	34-02 14813002	The Abbey Farm	Yes
RPS/ NIAH	34-03	Stables	Yes

	14813003		
RPS/ NIAH	34-03 14813004	The Old Forge	Yes
RPS/ NIAH	34-05 14813005	Parochial House	Yes
RPS/ NIAH	34-06 14813006	House	Yes
RPS/ NIAH	34-07 14813007	Brewery outbuildings	Yes
RPS/ NIAH	34-08 14813008	Cottage	Yes
RPS/ NIAH	34-09 14813009	Boundary wall and gates to graveyard	Yes
RPS/ NIAH	34-10 14813010	Handball alley	Yes
RPS/ NIAH	24-06 14917026	Cappancur House	Yes
RPS/ NIAH	24-10 14917031	Saints Francis of Assisi and Bridget	Yes
RPS/ NIAH	24-11 14917032	Tong's Bridge	Yes
RPS/ NIAH	24-12 14917033	Wood of O Bridge	Yes
RPS/ NIAH	34-11 14813012	Tarleton Family Mausoleum	Yes
RPS/ NIAH	039-030 15403901	Maryville House	Yes
RPS/ NIAH	039-031 15403902	House	Yes
RPS	B02-01	Carrick Castle	Yes
RPS	B02-03	Grange Castle	Yes
RPS	B02-04	Witches' Stone, Carrick Hill	Yes
RPS	B02-05	Carrick Church (in ruins)	Yes
RPS/ NIAH	B02-06 11900201	Rahan Church	Yes
RPS/ NIAH	B02-07 11900202	Grange House	Yes
RPS	B08-13	Drummin House	Yes
RPS	B08-14	Oldcourt House	Yes
RPS/ NIAH	MH052-100 14338001	Water pump	Yes
RPS/ NIAH	MH052-101 14338004	Church & graveyard	Yes
RPS/ NIAH	MH052-104 14338005	Bridge	Yes
NIAH	14338003	Telephone box	No
Designed Landscape	188 (E)	Demesne associated with Millbrook House	No
Designed Landscape	190	Demesne associated with Wood of O House	No
Designed Landscape	191	Demesne associated with Maryville	Principal structure is in RPS

Designed Landscape	192	Demesne associated with Toor House	No
Designed Landscape	193	Demesne associated with Greenhills House	Outbuildings are in RPS
Designed Landscape	199	Rahan House	No
Designed Landscape	200	Clayton Cottage	No
Designed Landscape	201	Ballyhagan House	No
Designed Landscape	202	Drummin House	Principal structure is in RPS

7.4 Route Corridor C3

Table F8 - 24 details the Cultural Heritage constraints that has been identified within Route Corridor C3

Site Type	ID Number	Classification	Statutory Protection
RMP	KD012-002001-	Road - class 1 togher	Yes
RMP	KD012-001----	Burial ground	Yes
RMP	KD012-008----	Bullaun stone	Yes
RMP	KD012-012001/2	Church & graveyard	Yes
RMP	KD008-025----	Road - unclassified togher	Yes
RMP	KD008-026----	Road - unclassified togher	Yes
RMP	KD008-027----	Road - unclassified togher	Yes
RMP	KD008-029001-	Road - class 1 togher	Yes
RMP	KD008-030----	Road - class 1 togher	Yes
RMP	KD008-036----	Road - class 2 togher	Yes
RMP	KD008-037002-	Road - class 2 togher	Yes
RMP	KD009-001----	Ringfort - unclassified	Yes
RMP	KD008-039----	Road - gravel/stone trackway - peatland	Yes
RMP	KD009-032----	Road - class 1 togher	Yes
RMP	KD008-043----	Structure - peatland	Yes
RMP	OF011-020----	Enclosure	Yes
RMP	OF011-022----	Barrow - ring-barrow	Yes
RMP	OF011-024----	Enclosure	Yes
RMP	OF011-025----	Enclosure	Yes
RMP	OF011-027----	Enclosure	Yes
RMP	OF011-031----	Enclosure	Yes
RMP	OF011-053----	Enclosure	Yes
RMP	OF011-054----	Barrow - ring-barrow	Yes
RMP	OF012-005001/2	Church & graveyard	Yes
RMP	OF012-006001/2	Castle - motte and bailey & enclosure	Yes
RMP	OF012-008----	Standing stone	Yes
RMP	OF012-009----	Enclosure	Yes
RMP	OF018-013----	Mound	Yes
RMP	OF018-021----	Enclosure	Yes
RMP	OF018-033----	Enclosure	Yes
RMP	OF018-027----	Road - class 1 togher	Yes

RMP	OF019-001/001/2	Church, graveyard & enclosure	Yes
RMP	OF025-010----	Linear earthwork	Yes
RMP	OF025-011----	Moated site	Yes
RMP	OF025-012----	Enclosure	Yes
RMP	OF025-018----	Well	Yes
RMP	OF025-019001/2	Enclosure & House - 17th century	Yes
RMP	OF018-119----	Road - class 3 togher	Yes
RMP	OF018-120----	Road - class 3 togher	Yes
RMP	OF018-121----	Road - class 3 togher	Yes
RMP	OF018-122----	Road - class 2 togher	Yes
RMP	OF018-123----	Road - class 2 togher	Yes
RMP	OF018-125----	Road - class 3 togher	Yes
RMP	OF018-127----	Road - class 2 togher	Yes
RMP	OF018-132----	Road - class 3 togher	Yes
RMP	OF018-079----	Road - class 1 togher	Yes
RMP	OF018-081----	Road - class 1 togher	Yes
RMP	OF018-084----	Road - class 3 togher	Yes
RMP	OF018-086----	Road - class 2 togher	Yes
RMP	OF018-088----	Road - class 3 togher	Yes
RMP	OF018-090----	Road - class 1 togher	Yes
RMP	OF018-099----	Road - class 3 togher	Yes
RMP	OF018-101----	Road - class 3 togher	Yes
RMP	OF018-109----	Road - class 3 togher	Yes
RMP	OF018-110----	Road - class 3 togher	Yes
RMP	OF018-111----	Road - class 3 togher	Yes
RMP	OF018-112----	Road - class 2 togher	Yes
RMP	OF018-114----	Road - class 3 togher	Yes
RMP	OF018-133----	Road - class 3 togher	Yes
RMP	OF018-134----	Road - class 3 togher	Yes
RMP	OF018-136----	Road - class 3 togher	Yes
RMP	OF018-140----	Road - class 3 togher	Yes
RMP	OF018-148----	Road - class 1 togher	Yes
RMP	OF018-149----	Post row - peatland	Yes
RMP	OF018-151----	Road - class 3 togher	Yes
RMP	OF018-152----	Road - class 3 togher	Yes
RMP	OF018-154----	Road - class 3 togher	Yes
RMP	OF018-155----	Road - class 3 togher	Yes
RMP	OF018-156----	Road - class 3 togher	Yes
RMP	OF018-161----	Road - class 3 togher	Yes
RMP	OF018-160----	Road - class 2 togher	Yes
RMP	OF018-162----	Road - class 2 togher	Yes
RMP	OF018-164----	Road - class 3 togher	Yes
RMP	OF018-165----	Road - class 3 togher	Yes
RMP	OF018-168----	Platform - peatland	Yes
RMP	OF018-169----	Road - class 2 togher	Yes
RMP	OF018-171----	Post row - peatland	Yes
RMP	OF018-174----	Road - class 1 togher	Yes
RMP	OF018-172----	Road - class 3 togher	Yes
RMP	OF018-173----	House - Iron Age	Yes
RMP	OF018-175----	Road - class 1 togher	Yes
RMP	OF018-179----	Post row - peatland	Yes

RPS/ NIAH	35-17 14926014	Thatched cottage	Yes
RPS/ NIAH	35-23 14918013	Thatched cottage	Yes
RPS/ NIAH	25-39 14918014	Thatched outbuilding	Yes
RPS/ NIAH	25-40 14918015	Thatched outbuilding	Yes
RPS/ NIAH	25-41 14918016	Thatched outbuilding	Yes
RPS/ NIAH	25-42 14918017	Thatched cottage	Yes
RPS/ NIAH	16-15 14911015	Ballinla House	Yes
RPS/ NIAH	17-59 14911021	Rathmore Bridge	Yes
NIAH	14912003	Drumcooly House	No
RPS/ NIAH	17-61 14912004	Colgan's Bridge	Yes
RPS/ NIAH	17-62 14912005	Downshire Bridge	Yes
RPS/ NIAH	17-63 14912006	Drumcooly Park	Yes
RPS/ NIAH	17-64 14912007	House	Yes
RPS/ NIAH	17-65 14912008	Blundell Aqueduct	Yes
RPS/ NIAH	17-66 14912010	Mile stone	Yes
NIAH	14912011	Little Tunnel	No
NIAH	14918012/11	Office building & entrance	No
NIAH	14918009	Gorteenkeel House	No
RPS/ NIAH	25-43 14919001	Mount Lucas	Yes
RPS/ NIAH	26-01 14919002	Springfield House	Yes
RPS/ NIAH	25-44 14919010	Esker Beg	Yes
RPS/ NIAH	35-13 14814015	Forge	Yes
RPS	B08-13	Drummin House	Yes
Designed Landscape	188 (E)	Demesne associated with Millbrook House	No
Designed Landscape	202	Demesne associated with Drummond House	Principal structure is in RPS
Designed Landscape	202a	Demesne associated with Ballinla House	Principal structure is in RPS
Designed Landscape	203	Demesne associated with Finter Lodge	No
Designed Landscape	204	Demesne associated with Newtown House	No

Designed Landscape	205	Demesne associated with Ballymooney House	No
Designed Landscape	206	Demesne associated with Rathfeston House	No
Designed Landscape	207	Demesne associated with Mount Lucas House	Principal structure is in RPS
Designed Landscape	208	Demesne associated with Springfield House	Principal structure is in RPS
Designed Landscape	209	Demesne associated with Leitrim House	No
Designed Landscape	210	Demesne associated with Lumville House	No
Designed Landscape	211	Demesne associated with Clarkville House	No
Designed Landscape	212	Demesne associated with Ballycolyan House	No
Designed Landscape	212a	Demesne associated with Drumcooly Park	Principal structure is in RPS

7.5 Route Corridor C4

Table F8 - 25 details the Cultural Heritage constraints that has been identified within Route Corridor C4

Site Type	ID Number	Classification	Statutory Protection
RMP	KD021-009----	Enclosure	Yes
RMP	KD012-002001	Road - class 1 togher	Yes
RMP	KD012-001----	Burial ground	Yes
RMP	KD012-012001-2	Church & graveyard	Yes
RMP	KD016-003----	Enclosure	Yes
RMP	KD016-004----	Mound	Yes
RMP	KD008-025----	Road - unclassified togher	Yes
RMP	KD008-026----	Road - unclassified togher	Yes
RMP	KD008-027----	Road - unclassified togher	Yes
RMP	KD008-029001-	Road - class 1 togher	Yes
RMP	KD008-030----	Road - class 1 togher	Yes
RMP	KD008-036----	Road - class 2 togher	Yes
RMP	KD008-037002-	Road - class 2 togher	Yes
RMP	KD009-001----	Ringfort - unclassified	Yes
RMP	KD008-039----	Road - gravel/stone trackway - peatland	Yes
RMP	KD009-032----	Road - class 1 togher	Yes
RMP	KD008-043----	Structure - peatland	Yes
RMP	LA001-002----	Castle - unclassified	Yes
RMP	OF020-002----	Enclosure	Yes
RMP	OF025-010----	Linear earthwork	Yes
RMP	OF025-012----	Enclosure	Yes
RMP	OF025-018----	Well	Yes
RMP	OF025-019001-2	Enclosure & House - 17th century	Yes
RMP	OF025-020----	Enclosure	Yes
RMP	OF026-032----	Enclosure	Yes

RMP	OF033-001----	Mound	Yes
RMP	OF033-005001-5	Church, Graveyard, Castle - tower house & bawn	Yes
RMP	OF033-007----	Designed landscape - tree-ring	Yes
RMP	OF034-001----	Road - unclassified togher	Yes
RMP	OF034-008001-	Burial ground & Enclosure	Yes
RPS/ NIAH	45-03 14926012	Thatched cottage	Yes
RPS/ NIAH	37-08 14928002	Hollywood House	Yes
NIAH	14933005	Cloneyquin House	No
RPS/ NIAH	34-14 14926001	Geashill Railway Station	Yes
RPS/ NIAH	34-15 14926002	Geashill Railway Station warehouse	Yes
RPS/ NIAH	34-16 14926003	Geashill Station - cottage	Yes
RPS/ NIAH	45-01 14926008	Railway bridge	Yes
RPS	B08-13	Drummin House	Yes
RPS/ NIAH	B16-01 11901601	Blakefield House	Yes
Designed Landscape	188 (E)	Demesne associated with Millbrook House	No
Designed Landscape	202	Demesne associated with Drummond House	Principal structure is in RPS
Designed Landscape	203	Demesne associated with Finter Lodge	No
Designed Landscape	204	Demesne associated with Newtown House	No
Designed Landscape	213	Demesne associated with Ballyavill	No
Designed Landscape	214	Demesne associated with Woodfield	No
Designed Landscape	215	Demesne associated with Bloomville	Principal structure is in RPS
Designed Landscape	216	Demesne associated with Kileen	No
Designed Landscape	217	Demesne associated with Hollywood House	Principal structure is in RPS

7.6 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Cultural Heritage (including Architecture & Archaeology)				
Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low as none are present**	**Very low as none are present**
Potential to impact (direct/indirect) on RMPs (designated sites)	**Mid-range** as a large amount of sites (144) are recorded within the corridor although the area itself is relatively large	**Mid-range** as a large amount of sites (154) are recorded within the corridor although the area itself is relatively large	**Low** as a large amount of sites (82) are recorded within the corridor although the area itself is relatively large	**Low** due to relatively low number (30) in large area
Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (35). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (30). This is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (19), this is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (8), this is low relative to the size of the area
Potential to impact (direct/indirect) on NIAH	**Low** although there are a number of structures recorded within the area (35). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (30). This is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (22), this is low relative to the size of the area	**Very low** as although there are a number of structures recorded within the area (8), this is low relative to the size of the area
Potential to impact (direct/indirect) on historic designed landscapes	**Mid-range** as a number of demesnes are recorded within the area (12), seven of which are associated with RPS	**Low** as only nine demesnes are recorded within the corridor, three of which are associated with RPS	**Mid-range** as a number of demesnes are recorded within the area (14), five of which are associated with RPS	**Low** as only nine demesnes are recorded within the corridor, three of which are associated with RPS
Potential to impact on ACA	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low** as none are present	**Very low** as only one is recorded in a large area
Recorded shipwreck sites	**Very low** as none are present	**Very low** as only one is recorded in a large area	**Very low** as none are present	**Very low** as only one is recorded in a large area

Table E5 - 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

The four route options vary slightly in length. C1 and C2 are the longer of the four pipeline, whereas C3 and C4 are shorter in length but cross slightly more bogland. This is reflected in the archaeological and cultural heritage constraints identified in each of the corridors. Corridor C1 is considered to be the least preferable of the route options based on the fact that it is the longest of all the routes and contains 144 recorded sites or groups of sites located within its area. This does not include the 67 redundant records from boglands within the corridor, which have not been included in this assessment. There are no National Monuments or sites with Preservation Orders on them within the corridor. With regards to the built heritage resource a total of 35 protected structures are located within the corridor. Of these, 25 are also recorded in the NIAH survey, with an additional ten NIAH structures that are not included in the RPS. A total of 12 designed landscapes have been identified within the corridor, seven of which are associated directly with protected structures.

Corridor C2 is considered to be the next preference. This is the second longest corridor and there are 154 recorded monuments present. This does not include the 71 redundant records from boglands within the corridor, which have not been included in this assessment. This corridor also contains one site that is registered as a National Monument. With regards to the built heritage resource a total of 30 protected structures are located within the corridor. Of these, 24 are also recorded in the NIAH survey, with an additional six NIAH structures that are not included in the RPS. A total of nine designed landscapes have been identified within the corridor, three of which are associated directly with protected structures.

Corridor C3 is considered to be the third preference, although it is very similar to C4 in terms of size. There are 82 recorded monuments located within the corridor. This does not include the 52 redundant records from boglands, which have not been included in this assessment. With regards to the built heritage resource a total of 19 protected structures are located within the corridor. Of these, 18 are also recorded in the NIAH survey, with an additional four NIAH structures that are not included in the RPS. A total of 14 designed landscapes have been identified within the corridor, five of which are associated directly with protected structures.

The most preferable route from a cultural heritage perspective is C4. Only 30 monuments are recorded within this corridor, none of which are listed as redundant records. There are no National Monuments or sites with Preservation Orders located within this corridor. A total of eight protected structures are recorded, seven of which are also recorded within the NIAH survey. In addition, there is one further NIAH structure listed that is not included in the RPS. A total of nine designed landscapes have been recorded within the corridor, three of which are directly associated with protected structures.

A review of the aerial photographic coverage has shown that all four corridor travel through sections of bogland. Even though Corridor C1 crosses the least amount of such bogland, because the route is longer and covers more area, it has more opportunity to impact on previously unrecorded archaeological sites than the other routes, especially C3 and C4.

8 Preliminary Route Corridor DE

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F8 – 13 below.

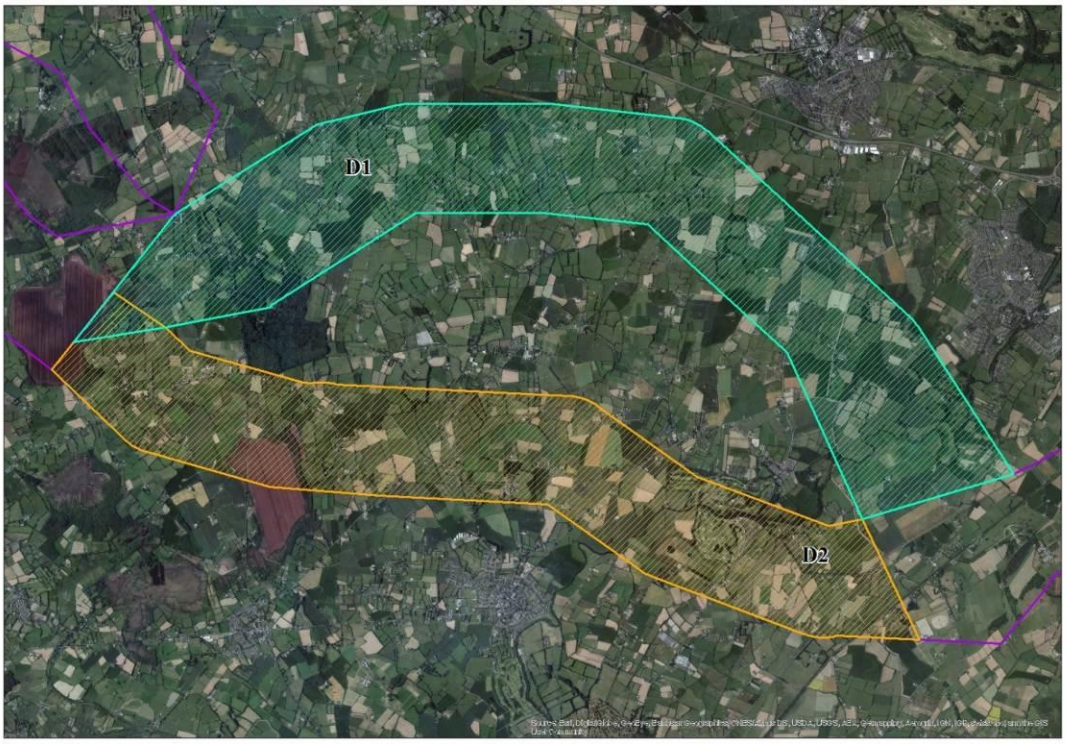


Figure F8 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

Table F8 - 26 details the Cultural Heritage constraints that has been identified within Route Corridor D1

Site Type	ID Number	Classification	Statutory Protection
RMP	KD011-005	Ringfort- unclassified	Yes
RMP	KD010-025	Ringfort- rath	Yes
RMP	KD010-023	Enclosure	Yes
RMP	KD010-024/001	Ritual site- holy well & holy tree/bush	Yes
RMP	KD010-036	Redundant record	Yes
RMP	KD011-006	Church	Yes
RMP	KD011-015001-3	Church & Ecclesiastical enclosure, site & graveyard	Yes
RMP	KD009-003	Ringfort- unclassified	Yes
RMP	KD009-004	Ringfort- rath	Yes
RMP	KD009-005	Ringfort- rath	Yes
RMP	KD010-001001/8	Linear earthwork &	Yes

		Settlement deserted-medieval	
RMP	KD010-002	Ringfort- rath	Yes
RMP	KD010-003	Enclosure	Yes
RMP	KD010-004	Ringfort- rath	Yes
RMP	KD010-005	Ringfort- rath	Yes
RMP	KD010-006/001	Enclosure & graveyard	Yes
RMP	KD010-014/001-5	Ecclesiastical site, enclosure, round tower, graveyard, chapel, church	Yes
RPS	B09-05	Ringfort	Yes
RPS	B09-09	Newpark House	Yes
RPS/ NIAH	B09-16 11900901	Connolly's	Yes
RPS	B10-01	Round Tower	Yes
RPS	B10-03	Church and Graveyard	Yes
RPS	B10-04A/B-1/B-2	Surviving portions of the Pale	Yes
RPS	B10-05	St. Patrick's Well	Yes
RPS/ NIAH	B10-10 11901005	Donaghstown Catholic Church	Yes
RPS	B10-15	Taghadoe House	Yes
RPS/ NIAH	B10-20 11901006	Windgates Villa	Yes
RPS	B10-21	Rose Lawn House	Yes
RPS	B10-22	Pickering Forest, Crippaun	Yes
RPS	B11-01	St. Patrick's Cathedral	Yes
RPS	B11-07	Killadoon Country House	Yes
RPS	B11-21	Beech Lodge	Yes
RPS	B11-121	Ardrass Lodge	Yes
Designed Landscape	218	Demesne associated with Newpark House	Principal structure is in RPS
Designed Landscape	219	Demesne associated with Laragh House	No
Designed Landscape	220	Demesne associated with Rose Lawn	Principal structure is in RPS
Designed Landscape	221	Demesne associated with Pickering Forest	Principal structure is in RPS
Designed Landscape	222	Demesne associated with Killadoon House	Principal structure is in RPS

8.3 Route Corridor D2

Table F8 - 27 details the Cultural Heritage constraints that has been identified within Route Corridor D2

Site Type	ID Number	Classification	Statutory Protection
RMP	KD010-026----	Ringfort - rath	Yes
RMP	KD010-032----	Enclosure	Yes
RMP	KD014-007001/3	Castle - motte and bailey & ring ditch	Yes

RMP	KD014-010----	Enclosure	Yes
RMP	KD014-012----	Castle - tower house	Yes
RMP	KD014-017/001	Castle - motte and bailey & lime kiln	Yes
RMP	KD014-021----	Moated site	Yes
RMP	KD014-022001-7	Church, Ecclesiastical enclosure, Field system, Ritual site - holy well, graveyard & font	Yes
RMP	KD014-045/001	House - fortified house & tower house	Yes
RMP	KD009-024----	Ritual site - holy well	Yes
RMP	KD009-025----	Burnt mound	Yes
RMP	KD009-016----	Building	Yes
RMP	KD009-023----	Enclosure	Yes
RMP	KD010-037----	Enclosure	Yes
RMP	KD014-006001-4	Church, Graveyard, Cross-inscribed stone & Mausoleum	Yes
RMP	KD010-021----	Linear earthwork	Yes
RMP	KD009-033----	Road - class 1 togher	Yes
RMP	KD010-039----	Enclosure	Yes
RMP	KD014-056----	Fulacht fia	Yes
RMP	KD014-057----	Ring-ditch	Yes
RMP	KD014-058----	Enclosure	Yes
RPS/ NIAH	B09-17 11900902	Saint Benignus's Catholic Church	Yes
RPS	B14-05	Mainham Moat (Queen Buans Grave)	Yes
RPS	B14-15	Wogan Browne Mausoleum	Yes
RPS	B10-04C-1	Surviving Portions of the Pale at Clongowes	Yes
RPS	B14-01	Clownings Rectilinear Earthworks	Yes
RPS	B14-09	Ruined Castle and Church and Baptismal Font	Yes
RPS	B14-14	Clongoweswood College	Yes
RPS/ NIAH	B14-29 11809026	Straffan House entrance	Yes
RPS/ NIAH	B14-29A 11809025	Straffan House gate lodge	Yes
RPS/ NIAH	B14-29B 11809027/ 21/ 24/ 09	Straffan House hotel (& demesne walls)	Yes
RPS/ NIAH	B14-32 11809019/20	Millbrook House	Yes
RPS/ NIAH	B14-38 11901407	House	Yes
RPS/ NIAH	B14-54 11809023	Straffan Bridge	Yes
RPS	B14-75	Irishtown House	Yes

RPS	B15-10	Old School House	Yes
RPS	B15-11	Stone Cottage	Yes
RPS/ NIAH	B15-12 11901501	Henry Bridge, Grand Canal Main Line	Yes
NIAH	11900903	Staplestown School	No
NIAH	11809018	Outbuilding	No
NIAH	11809022	Weir	No
NIAH	11809031	Turbine house	No
Designed Landscape	223	Demesne associated with Mount Egan	No
Designed Landscape	224	Demesne associated with Clongoweswood College	Principal structure is in RPS
Designed Landscape	225	Demesne associated with Ladycastle House	No
Designed Landscape	226	Demesne associated with Ladycastle House Lower	No
Designed Landscape	227	Demesne associated with Irishtown House	Principal structure is in RPS
Designed Landscape	228	Demesne associated with Straffan House	Principal structure is in RPS
Designed Landscape	229	Demesne associated with Tipperstown House	No
Designed Landscape	230	Demesne associated with Farmhill House	No
Designed Landscape	231	Demesne associated with Lodge Park	Principal structure is in RPS
Designed Landscape	232	Demesne associated with Castledillon	No

8.4 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Cultural Heritage (including Architecture & Archaeology)		
Potential to impact (direct/indirect) on National Monuments (designated sites)	**Very low** as none are present	**Low** as only one is recorded in a relatively large area
Potential to impact (direct/indirect) on RMPs (designated sites)	**Low** as there are 17 sites recorded within a relatively large area	**Low** as there are 21 sites recorded within a relatively large area
Potential to impact (direct/indirect) on RPS (designated sites)	**Low** although there are a number of structures recorded within the area (16). This is low relative to the size of the area	**Low** although there are a number of structures recorded within the area (17). This is low relative to the size of the area
Potential to impact (direct/indirect) on NIAH	**Very low** as only three structures are recorded within the area	**Low** although there are a number of structures recorded within the area (12). This is low relative to the size of the area
Potential to impact (direct/indirect) on historic designed landscapes	**Low** although there are a number of landscapes recorded within the area (5). This is low relative to the size of the area	Mid-range as a number of demesne are recorded within the area (10)
Potential to impact on ACA	**Very** low as none are present	**Very low** as none are present
Recorded shipwreck sites	**Very low** as none are present	**Very low** as none are present

Table E5 - 7 Summary of the MCA for Route Corridors DE

8.5 Comparative Discussion

The two route options are both similar in size and cross a landscape characterised by arable and pastoral farming. Corridor D2 is considered to be the least preferable of the route options based on the fact that there are 21 recorded sites or groups of sites located within its area one of which is listed as National. With regards to the built heritage resource a total of 17 protected structures are located within the corridor. Of these, 12 are also recorded in the NIAH survey. A total of 10 designed landscapes have been identified within the corridor, four of which are associated directly with protected structures.

The most preferable route from a cultural heritage perspective is D1. Only 17 monuments are recorded within this corridor. There are no National Monuments or sites with Preservation Orders located within this corridor. A total of 16 protected structures are recorded, three of which are also recorded within the NIAH survey. A total of five designed landscapes have been recorded within the corridor, four of which are directly associated with protected structures.

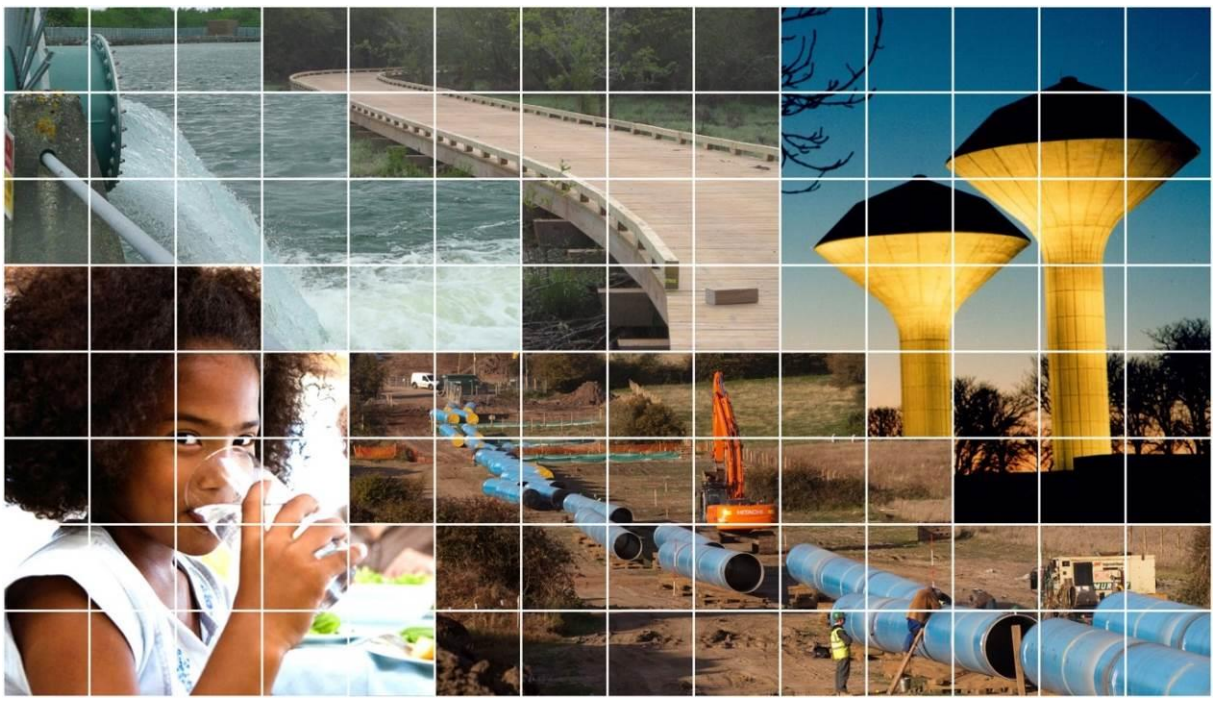
A review of the aerial photographic coverage has shown that whilst there are no areas of bogland located within the corridor of D1, the northern part of a farm bog is located within the corridor of Corridor D2.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F9: Landscape and Visual

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F9 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F9 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F9 is a statement on the specialism Landscape and Visual and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under 18 no. Landscape and Visual sub-criteria.

- Potential to impact on designated areas of 'Highly Sensitive Landscape'
- Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)
- Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)
- Potential to impact on woodlands and significant tree groups
- Potential to impact on historic designed landscapes
- Potential to alter the prevailing landscape character

- Potential to impact on designated scenic routes / views
- Potential to impact on views from heritage/tourist/amenity features of national or regional importance
- Potential to impact on views from settlements
- Potential to impact on views from dwellings / local roads
- Potential to impact on views from motorways
- Potential to impact on views from other major roads (national or regional roads)
- Potential to impact on views from rail lines
- Potential to impact on arrival views from Airports including aerial approach and vehicular egress
- Potential to impact on views from national 'way marked' walking routes
- Potential to impact on local walks
- Potential to impact on views from angling or swimming locations (rivers, lakes, sea)
- Potential that landscape screening measures will be ineffective or incongruous

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F9 – 1 Peamount

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Landscape and Visual	
Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Very Low** - General rural land use zoning
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Very Low** - no distinctive landscape elements identified
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Large fields defined by hedgerows
Potential to impact on woodlands and significant tree groups	**Very Low** – Canal-side vegetation the most notable vegetation pattern
Potential to impact on historic designed landscapes	**Very Low** - Does not appear to be any designed landscapes in this area
Potential to alter the prevailing landscape character	**Low** - Although predominantly rural this is a transition urban fringe area. CDP polies promote rural landuse and enhancement
Potential to impact on designated scenic routes / views	**Very Low** - Some distant views from designations in Dublin Mountains
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Mid-range** - Grand canal adjacent to the north
Potential to impact on views from settlements	**Mid-range** - Rural fringe of Dublin City
Potential to impact on views from dwellings / local roads	**Low** - Sparsely populated rural area despite proximity to western suburbs of Dublin
Potential to impact on views from motorways	**Very Low** - None in the vicinity
Potential to impact on views from other major roads (national or regional roads)	**Mid-range** - R120 adjacent to the SE
Potential to impact on views from rail lines	**Low** - National rail line to Limerick passes <1km to the N and W
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Low** - Casement Aerodrome c. 1.5km SE but not a tourist airport
Potential to impact on views from national 'way marked' walking routes	**Mid-range** - Grand Canal Way
Potential to impact on local walks	**Mid-range** - Grand Canal utilised as a local walking amenity
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Fishing and swimming not particularly popular along this section of Grand Canal but it is utilised by barges
Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - Screen planting can be assimilated into prevailing vegetation patterns and built development

Table F9 - 2 Summary of the MCA for Peamount

2.4 Comparative Discussion

Overall the Peamount terminal point location is considered to be relatively robust in terms of landscape and visual constraints. The main consideration is its proximity to the Grand Canal and the associated 'Grand Canal Way' along its tow path, which is a national 'way-marked' walking route. The canal tends to be strongly contained by embankments and vegetation along this section. With considered siting and mitigation screen planting of the terminal point infrastructure it is not envisaged that proximity to the Grand Canal is a critical landscape and visual factor for this location.

Whilst there is potential for some mid-range visual impacts from surrounding residential receptors, the R120 regional road and Peamount Hospital, this is an urban fringe location already characterised by substantial industrial / business park buildings in the near vicinity to the east. Again, potential visual impacts can be substantially mitigated by considered site design and screen planting that will assimilate readily with surrounding vegetation structures. Significant landscape and visual impacts are not envisaged at this terminal point location.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F9 – 2.

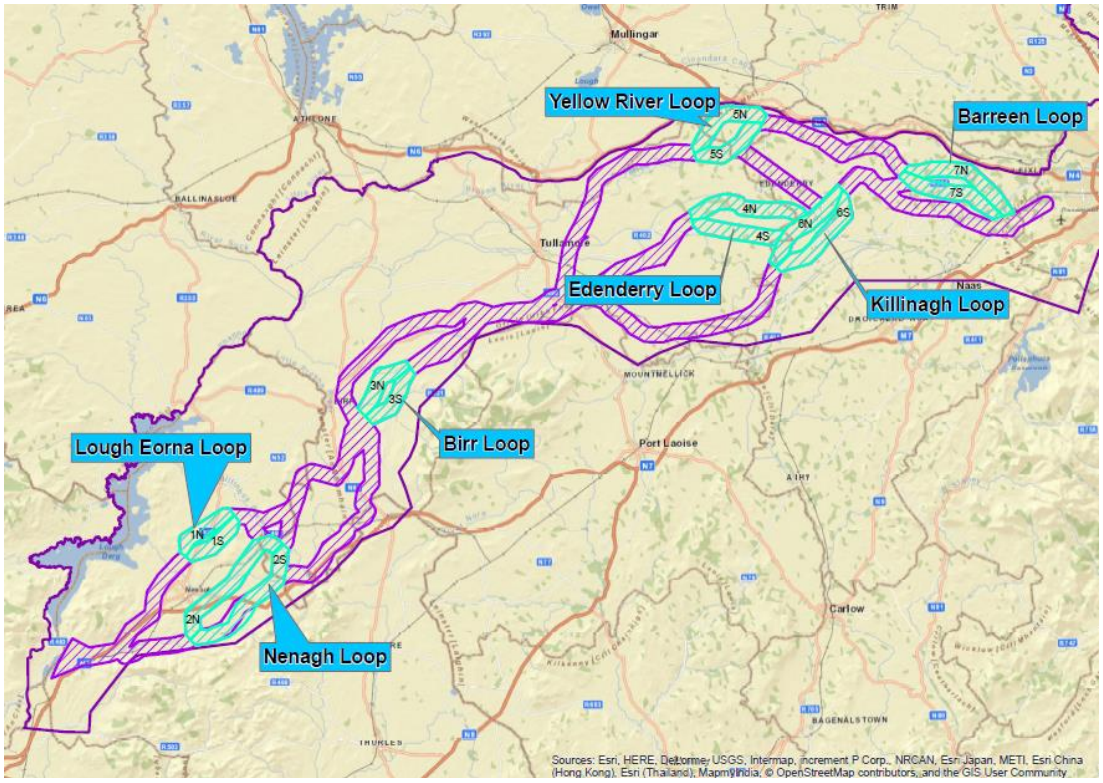


Figure F9 – 1 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

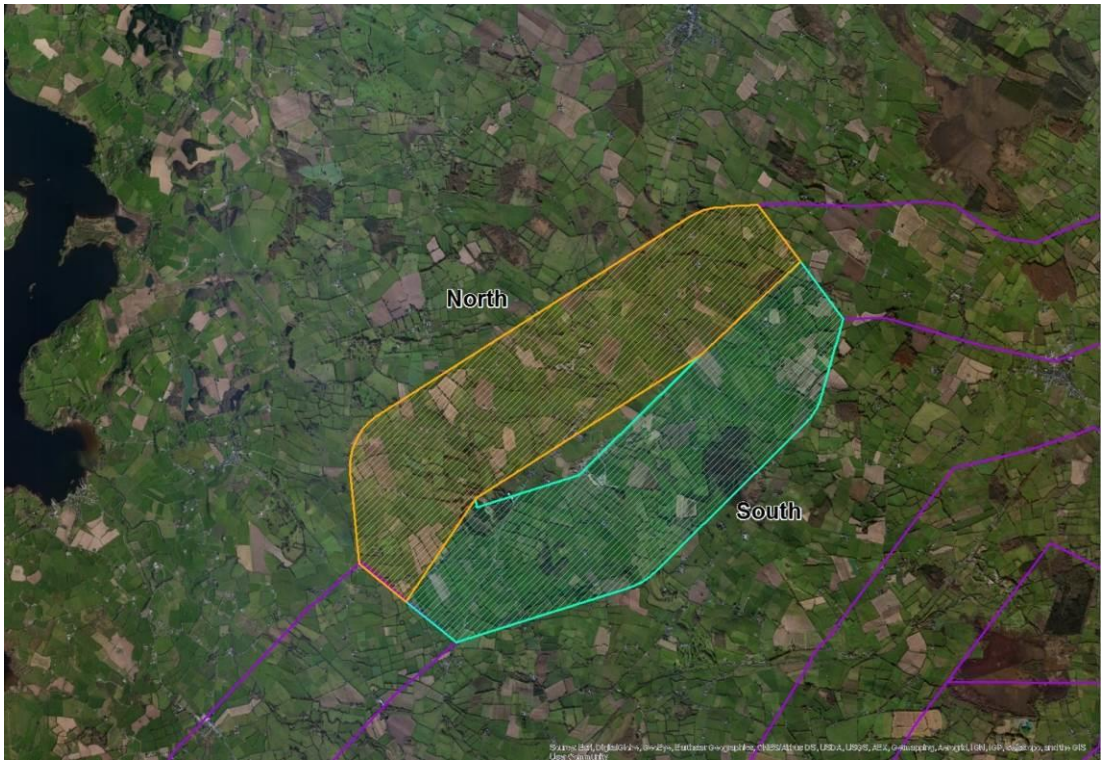


Figure F9 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

The northern Branch of the Lough Eorna loop diverges northwards around Lough Eorna passing through the Ashley Park demesne and skirting to the north of the settlement of Ardcrony.

4.1.2 Southern Branch

The southern Branch of the Lough Eorna loop runs to the south of Lough Eorna and to the southeast of Ardcrony before converging with the northern loop to the east of the settlement of Cloughjordan.

4.1.3 Comparative Discussion

Both the northern and southern branches of the Lough Eorna loop have a similar degree of impact on Lough Eorna and the settlement provide Ardcrony. However, the northern loop passes through the mature tree lines and parkland landscape of Ashley Park house and demesne. Given that there is potential to disrupt mature tree lines that would take a long time to re-establish, the southern branch was slightly preferred in this instance.

4.2 The Nenagh Loop

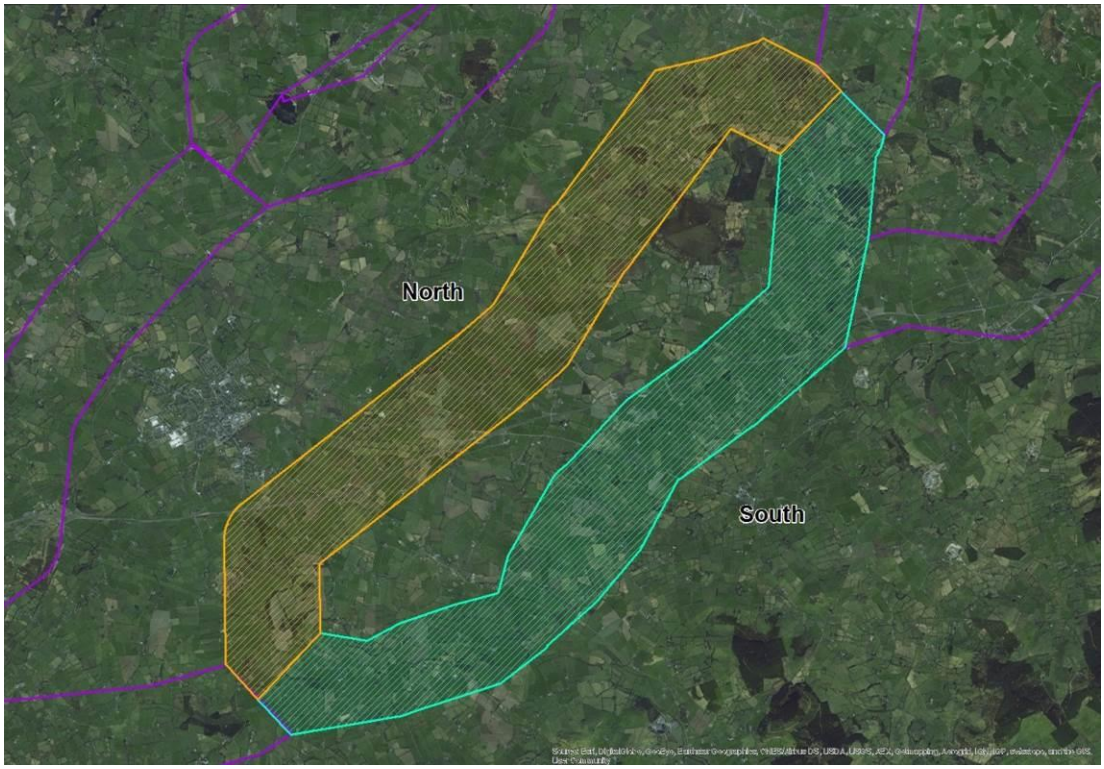


Figure F9 – 4 The Nenagh Loop

4.2.1 Northern Branch

The northern branch of the Nenagh loop diverts in a northward direction from the settlement of Dolla towards the settlement of Nenagh itself. It then follows the M7 motorway in a north-easterly direction towards the settlement of Cloughjordan. To the south-west of Cloughjordan it encompasses a section of the national railway line and an adjacent section the R491 regional route, which is designated as a scenic route for part of this section.

4.2.2 Southern Branch

From near the settlement of Dolla, the southern branch skirts the base of the Silvermines Mountains heading in a more easterly direction than the northern branch. It passes a short distance to the northwest of the settlement of T before connecting with the northern Branch just inside the border of County Offaly.

4.2.3 Comparative Discussion

Even though both the northern and southern branch of the Nenagh loop cross the Nenagh River, the northern branch encompasses a more significant portion of riparian woodland. It also encompasses a section of scenic route designation on the R491 as well as a section of national railway line in the same area. For these reasons the southern route was the slightly preferred option.

4.3 The Birr Loop

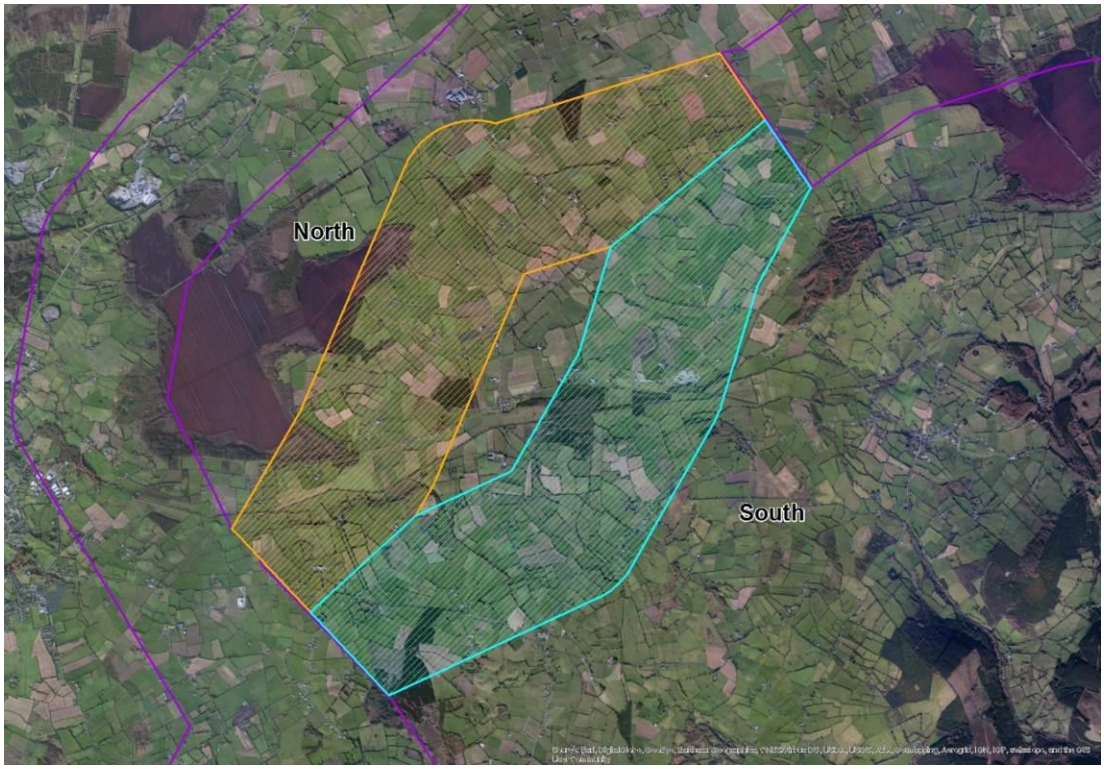


Figure F9 – 5 The Birr Loop

4.3.1 Northern Branch

The northern branch of the Birr Loop emanates from a short distance to the south of the settlement of Birr itself. It skirts a substantial cutaway bog to the east of Birr and terminates to the southwest of Kilcormack. The route crosses the Camcor River and a section of the R440 regional road, which is designated as a scenic route in the Offaly County development plan.

4.3.2 Southern Branch

The southern branch of the Birr Loop is slightly further from the settlement of Birr, but also crosses the R440 scenic route designation and Camcor River a short distance to the east of the northern branch. It runs close to Knockbarron Wood amenity area, but does not encompass it.

4.3.3 Comparative Discussion

The main constraints associated with the Birr Loop are the Camcor River and its associated riparian vegetation as well as the scenic route designation along the R440 regional road to the east of Birr. As both branches of this loop cross these linear features in the same area there is not considered to be a clear differentiation between them in terms of a preference.

4.4 The Edenderry Loop

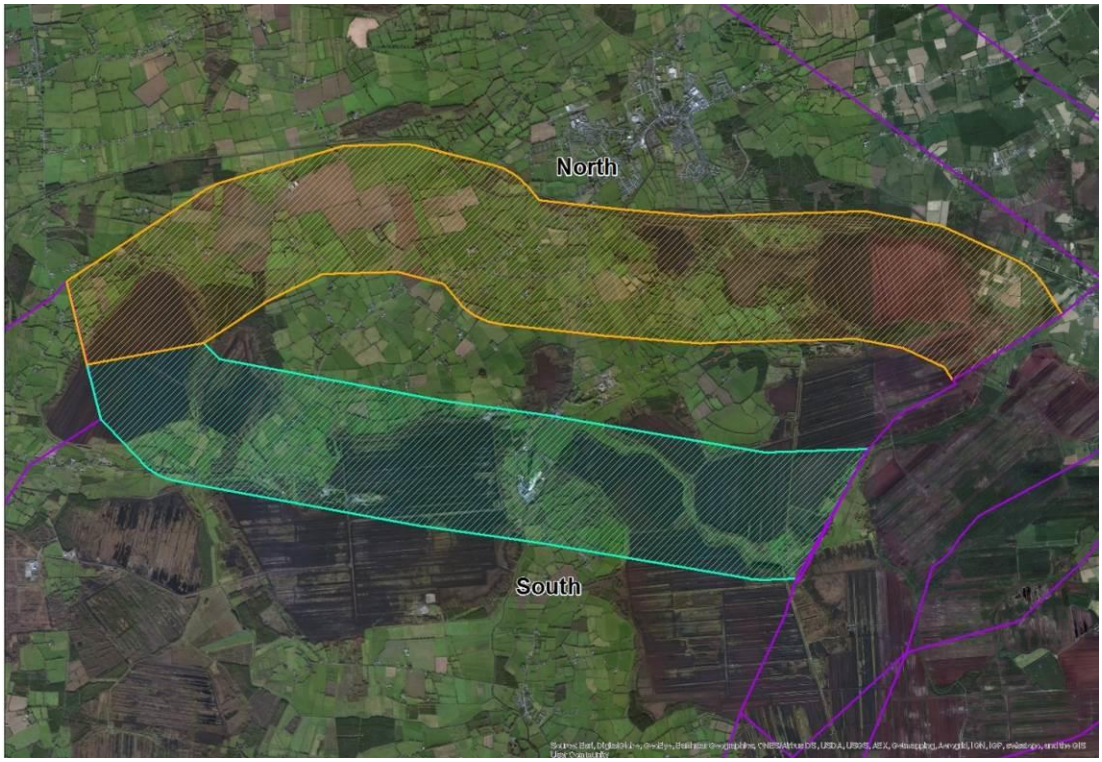


Figure F9 – 6 The Edenderry Loop

4.4.1 Northern Branch

The northern branch of the Edenderry route skirts eastwards in close proximity to the settlement of Edenderry incorporating the Grand Canal just to the south of the town. This branch commences near the crossroads settlement of Mount Lucas and terminates just inside the western border of County Kildare. It passes predominantly through a rural landscape of fields and hedgerows, but also crosses some sections of cutaway bog and forestry.

4.4.2 Southern Branch

In comparison to the northern branch of the Edenderry Loop, the southern Branch runs predominantly through cutaway peat bog and plantation forestry further to the south of the settlement of Edenderry. It covers a particular sparsely populated area of western Offaly.

4.4.3 Comparative Discussion

Both eskers and canals are identified as highly sensitive landscape features in the Offaly County Development Plan. Given that the northern branch of the Edenderry loop encompasses section of both canal and eskers and the southern branch does not, the latter is preferred in this instance.

4.5 The Yellow River Loop

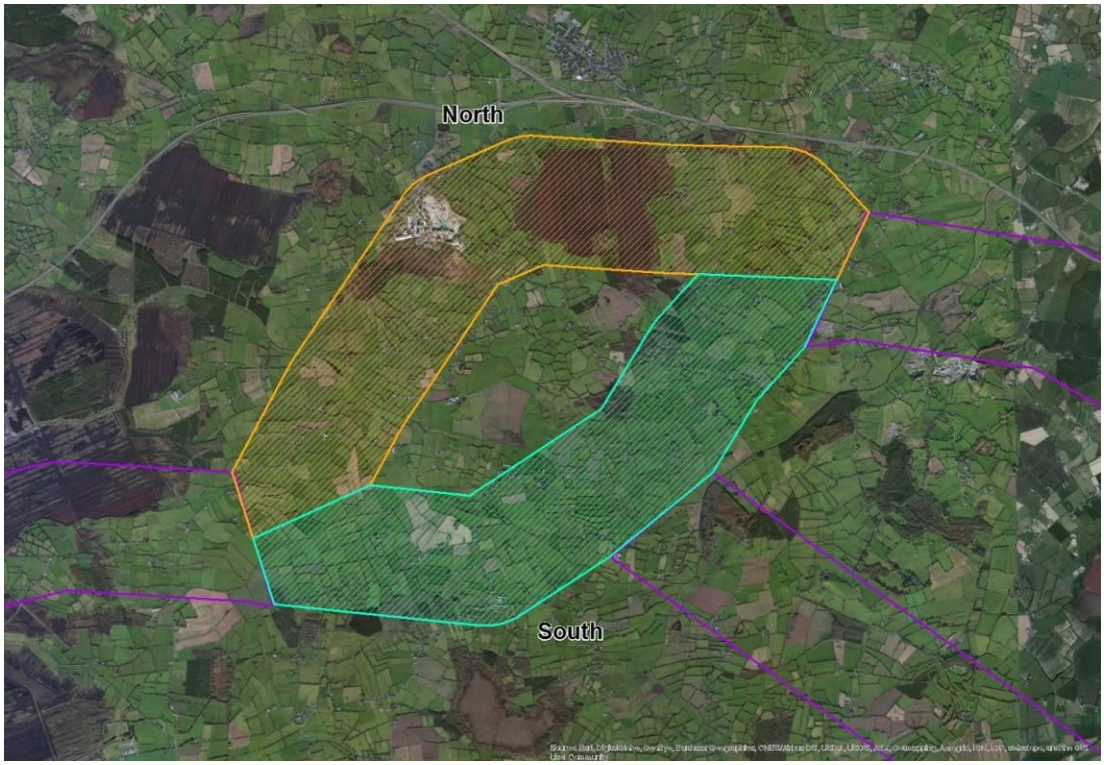


Figure F9 – 7 The Yellow River Loop

4.5.1 Northern Branch

The northern branch of the Yellow River Loop commences just inside the north-eastern border of County Offaly and crosses the County Meath border in a north-easterly direction. It skirts through a landscape of cutaway peatland forest plantations and farmed fields just to the south of the County Westmeath border. The most distinctive land use within this branch is the cement works that lie to the south-east of the settlement of Kinnegad.

4.5.2 Southern Branch

The southern branch of Yellow River Loop passes through a predominantly rural landscape of farm fields crossing the Meath Offaly border in close proximity to the dispersed rural settlement of Castlejordan. It connects with the northern loop a short distance to the southeast of Kinnegad.

4.5.3 Comparative Discussion

Given the robust landscape character and disruption of the rural landscape patterns in the vicinity of the cement works within the Yellow River northern loop it is considered to be less susceptible to any landscape or visual impacts imparted by the proposed water supply pipeline corridor. It also avoids any significant concentrations of rural population, whereas the southern loop passes in close proximity to Castlejordan. For these reasons the Yellow River northern loop is preferred.

4.6 The Killinagh Loop

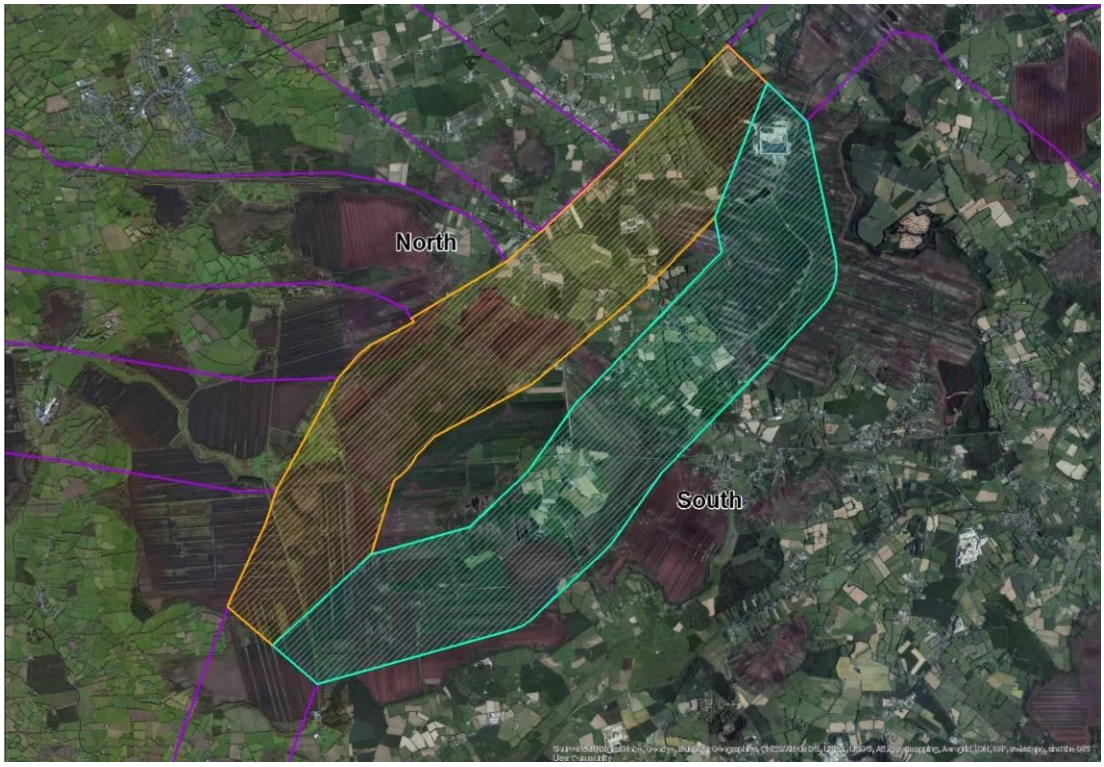


Figure F9 – 8 The Killinagh Loop

4.6.1 Northern Branch

The northern branch of the Killinagh Loop follows the zigzagging border between County Offaly and County Kildare in a north-easterly direction. It crosses a landscape of cutaway peatland throughout its south-westerly extents before transitioning into a farmed landscape of fields and hedgerows where it also crosses the Grand Canal and the R403 regional route. It terminates just to the east of the settlement Derrinturn.

4.6.2 Southern Branch

The southern branch of the Killinagh Loop also runs through cutaway peatland in the vicinity of the Offaly/Kildare border before encountering a rural landscape of farmed fields to the west of the settlement of Allenwood. It then diverts northwards through another area of peatland before connecting with the northern branch of this loop. This southern branch crosses the Grand Canal and the R403, but it also incorporates the Lullymore Heritage Park and a designated scenic view from the Kildare County development plan on the R414 near Lullymore.

4.6.3 Comparative Discussion

On the basis that the southern branch of the Killinagh loop passes through the heritage park at Lullymore and incorporates a designated scenic view from the Kildare County Development Plan there was a slight preference for the northern branch of this loop.

4.7 The Barreen Loop

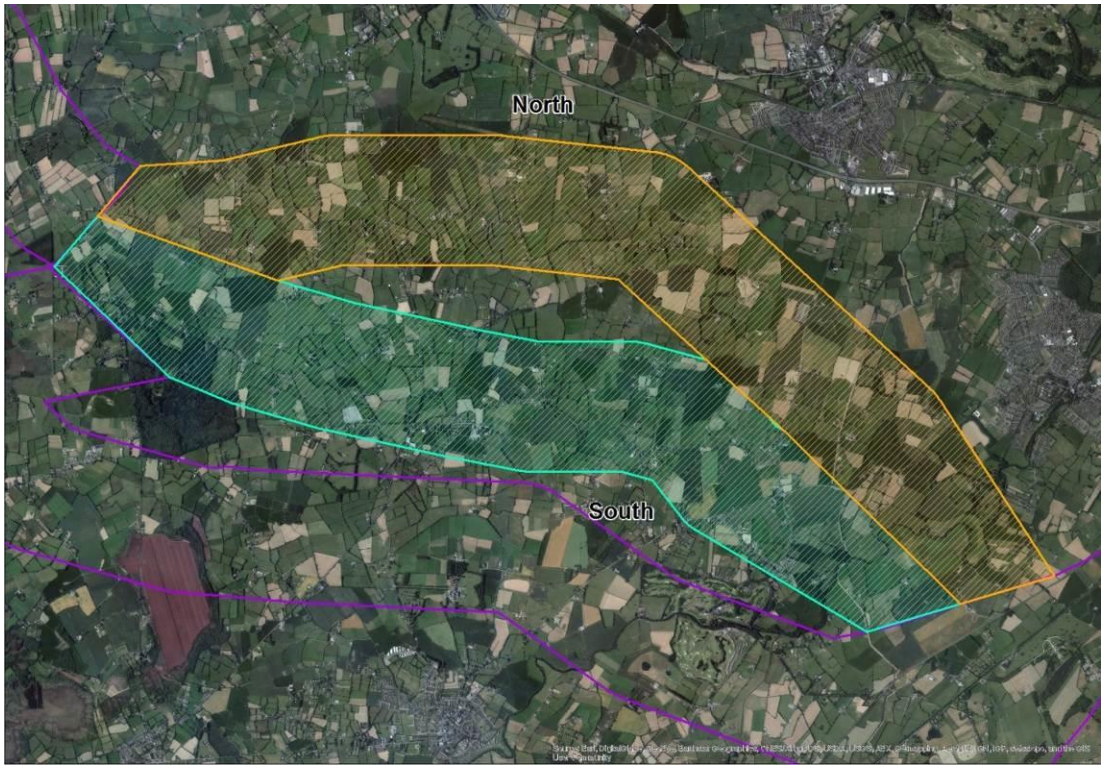


Figure F9 – 9 The Barreen Loop

4.7.1 Northern Branch

The northern branch of the Barreen Loop skirts to the north of the Donadea woodland before arcing in an easterly and south-easterly direction across a landscape of fields and hedgerows. It runs between the settlements of Straffan and Celbridge and at its eastern end it crosses the River Liffey along with a more extensive pattern of large fields associated with demesne landscapes.

4.7.2 Southern Branch

The southern branch of the Barreen Loop incorporates the northern extents of Donadea woodland and then passes through a farmed landscape and the dispersed rural settlement of Rathcoffey. At its eastern end it incorporates the northern extents of the settlement of Stratton as well as Palmerstown Castle before crossing the River Liffey where it converges with the northern branch of this loop.

4.7.3 Comparative Discussion

Both branches of the Barreen Loop pass through similar farmed landscapes with a high density of rural dwellings lining the relatively dense network of local roads. They also both encounter demesne landscapes and cross the River Liffey. However, the southern branch incorporates a section of the Donadea Woodland, which is a public recreation area. It also encompasses Rathcoffey, Straffan and Barberstown Castle. For these reasons, the northern branch of this loop is preferred.

The Matrix of Multi Criteria analysis below summarises the assessment of all loop/branch options.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna		Nenagh		Birr		Edenderry	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
Potential to impact on designated areas of 'Highly Sensitive Landscape'	Very low - No Sensitive landscape Character Areas identified	Very low - No Sensitive landscape Character Areas identified	Very low - No Sensitive landscape Character Areas identified	Very low - No Sensitive landscape Character Areas identified	Low - Contains the fringes of two moderately sensitive landscapes (bogs)	Low - Contains a portion of a moderately sensitive landscapes (forested bog)	Mid-range - Contains narrow sections of high amenity landscape south of Edenderry (Grand Canal and Eskers) + moderately sensitive bog	Low - Contains several portions of Moderately sensitive bog
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	Low - Lough Eorna	Low - Lough Eorna	Very low - None apparent	Very low - None apparent	Very low - Scrubby woodland at bog fringes	Very low - Scrubby woodland	Low - Eskers	Very low - Bog
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	Low - Woodlands and mature treelines associated with Ashley Park	Low - Small patches of bog and scrubby woodland	Low - Riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers	Low - Riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations
Potential to impact on woodlands and significant tree groups	Low - Woodlands and mature treelines	Low - Small patches of bog and scrubby	Low - riparian woodlands on Nenagh	Very low - Nothing substantial	Low - Scrubby woodland at bog fringes	Low - Scrubby woodland at bog fringe	Low - Scrubby woodland at bog fringes	Low - Scrubby woodland at bog fringes

Criteria	Lough Eorna		Nenagh		Birr		Edenderry	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
	associated with Ashley Park	woodland	River at Ballynaclogh		and patches of mixed species plantations	and large mixed species woodland flanking Camcor River	and patches of mixed species plantations	and patches of mixed species plantations
Potential to impact on historic designed landscapes	Principal views from Ashley Park House south across Lough but >500m to corridor	Principal views from Ashley Park House south across Lough but >500m to corridor	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)
Potential to alter the prevailing landscape character	Landscape will be largely reinstated	Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated
Potential to impact on designated scenic routes / views	Very low - No Scenic Views in the vicinity	Very low - No Scenic Views in the vicinity	Low - Corridor follows R491 between Elmhill and Carrig which is part of a designated view	Very low - No Scenic Views in the vicinity	Mid-range - R440 identified as an amenity route and designated views also identified towards Slieve Blooms from this section	Mid-range - R440 identified as an amenity route and designated views also identified towards Slieve Blooms from this section	Very low - Designated scenic view from Ticknevin bridge but heavily enclosed by canal-side vegetation	Very low - No Scenic Views in the vicinity
Potential to impact on views from heritage/tourist/amenity	Low - Ashley Park House and demesne	Ashley Park House and demesne	Very low - None apparent	Very low - None apparent	Very low - None apparent	Very low - None apparent	Low - Grand Canal and the Grand	Very low - None apparent

Criteria	Lough Eorna		Nenagh		Birr		Edenderry	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
features of national or regional importance							Canal Way runs along northern edge of corridor	
Potential to impact on views from settlements	Low - runs through Ardcroney cross roads	Low - Just to SE of Ardcroney cross roads but this is the more developed side of village	Very low - No substantial settlements	Very low - No substantial settlements	Very low - No substantial settlements	Very low - No substantial settlements	Very low - No substantial settlements	Very low - No substantial settlements
Potential to impact on views from dwellings / local roads	modest levels of rural housing	modest levels of rural housing	Very low - modest levels of rural housing	Very low - modest levels of rural housing	Very low - modest levels of rural housing	Very low - modest levels of rural housing	Very low - Very low level of rural housing	Very low - Very low level of rural housing
Potential to impact on views from motorways	No Motorways in the vicinity	No Motorways in the vicinity	Low - Crosses M7	Low - Crosses M8	Very low - No Motorways in the vicinity	Very low - No Motorways in the vicinity	Very low - No Motorways in the vicinity	Very low - No Motorways in the vicinity
Potential to impact on views from other major roads (national or regional roads)	Low - Crosses N52 national secondary road	Low - Crosses N52 national secondary road	Low - Crosses R498 and R445	Low - Crosses R498 and R446	Mid-range - Crosses R440 (designated scenic route)	Mid-range - Crosses R440 (designated scenic route)	Low - Crosses R402 and R401	Low - Crosses R402 and R401
Potential to impact on views from rail lines	No railway lines in vicinity	No railway lines in vicinity	Low - Follows national railway line between Elmhill and	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity

Criteria	Lough Eorna		Nenagh		Birr		Edenderry	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
			Carrig which is also adjacent to designated view					
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	No Airports in vicinity	No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	Lough Derg Way >3km W	Lough Derg Way >4km W	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity	Low - Grand Canal Way runs along northern edge of corridor	Very low - None in the vicinity
Potential to impact on local walks	None apparent	None apparent	Very low - None apparent	Very low - None apparent	Very low - None apparent	Very low - None apparent	Very low - None apparent	Very low - None apparent
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	Low - Lough Eorna	Low - Lough Eorna	Low - Nenagh, Ballinboy and Ollatrim Rivers recognised fisheries	Low - Nenagh, Ballinboy and Ollatrim Rivers recognised fisheries	Low - Camcor River is a recognised fishery	Low - Camcor River is a recognised fishery	Very low - No recognised amenities or fisheries	Very low - No recognised amenities or fisheries
Potential that landscape screening measures will be ineffective or incongruous	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be	Very Low - nothing permanent to screen and this is a modified rural landscape that can be

Criteria	Lough Eorna		Nenagh		Birr		Edenderry	
Landscape and Visual	North loop	South loop	North loop	South loop	North loop	South loop	North loop	South loop
		readily reinstated	readily reinstated	readily reinstated	readily reinstated	readily reinstated	readily reinstated	readily reinstated

Criteria	Yellow River		Killinagh		Barreen	
Landscape and Visual	North loop	South loop	North loop	South loop	North loop	South loop
Potential to impact on designated areas of 'Highly Sensitive Landscape'	Very low - designated as Low sensitivity	Very low - Contains small section of moderately sensitive forest/woodland	Low - Crosses Grand Canal (High sensitivity Feature Kildare CDP)	Low - Crosses Grand Canal (High sensitivity Feature Kildare CDP)	Mid-range - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)	Mid-range - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	Very low - Bog	Very low - Bog	Very low - Bog	Very low - Bog	Low - River Liffey	Low - Woodland at Donadea Demesne and River Liffey
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations	Low - Hedgerows and geometric forest plantations	Low - Dense hedgerow pattern throughout	Low - Dense hedgerow pattern throughout
Potential to impact on woodlands and significant tree groups	Low - Scrubby woodland at bog fringes and patches of mixed species plantations	Low - Scrubby woodland at bog fringes and patches of mixed species plantations	Very low - Nothing substantial	Very low - Nothing substantial	Very low - Nothing substantial	Low - Donadea Woodland
Potential to impact on historic designed landscapes	Very low - Nothing notable (see cultural heritage appraisal)	Very low - Nothing notable (see cultural heritage appraisal)	Low - Spring Valley house and demesne	Very low - Nothing notable (see cultural heritage appraisal)	Low - Several stately houses and demesnes within the corridor	Low - Several stately houses and demesnes within the corridor

Criteria	Yellow River		Killinagh		Barreen	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
Potential to alter the prevailing landscape character	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated	Very low - Landscape will be largely reinstated
Potential to impact on designated scenic routes / views	Very low - No Scenic Views in the vicinity	Very low - No Scenic Views in the vicinity	Very low - Close to Ticknevin Bridge viewpoint but this would be unaffected	Low - Scenic view near Lullymore on R414	Very low - Close to Barberstown scenic route	Low - RL4 from Straffan Bridge and scenic route east of Barberstown castle designated in Kildare CDP encompassed by corridor
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	Very low - None apparent	Very low - None apparent	Low - Grand Canal and Grand Canal Way	Mid-range - Lullymore Heritage Park and Grand Canal / Grand Canal Way	Very low - None apparent	Low - Barberstown castle within corridor and K-Club just outside
Potential to impact on views from settlements	Very low - No substantial settlements	Low - Passes through Castlejordan	Very low - No substantial settlements	Very low - No substantial settlements	Very low - No substantial settlements	Low - Rathcoffey and Straffan
Potential to impact on views from dwellings / local roads	Very low - Very low level of rural housing	low level of rural housing except in the vicinity of Castlejordan	Very low - Very low level of rural housing	Very low - Very low level of rural housing	Low - Some sections of linear rural developments along local roads	Mid-range - Some sections of substantial linear rural developments along local roads which may be difficult to thread through
Potential to impact on views from motorways	Very low - M4/M6 motorways just to the north of loop	Very low - No Motorways in the vicinity	Very low - No Motorways in the vicinity	Very low - No Motorways in the vicinity	Very low - M4 to the north of corridor	Very low - No Motorways in the vicinity

Criteria	Yellow River		Killinagh		Barreen	
Landscape and Visual	**North loop**	**South loop**	**North loop**	**South loop**	**North loop**	**South loop**
Potential to impact on views from other major roads (national or regional roads)	Low - Crosses R401	Low - Crosses R401	Low - Crosses R403	Low - Crosses R403 and follows section of R414	Low - crosses R407, R408, R406 and R403	Low - crosses R407, R408, R406 and R403
Potential to impact on views from rail lines	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - No railway lines in near vicinity	Very low - Railway line close to south-eastern end	Very low - Railway line close to south-eastern end
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity	Very low - No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	Very low - None in the vicinity	Very low - None in the vicinity	Low - Crosses Grand Canal Way	Low - Crosses Grand Canal Way	Very low - Grand Canal Way beyond eastern end of loop	Very low - Grand Canal Way beyond eastern end of loop
Potential to impact on local walks	Very low - None apparent	Very low - None apparent	Very low - None apparent	Low - Lullymore Heritage trail	Very low - None apparent	Low - Several walks within Donadea Woodland
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	Very low - No recognised amenities or fisheries	Very low - No recognised amenities or fisheries	Very low - No recognised amenities or fisheries	Very low - No recognised amenities or fisheries	Low - River Liffey	Low - River Liffey
Potential that landscape screening measures will be ineffective or incongruous	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	Very Low - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated

Table F9 - 3 Summary of the MCA for Corridor sub-options or "Loops"

5 Preliminary Route Corridor AB

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F9 – 10 below.

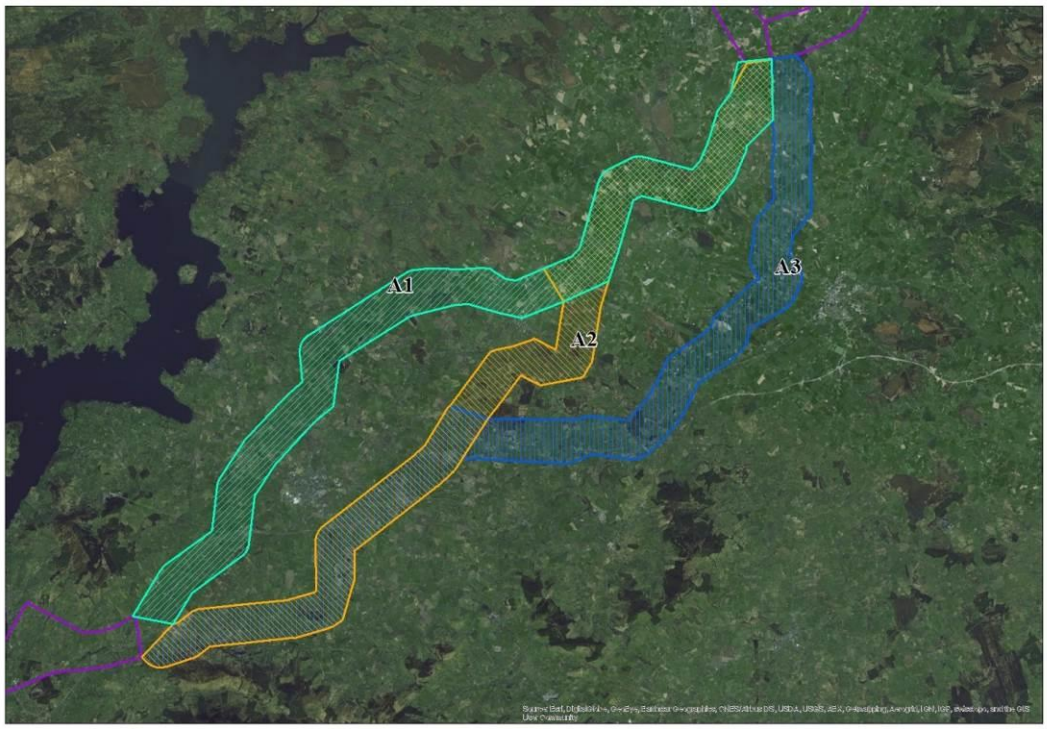


Figure F9 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Route corridor A1 runs from the common node where the M7 motorway crosses the Kilmustulla River, in a north-easterly direction and incorporates a major junction of the M7 to the southwest of the settlement of Nenagh. It then arcs in a more northerly direction around the settlement of Nenagh and skirts just to the northwest of Lough Eorna and Ashley Park House and Demesne. It then proceeds past the dispersed rural settlement of Ardcrony on the N52 in the direction of Cloughjordan. From Cloughjordan it shares a common path with route corridor A2 which zigzags through predominantly agricultural land before terminating to the south of Birr in County Offaly.

It is not considered that route corridor option A1 would give rise to landscape or visual impacts of greater than slight magnitude and these are likely to be during construction and prior to the establishment of replacement planting. The greatest potential impacts relate to the loss of sections of mature tree lines and riparian vegetation associated with Lough earner and the adjacent Ashley Park demesne

landscape. There is also a woodland to the north Cloughjordan that should be avoided by the refined pipeline corridor.

5.3 Route Corridor A2

Route corridor A2 commences at the same node as route corridor A1, but heads in a more easterly direction along the base of the Silvermines Mountains towards the small rural settlement of Dolla. It then veers in a more northerly direction towards the southern outskirts of Nenagh before returning to a north-easterly orientation that follows the M7 motorway for several kilometres. The route follows the R491 and a section of the national railway line in a north-easterly direction towards Cloughjordan before looping around the settlement to the south-east and connecting with route corridor A1 to form a common leg towards Birr (as described above).

In terms of landscape and visual constraints, part of the section of the R491 encompassed by route corridor A2 is designated as a scenic route and the Silvermines Mountains are identified as an A1 landscape area in the north Tipperary County development plan. Neither of these designations would be materially affected by the pipeline corridor beyond the short-term and they can be readily avoided by the corridor refinement. Several river crossings would be required including the Nenagh, Ballinboy and Ollatrim Rivers and it would be important to minimise long-term impacts on established riparian vegetation associated with these water courses. Otherwise, is considered that route corridor option A2 would give rise to more than low levels of landscape and visual impacts prior to corridor re-establishment.

5.4 Route Corridor A3

Route corridor A3 diverges in an eastward direction from route corridor A2 a short distance to the north of Toomevara. It passes into County Offaly incorporating the settlement of Moneygall before veering north-eastwards through the dispersed rural settlement of Dunkerrin and veers to the west of Roscrea where it crosses a national railway line and also the R491 regional road and N62 national secondary road. It continues northwards through a sparsely populated farmed landscape of large geometric fields before converging with the combined A1 and A2 route corridors south of Birr.

In terms of landscape designations, route corridor A3 skirts to the west of the Slieve Bloom Mountains which are identified as high amenity landscape in the Offaly County development plan. Designated scenic route number 15 from the same development plan is encompassed by the route corridor in the townlands of Knock. This relates to views of the Slieve Bloom Mountains and leap Castle which would be almost unaffected by the subsurface pipeline particularly following post-construction re-establishment. There are several woodlands and sections of mature tree line that should be avoided by the final route corridor, but otherwise it is not considered that more than low level landscape and visual impacts would arise from selecting route corridor A3.

5.5 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Very Low -** No Sensitive landscape Character Areas identified	**Low** - Skirts 'A1 Landscape Area' south of Silvermines and Dolla	**Low -** Skirts the high amenity landscape designation associated with the Slieve Blooms
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Lough Eorna within corridor but can be easily avoided	**Low** - Skirts naturalistic moorland near Silvermines	**Very Low** - none apparent in this farmed landscape
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low -** Woodlands and mature treelines associated with Ashley Park and woodland north of Cloughjordan	**Low** - Woodland at Pollanorman, riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers and woodland patches at Kylenaheskeragh	**Low** - several mixed species woodlands at Busherstown and around Fanure, BallyKnockan.
Potential to impact on woodlands and significant tree groups	**Low** - Woodlands and mature treelines associated with Ashley Park and woodland north of Cloughjordan	**Low** - Woodland at Pollanorman, riparian vegetation associated with Nenagh, Ballinboy and Ollatrim Rivers and woodland patches at Kylenaheskeragh	**Low** - Sections of mature tree lined hedgerows throughout
Potential to impact on historic designed landscapes	**Low -** Principal views from Ashley Park House south across Lough but can be avoided	**Very low** - Nothing notable (see cultural heritage appraisal)	**Low** - tree lined avenue providing views towards woodland from Busherstown house and avenue views from Mount St Josephs - also appears to be several other demesnes
Potential to alter the prevailing landscape character	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated
Potential to impact on designated scenic routes / views	**Very Low -** No Scenic Views in the vicinity	**Low** - Corridor follows R491 between Elmhill and Carrig which is part of a designated view	**Very Low** - designated view 15 in Offaly CDP in townland of Knock looking towards Slieve Blooms and Leap Castle

Criteria	A1	A2	A3
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Low** - Ashley Park House and demesne and Cloghjordan Eco-village	**Very Low** - nothing notable apparent	**Very Low** - nothing notable apparent
Potential to impact on views from settlements	**Low** - runs through outskirts of Nenagh, Ardcroney cross roads and Cloughjordan	**Very Low** - Skirts Silvermines	**Very Low** - Moneygall and outskirts of Roscrea near edges of corridor
Potential to impact on views from dwellings / local roads	**Low -** some relatively dense clusters of rural housing around outskirts of Nenagh and M7 interchange	**Very low** - modest levels of rural housing	**Low** - generally this is a modestly populated rural area but higher concentrations of dwellings occur around Dunkerrin and along the approach roads to Roscrea
Potential to impact on views from motorways	**Low -** Incorporates the M7 at its western end	**Low -** Crosses M7 at two regional route junctions	**Low** - follows route of M7 in southern reaches
Potential to impact on views from other major roads (national or regional roads)	**Low** - Encompasses M7 and crosses N52 national secondary road and several regional roads	**Low** -Crosses M7 at junctions with the R445 and R498 and follows alignment of R491 further north	**Low** - crosses the R490 and R491
Potential to impact on views from rail lines	**Very Low -** railway lines avoided	Briefly follows national railway line at Shallee as well as between Elmhill and Carrig which is also adjacent to designated view	**Low -** Crosses national railway line near Roscrea
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very Low -** No Airports in vicinity	**Very Low -** No Airports in vicinity	**Very Low -** No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	**Very Low -** Lough Derg Way >3km W	**Low** - Slieve Felim Way has a trail head in Silvermines	**Very Low** - Slieve Bloom Way outside of corridor
Potential to impact on local walks	**Low -** Nenagh cycle loop and loop walks within woodland north of Cloghjordan	**Very Low** - several loop walks emanate from Silvermines but generally head south into Silvermines mountains	**Very Low** - Moneygall Rock of Loyer loop just outside of corridor

Criteria	A1	A2	A3
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Lough Eorna	**Low** - Nenagh, Ballinboy and Ollatrim Rivers recognised fisheries	**Low** - Ollatrim and Little Brosna Rivers recognised fisheries
Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low -** nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low -** nothing permanent to screen and this is a modified rural landscape that can be readily reinstated

Table F9 - 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

Route corridors A1, A2 and A3 all pass through similar rural landscapes of predominantly fields and hedgerows with occasional patches of woodland, river crossings with established riparian vegetation and sections of mature tree lines that may be associated with demesne landscapes or remnants. Route corridors A2 and A3 run close to highly sensitive landscape designations (Silvermines Mountains, and Slieve Bloom Mountains), but do not encompass them. The same route corridors also incorporate one designated scenic view apiece. However, the subsurface pipeline is unlikely to have any material effect on these designated views beyond the construction and landscape re-establishment stages. It is not considered that landscape and visual impacts of greater than a low magnitude would arise from the selection of any of these route corridor options and this will only apply to the construction stage. Furthermore, given the purpose of this appraisal is to identify a least constrained 2km wide corridor, there is ample scope to avoid many of the sensitive landscape features described above during the course of refining the final pipeline corridor. Overall, there is no clear preference for any of these route corridor options and any of them would be potentially suitable in terms of landscape and visual constraints.

6 Preliminary Route Corridor BC

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F9 – 11 below.

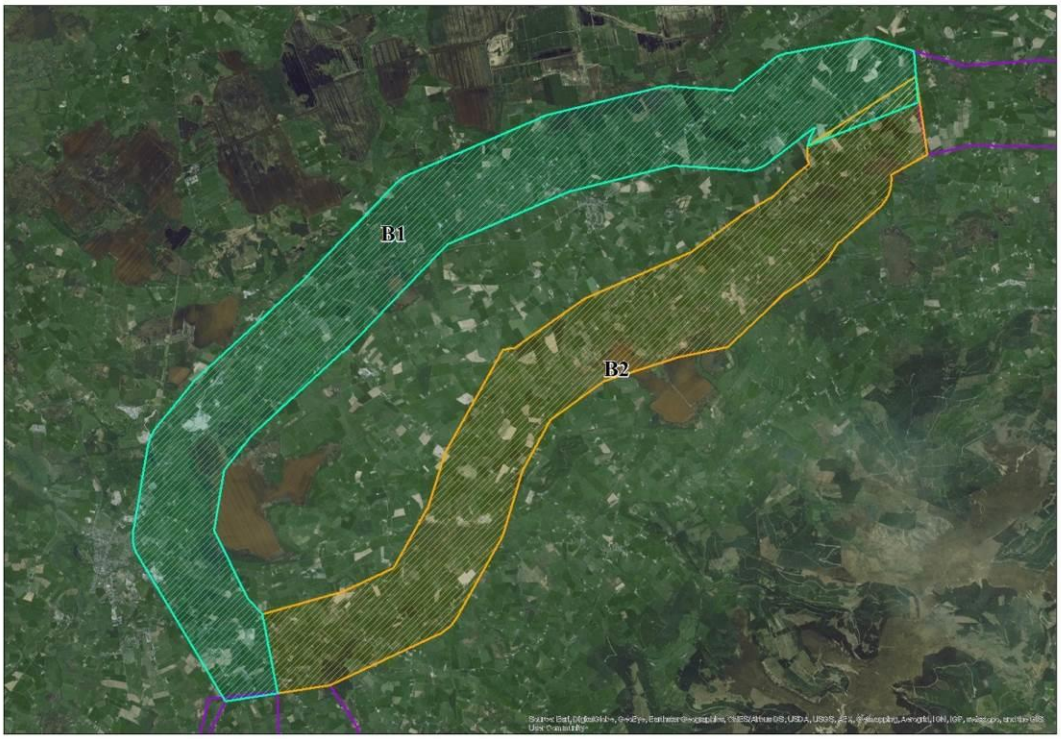


Figure F9 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

Route corridor B1 commences from the common node to the south-east of Birr and arcs in a northerly direction towards the eastern outskirts of the settlement itself. It then threads between expanses of cutaway peatland following the course of the N52 national secondary road towards could Kilcormack. It passes to the north of Kilcormack and continues in an easterly direction towards its termination point near Mountbolus. This route corridor encompasses a land cover consisting of urban fringe, fields and hedgerows, peat bogs and commercial forest plantations.

In terms of landscape designations, the section of the R440 regional route crossed near the outskirts of Birr is designated as a scenic route in the Offaly County Development Plan. Another designated scenic view occurs on the N52 to the north-east of Birr, which is also within this route corridor. Near its eastern end, route corridor B1 skirts Lough Boora bog, which is designated as a highly sensitive landscape in the county development plan along with several eskers that are also contained within this corridor.

In terms of non-designated constraints, route corridor B1 passes close to the settlements of Birr, Kilcormack and Mountbolus and will also cross the Camcor and

Silver Rivers, which are lined by riparian woodland along some sections. It also crosses the 'Offaly Way', which is a national way-marked walking route near the settlement Kilcormack.

6.3 Route Corridor B2

From the common node point route option B2 briefly heads in an eastward direction towards Kinnity, but veers northward to skirt just to the west of the Knockbarron wood amenity area. It then returns to a more easterly orientation towards its junction with route corridor B1 at Mountbolis. This route corridor also encompasses a predominantly farmed landscape consisting or large geometric fields and also skirts past cutaway peatland with commercial forestry at its fringes.

This route corridor crosses the R440 regional road, which is designated as a scenic route between Birr and Kinnity. It also encompasses designated view no.17 from the Offaly County development plan, which is described as being "across lowland from Knockhill".

Corridor B2 also crosses the Camcor River and although it skirts close to the Knockbarron Wood eco-walk, this is an enclosed amenity area that is unlikely to be affected by a nearby pipeline corridor. Route corridor B2 also crosses the Offaly Way near Kilcormack.

6.4 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Low** - small portion of Lough Boora bog and several eskers inside corridor	**Very Low** - Contains portions of a moderately sensitive landscapes (bog)
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Eskers and bog	**Low** - Scrubby woodland and bog
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Very low** - generally large fields with low hedgerows, but with some mature tree lines	**Low** - Hedgerows and geometric forest plantations
Potential to impact on woodlands and significant tree groups	**Low** - Riparian woodland on Camcor and Silver Rivers and scrubby woodlands at bog fringes	**Low** - Scrubby woodland at bog fringe and mixed species woodland flanking Camcor River
Potential to impact on historic designed landscapes	**Low** - Demesne Landscape at Ballynacard	**Very low** - Nothing notable (see cultural heritage appraisal)
Potential to alter the prevailing landscape character	**Very Low -** Rural landscape will be largely reinstated	**Very Low -** Rural landscape will be largely reinstated
Potential to impact on designated scenic routes / views	**Low** - Crosses R440 designated scenic route and encompasess designated view 5 in Offaly CDP from N52 to Slieve Blooms	**Low** - Crosses R440 designated scenic route and encompasess designated view 17 in Offaly CDP 'across lowland' from Knockhill

Criteria	B1	B2
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Very low** - Birr Castle west of corridor and Lough Boora Parklands a short distance to north of northern end of corridor	**Very low** - None apparent
Potential to impact on views from settlements	**Low** - Birr, outskirts of Kilcormac and Mountbolus	**Very low** - No substantial settlements
Potential to impact on views from dwellings / local roads	**Low** - Fairly modest and dispersed rural settlement outside of settlements	**Very low** - sparse and dispersed rural housing
Potential to impact on views from motorways	**Very low** - No Motorways in the vicinity	**Very low -** No Motorways in the vicinity
Potential to impact on views from other major roads (national or regional roads)	**Low** - Crosses R440 (scenic route) follows N52 national secondary route	**Low** - Crosses R440 (designated scenic route)
Potential to impact on views from rail lines	**Very low** - No railway lines in near vicinity	**Very low** - No railway lines in near vicinity
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	**Low** -Crosses Offaly Way near Kilcormac	**Low** -Crosses Offaly Way near Kilcormac
Potential to impact on local walks	**Low** - Birr town and river bank walks	**Very low** - Knockbarron Wood eco-walk nearby (enclosed)
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - Camcor River is a recognised fishery	**Low -** Camcor River is a recognised fishery
Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated

Table F9 - 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

Whilst neither route corridor B1 or B2 is considered likely to give rise to landscape and visual impacts of greater than a low magnitude, route corridor B2 is the slightly preferred option. This is on the basis that route corridor B1 encompasses several eskers and contains the fringe of the highly sensitive Lough Bora bog. It also impacts on a higher number of residences because it passes so close to several significant settlements. By comparison route corridor B2 passes through a fairly sparsely populated rural landscape.

7 Preliminary Route Corridor CD

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F9 – 12 below.

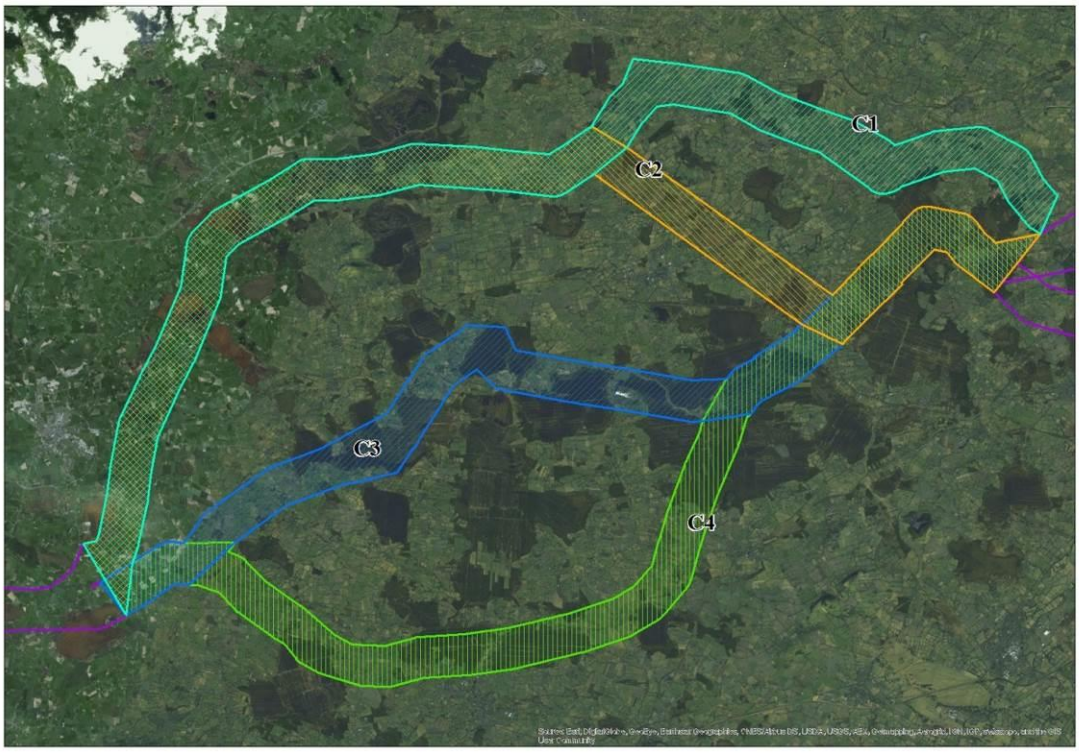


Figure F3 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

From the common node at Killeigh, route corridor C1 heads in a northerly direction to pass just to the east of Tullamore and then veers in a more north-easterly direction crossing several extensive cutaway peatlands and the Offaly/Westmeath border. It then follows the Westmeath border for a short distance before veering directly eastward between the settlements of Rockfortbridge and Rhode. The corridor crosses the Offaly/Meath border near the small rural settlement of Castlejordan and briefly heads in a north-easterly direction towards Clonard. However, before it reaches the M4 motorway it turns to the southeast and remains just to the south of the motorway as it passes the settlement of Enfield before briefly diverging southwards to the eastern nodal point of the route 'C' options.

In terms of designated landscape and visual constraints, route corridor C1 crosses the Grand Canal twice near Tullamore and there is also an esker present in this area. Both of these landscape features are deemed to be highly sensitive in the Offaly County Development Plan. The Grand Canal towpath is a National way-marked walking route known as the 'Grand Canal Way'. Near its eastern end, this route corridor contains a portion of the 'Northern Hills' landscape character area,

which is identified as a highly sensitive landscape in the Kildare County Development Plan.

Route corridor C1 incorporates a number of small settlements including Killeigh, Castlejordan, Cadamstown, Thomastown, Kilmurry, and Johnstown Bridge. It crosses a section of the national railway line just to the south of Tullamore and also skirts close to the M4 motorway in its more northerly sections. Although it crosses the River Boyne near the Offaly/Kildare border, this iconic river is a fairly small watercourse that is close to its origin in this area.

7.3 Route Corridor C2

Route corridor C2 is something of a link section between the C1 corridor and a common leg of the C3 and C4 corridors. It emanates at the confluence of the County Meath/Offaly/Kildare borders to the north of Edenderry and runs in a south-easterly direction towards the settlement of Derrinturn. It passes through a predominantly rural area, but also encompasses a portion of cutaway peatland near Derrinturn and the closely associated Edenderry Golf Course and Highfield Country Club Golf Course just to the north-east of Edenderry.

Route corridor C2 does not incorporate any sensitive landscape or visual designations from the applicable county development plans. The main constraint would appear to be the pinch point between Edenderry Golf Course and Highfield Country Club Golf Course. These would need to be avoided by any further refinement of this route corridor.

7.4 Route Corridor C3

Route corridor C3 commences at the common nodal point at Killeigh and heads in a north-easterly direction through a farmed landscape of fields and hedgerows between the settlements of Ballinagar and Geashill before entering a landscape that predominantly consists of cutaway peatland. It continues north-eastward through this peatland landscape before veering in a more easterly direction from a point to the south of the settlement of Rhode. It crosses the Offaly/Kildare border between the settlements of Edenderry and Clonbulloge where it connects with route corridor C4. These combined corridors then link with route corridor C2 just to the south of Derrinturn, whereupon, the combined route continues through a landscape of peatland, farmland and forestry to the common node near Donadea Woodland in County Kildare.

In terms of designated landscape and visual constraints, route corridor C3 crosses several eskers near Lugmore in Springfield and these landscape features are considered to be highly sensitive in the Offaly County development plan. The corridor also crosses the Grand Canal and associated Grand Canal Way near its eastern end. The Grand Canal is considered to be a highly sensitive landscape feature in the Kildare County Development Plan. Given that this route corridor passes through a substantial area of cutaway peatland and peatland fringe, it is sparsely populated with rural dwellings. In terms of linear receptors, the corridor crosses four regional roads and a section of the national railway line to the south of Tullamore.

7.5 Route Corridor C4

From the common nodal point at the settlement of Killeigh, route corridor C4 arcs to the northeast then southeast following the Offaly / Laois border. It then runs in an easterly direction across the northern outskirts of the settlement Portarlington. It subsequently veers to the northeast following the zigzagging border between County Offaly and County Kildare passing to the west of Rathangan and connecting with route corridor C3 in the heart of a large cutaway peatland. The remainder of the combined route is described above in respect of route corridor C3. In comparison to route corridor C3, this route corridor passes through more of a farmed landscape with a lower proportion of cutaway peatland. Nonetheless, it does contain significant sections of peatland and peatland fringe, which includes conifer plantations.

There are no sensitive landscape designations or protected views contained within this route corridor. Aside from passing through the northern outskirts of Portarlington this route corridor traverses a sparsely populated rural landscape. As with each of the other route corridor options, it crosses several regional roads and the headwaters of several rivers, which tend to be narrow watercourses in this boggy watershed area.

7.6 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Low** - crosses the Grand canal twice near Tullamore and also an esker present in this area (high sensitivity Offaly CDP). Northern Hills LCA contained in north-eastern section of this corridor (high sensitivity Kildare CDP)	**Very low** - medium and low classifications only	**Low** - Crosses Eskers near lugmore and Springfield (high sensitivity Offaly CDP) and crosses Grand canal at eastern end of corridor (high sensitivity Kildare CDP)	**Very low** - medium and low classifications only
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Bogs (mainly cutaway)	**Low** - Bogs (mainly cutaway)	**Low** - Eskers and bogs (mainly cutaway)	**Low** - Bogs (mainly cutaway)
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Hedgerows, tree lines and forest plantations throughout	**Low -** Hedgerows, tree lines and forest plantations throughout	**Low** - Hedgerows, tree lines and forest plantations throughout	**Very low** - mainly large fields with little enclosure by hedgerows
Potential to impact on woodlands and significant tree groups	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes	**Very low** - mainly scrubby woodlands at bog fringes
Potential to impact on historic designed landscapes	**Very low -** some demesne landscapes but nothing with strong axial views	**Low** - Highfield House appears to have some axial views NW	**Very low** - none apparent	**Very low** - none apparent
Potential to alter the prevailing landscape character	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated

Criteria	C1	C2	C3	C4
Potential to impact on designated scenic routes / views	**Very low** - none contained within corridor. Several with potential elevated views from just beyond corridor (Tyrellspass WM and Northern Hills Kildare)	**Very low** - scenic route associated with views of Carbury Castle a short distance outside of corridor (views in opposite direction)	**Very low** - none in Offaly and corridor runs between two designated Canal Views from Kildare CDP	**Very low** - none within the corridor or in the near vicinity
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Very low** - several golf courses that can be avoided	**Low** - Edenderry golf course and Highfield country club and golf course create a 'pinch point' in corridor	**Low -** Grand Canal	**Very low** - none apparent
Potential to impact on views from settlements	**Low** - Several small settlements within corridor (Killeigh, Castlejordan, Cadamstown, Thomastown, Kilmurry, Johnstown Bridge)	**Low** - Derrinturn	**Very low** - no significant settlements within corridor	**Low** - corridor skirts past Portarlington but no other significant settlements
Potential to impact on views from dwellings / local roads	**Low** - Generally sparsely populated but some relatively dense areas around Cadamstown and Thomastown	**Low** - Generally sparsely populate area but with concentration of linear development at Ballyhagan	**Low** - dispersed rural settlement in the vicinity of Ticknevin Bridge	**Low** - whilst there are several small concentrations of rural residences most of this corridor is very sparsely populated
Potential to impact on views from motorways	**Low** - corridor includes two small sections of M4 at northern periphery	**Very low** - none in the vicinity	**Very low** - none in the vicinity	**Very low** - none in the vicinity
Potential to impact on views from other major roads (national or regional roads)	**Low** - crosses R400 and R402 regional roads	**Low** - crosses R401 and R402 regional roads	**Low -** crosses R400, R401, R420 and R402 regional roads	**Low** - crosses R401, R419 and R420 regional roads

Criteria	C1	C2	C3	C4
Potential to impact on views from rail lines	**Low** - Crosses national rail line south of Tullamore	**Very low** - none within corridor	**Low** - Crosses national rail line south of Tullamore	**Low** - follows substantial portions of railway line between Tullamore and Portarlington
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	**Low** - crosses Grand Canal Way twice near Tullamore	**Very low** - None in the vicinity	**Low -** Crosses Grand Canal Way at eastern end of corridor	**Very low** - None in the vicinity
Potential to impact on local walks	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor	**Very low** - none apparent within corridor
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - crosses the River Boyne at Offaly Kildare border (recognised fishery) Other watercourse small in this boggy watershed area	**Low** - crosses the River Boyne at Meath Kildare border (recognised fishery)	**Very low** - crosses the Tullamore River but few other substantial watercourses in this watershed area	**Low** - Encompasses confluence of Cushina, Figile and Slate Rivers (recognised fisheries)
Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated

Table F9 - 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

It is not considered that any of these route corridor options would give rise to critical landscape and visual impacts. Indeed, the highest level of impact anticipated is low and even this relates to the construction stage and prior to remediation of the corridor. Setting aside route corridor C2, which is something of a link between the other three more substantial route corridors, the most preferred corridor is considered to be C4. This is on the basis that it does not impact on any landscape or visual designations and aside from skirting the northern fringes of Portarlington it crosses a sparsely populated rural area. The next most preferred corridor is C3 for similar reasons of sparse population as it passes through predominantly cutaway peatland. It does, however, cross some eskers and the Grand Canal. The least preferred corridor is C1 as it incorporates the highly sensitive Northern Hills landscape character area in County Kildare. It also Crosses the Grand Canal twice and contains eskers, which are features that are identified as highly sensitive in the Offaly County Development Plan. It should be noted that an option of following corridor C1 and diverting to corridor C2 is preferable to following corridor C1 for its full-length. Again, this is on the basis of avoiding sensitive landscape designations at the eastern end of corridor C1.

8 Preliminary Route Corridor DE

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F9 – 13 below.

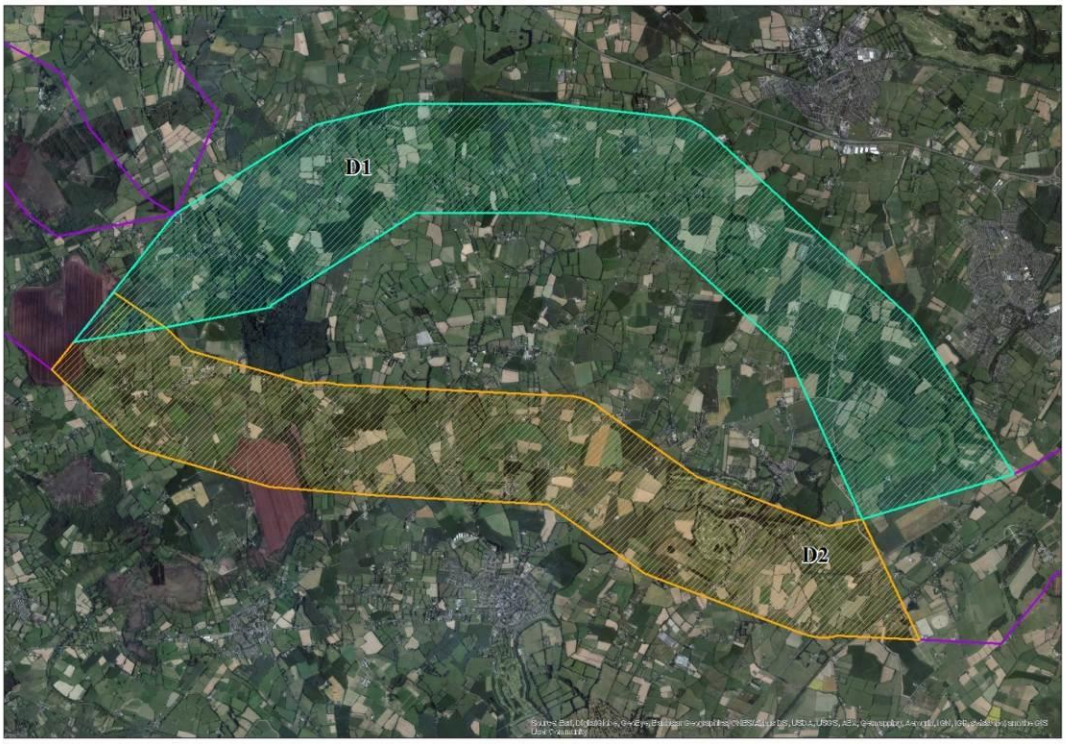


Figure F9 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

Route corridor D1 emanates from the common node near Donadea Woodland and follows an easterly course through a relatively densely populated rural landscape in the direction of Maynooth. Just to the south of the M4 motorway near Maynooth, the corridor veers south-eastwards. It continues in this direction across the River Liffey between the settlements of Celbridge and Straffan to connect to the final common leg of the route corridor near the County Dublin border.

A key landscape and visual constraint for this route corridor is the River Liffey corridor, which is designated as a highly sensitive landscape feature in the Kildare County Development Plan. There are also several demesne landscapes in the vicinity of the Liffey corridor, which have a parkland character and contain large mature tree lines. The corridor also incorporates the northern portion of Donadea Woodland, which is part of Donadea demesne and is a public amenity area. This would need to be avoided by any refinement of this corridor option.

Given the high density of rural housing lining the web of local roads in this area, there may be some difficulty in threading the final pipeline route between dwellings, whilst allowing appropriate buffer distances.

8.3 Route Corridor D2

Route corridor D2 emanates from the common nodal point and runs in a south-easterly direction past the southern extent of the Donadea woodland. It passes through a section of cutaway peatland before continuing through a farmed landscape and dissecting the settlements of Clane and Straffan. At this point it also crosses the River Liffey before joining the common node at its eastern end. Both corridor D1 and D2 would cross the M7 motorway and the Grand Canal at the common node.

As with route corridor D1, route corridor D2 crosses the highly sensitive landscape designation associated with the River Liffey as well as several demesne landscapes in the vicinity. One of these contains the internationally renowned K-Club Golf Course to the south of Straffan. The other key constraint that is also common to the D1 route corridor is a high density of rural dwellings throughout this landscape, but particularly in the vicinity of Straffan and Balnaboley. This is not a significant constraint with respect to this 2km wide corridor; however, there may be some difficulty in threading a final pathway for the proposed pipeline, whilst providing appropriate distance buffers to dwellings.

8.4 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Potential to impact on designated areas of 'Highly Sensitive Landscape'	**Mid-range** - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)	**Mid-range** - Crosses the River Liffey corridor at eastern end (high sensitivity Kildare CDP)
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	**Low** - Woodland at Donadea Demesne and River Liffey	**Low** - Bog, Woodland at Donadea Demesne and River Liffey
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	**Low** - Hedgerows, tree lines throughout	**Low -** Hedgerows, tree lines throughout
Potential to impact on woodlands and significant tree groups	**Low** - Woodland at Donadea Demesne, but this can be avoided	**Low -** Woodland at Donadea Demesne, but this can be avoided
Potential to impact on historic designed landscapes	**Low** - Several stately houses and Demesnes within the corridor	**Low** - Clongowes Wood College, Straffan demesne
Potential to alter the prevailing landscape character	**Very Low** - Rural landscape will be largely reinstated	**Very Low** - Rural landscape will be largely reinstated
Potential to impact on designated scenic routes / views	**Low** - Portion of a scenic route east of Barbertown castle encompassed by corridor	**Low** - RL4 from Straffan Bridge designated in Kildare CDP encompassed by corridor
Potential to impact on views from heritage/tourist/amenity features of national or regional importance	**Low** - Donadea woodland	**Mid-range -** The K Club internationally renowned golf course and the Grand Canal/ Grand Canal Way
Potential to impact on views from settlements	**Low -** Corridor tends to thread between significant settlements	**Low** - Corridor tends to thread between significant settlements

Criteria	D1	D2
Potential to impact on views from dwellings / local roads	**Mid-range** - Some sections of substantial linear rural developments along local roads which may be difficult to thread through	**Mid-range** - Some sections of substantial rural residential development around Ballnaboley and Straffan
Potential to impact on views from motorways	**Very low** - reasonable distance from M4	**Very low** - no motorways in the vicinity
Potential to impact on views from other major roads (national or regional roads)	**Low -** crosses R403, R406, R407 and R408 regional roads	**Low** - crosses R403, R406, R407 and R408 regional roads
Potential to impact on views from rail lines	**Very low** - railway line runs just to the south east of this corridor	**Low** - corridor crosses railway line at eastern end
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	**Very low** - No Airports in vicinity	**Very low** - No Airports in vicinity
Potential to impact on views from national 'way marked' walking routes	**Very low** - Grand Canal Way just beyond the eastern end of this corridor	**Low** - Corridor crosses Grand Canal Way at its eastern end
Potential to impact on local walks	**Low** - Several loop walks associated with Donadea Woodland	**Very low** - Several loop walks associated with Donadea Woodland
Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	**Low** - River Liffey	**Low** - River Liffey, Grand Canal
Potential that landscape screening measures will be ineffective or incongruous	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated	**Very Low** - nothing permanent to screen and this is a modified rural landscape that can be readily reinstated

Table F9 - 7 Summary of the MCA for Route Corridors DE

8.5 Comparative Discussion

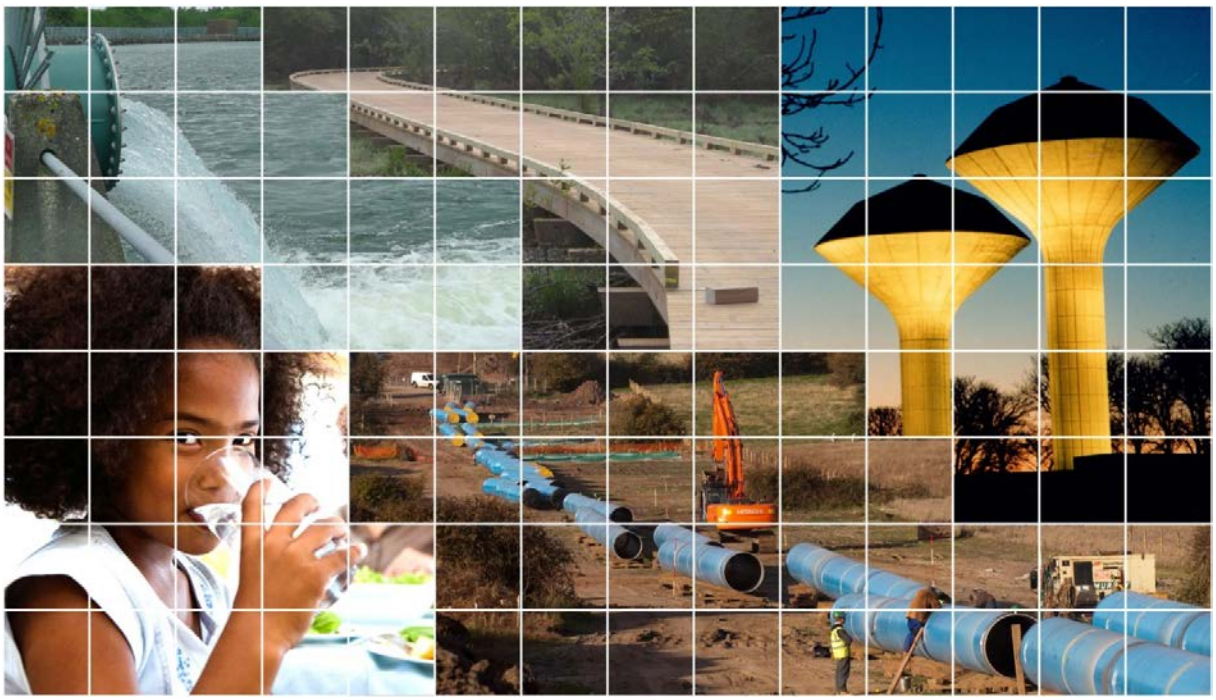
Whilst some consideration needs to be given to the design of the pipeline route as it approaches and crosses the River Liffey corridor, especially with respect to riparian vegetation where this forms part of a domain or demesne remnant, this constraint is common to both corridor options. Route corridor D1 contains a greater proportion of the Donadea woodland at its western end, but ample scope is afforded to avoid this amenity area through further corridor refinement. From a landscape and visual perspective the preferred corridor route is D1 on the basis that a significant portion of the D2 corridor is occupied by the highly sensitive receptor of the K-Club Golf Course.

Water Supply Project
Eastern and Midlands Region (WSP)

Option F: Parteen Basin Reservoir MCA

Appendix F10: Agronomy

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Landscape and visual** – the consideration of landscape and visual impact.
vi. **Agronomy** – the consideration of impact on land based enterprise.
vii. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
viii. **Planning** – the consideration of planning and land use policy in relation to proposed works
ix. **Engineering** - the consideration of technical challenges associated with proposed works.

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria Analysis and explicitly considers multiple criteria, see Table F5 - 1, within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F10 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F10 is a statement on the specialism Agronomy and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under a range of agronomy sub-criteria.

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a "least constrained" component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid range	**Green**
Low	**Light Green**
Very low	**Cream**

From an agricultural point of view the following constraints are relevant to the selection of least constrained corridor option:

- Farming Enterprise
- Number of landowners impacted within site boundary
- Land Quality
- Crop rotation practiced
- Overall Impact

The above criteria are considered relevant in selecting the least constrained corridor option. It is to be noted that without knowledge of the precise route through individual farms it is not possible at constraints stage to identify impacts on individual farms. This desk top study is at a high level and no individual farm impact studies were carried out.
Land quality data was derived from EPA Soil Series Maps,
Ref: gis.teagasc.ie/isis/help.php

At constraints study stage it is not possible to examine the effect of the proposed scheme on the following sub criteria

- Approximate reduction on overall farm holding
  The effect on an individual farm will only become clear when the precise route has been identified. It is likely that land loss will be minimal and confined to inspection chambers only.
- Severance based on site location within overall land holding
  It is only possible to assess the severance caused when the actual route corridor has been chosen and its effects on the individual farm or farms can then be assessed as regards severance.
- Potential Impacts on land holding
  The actual impacts on a land holding will vary from farm to farm depending on size, enterprise, rotation of crops and animals. These impacts will be assessed in full when the exact route corridor has been selected.

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F10 – 1 Peamount

The identified termination point, in the main, is in agricultural land. The identified termination point is rural in character and consists predominantly of farm land

2.2.1.1 Farm Enterprises

The predominant farm enterprises within the study area are grass based and tillage production.

2.2.1.2 Number of Land owners Impacted

There are approximately 3-5 individual landowners within the study area.

2.2.1.3 Land Quality

The soils encountered are broadly described as loamy drift with a limestone base. These soils are suitable for a wide range of agricultural uses. The land quality would be described as very good quality.

2.2.1.4 Crop Rotations Practised

The predominant crop within the identified study area is permanent pasture. There are substantial areas of tillage, particularly cereal production. It is likely that the most common rotation practised is cereals and grass land.

2.2.1.5 Overall Impact

The principal short term impacts at the construction phase will be temporary loss of land, noise, dust and other general disturbance.
The long term impacts may be loss of agricultural land depending upon the exact site chosen.

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Agronomy	
Approximate % Reduction in overall farm holding	Unknown until precise location is chosen
Farming Enterprise	Predominantly grass and tillage
Number of landowners impacted within site boundary	3-5 Landowners
Land Quality	Very good land quality
Severance based on site location within overall land holdings	Unknown until precise location is established
Potential Impacts on landholdings	Land loss and potential construction disturbance.
Crop rotation practiced	Grass based and tillage.
Overall Impact	Low at national level, potentially high at individual farm level.

Table F10 - 2 Summary of the MCA for Peamount

2.4 Discussion

The identified study area adjacent to Peamount consists of intensively farmed agricultural land. The principal farm enterprises are grass based, mainly cattle and sheep with some equine and tillage. The area falls within a prominent tillage production area and most of the farms would possess the full range of tillage machinery.

The siting of the reservoir within the area is deemed to have a low impact nationally. Depending on the land requirement the effect on individual farms may vary from low to high impact. The principal impact of the reservoir construction will be loss of agricultural land.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F13 – 1.

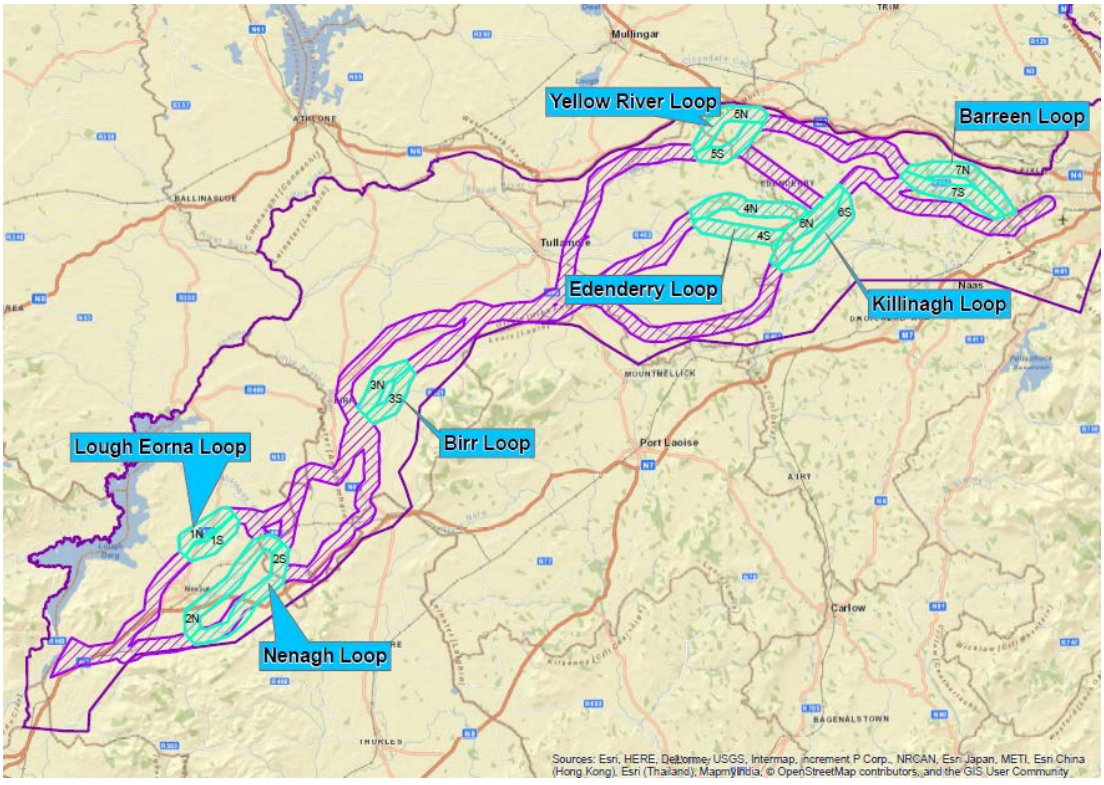


Figure F10-1 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify, and then appraise, “Preliminary Route Corridors” (approximately 2 km wide) from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

4.1.1 Northern Branch

Mainly good quality agricultural land suitable and used for all types of main farming enterprises

4.1.1.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle and sheep production. In addition there are areas of tillage and equine enterprises and some areas of forestry. The study area being eighteen square kilometres in size will have represented within it all the main farming systems.

4.1.1.2 Number of Land owners Impacted

There are approximately 144 individual landowners within the study area. It is likely 36 would be affected by the pipeline.
The farms are mainly residential with each individual farms having a range of farm buildings suitable to the enterprise practised.

4.1.1.3 Land Quality

The soils encountered in the study area are broadly described as loamy drift with a limestone base. These soils are suitable for a wide range of agricultural uses. Areas within this study area would be prone to poor drainage and localised areas would have low productivity. The land quality would be described as good quality and would be suited to a wide range of farming enterprises. .

4.1.1.4 Crop Rotations Practised

The predominant crop within the identified study area is permanent pasture. Areas of tillage are commonly rotated with grass land.

4.1.1.5 Overall Impact

The principal impacts of the laying of an underground pipe line through farm land will be relevant to the construction phase. Impacts such as temporary loss of land, disruption to access, noise, dust and increased traffic are the most relevant to farming enterprises.
The impacts from the operation phase would consist of potential intermittent disturbance during inspection or repair routines.
The overall impact during construction is deemed to be mid-range and low at the operation phase.

4.1.2 Southern Branch

Mainly good quality agricultural land suitable and used for all types of main farming enterprises

4.1.2.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle and sheep production. In addition, there are areas of tillage and equine enterprises and some areas of forestry. The study area being sixteen square kilometres in size will have represented within it all the main farming systems.

4.1.2.2 Number of Land owners Impacted

There are approximately 130 individual landowners within the study area. It is likely 32 would be affected by the pipeline.
The farms are mainly residential with each individual farms having a range of farm buildings suitable to the enterprise practised.

4.1.2.3 Land Quality

The soils encountered in the study area are broadly described as loamy drift with a limestone base. These soils are suitable for a wide range of agricultural uses. Areas within this study area would be prone to poor drainage and localised areas would have low productivity. The land quality would be described as good quality and would be suited to a wide range of farming enterprises. .

4.1.2.4 Crop Rotations Practised

The predominant crop within the identified study area is permanent pasture. Areas of tillage are commonly rotated with grass land.

4.1.2.5 Overall Impact

The principal impacts of the laying of an underground pipe line through farm land will be relevant to the construction phase. Impacts such as temporary loss of land, disruption to access, noise, dust and increased traffic are the most relevant to farming enterprises.
The impacts from the operation phase would consist of potential intermittent disturbance during inspection or repair routines.
The overall impact during construction is deemed to be mid-range and low at the operation phase.

4.1.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas.

It is likely that within a two kilometre wide corridor of approximately 9 kilometres in length there will be a significant number of intensive dairy farms. In addition given the strong tradition within the area for horse breeding it is likely that significant equine establishments will be encountered. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.2 The Nenagh Loop

4.2.1 Northern Branch

Mainly good quality agricultural land suitable and used for all types of main farming enterprises

4.2.1.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle and sheep production. In addition there are areas of tillage and equine enterprises and some areas of forestry. The study area being thirty-six square kilometres in size will have represented within it all the main farming systems.

4.2.1.2 Number of Land owners Impacted

There are approximately 288 individual landowners within the study area. It is likely 70 would be affected by the pipeline.
The farms are mainly residential with each individual farms having a range of farm buildings suitable to the enterprise practised.

4.2.1.3 Land Quality

The soils encountered in the study area are broadly described as loamy drift with a limestone base. These soils are suitable for a wide range of agricultural uses. Areas within this study area would be prone to poor drainage and localised areas would have low productivity. The land quality would be described as good quality and would be suited to a wide range of farming enterprises. .

4.2.1.4 Crop Rotations Practised

The predominant crop within the identified study area is permanent pasture. Areas of tillage are commonly rotated with grass land.

4.2.1.5 Overall Impact

The principal impacts of the laying of an underground pipe line through farm land will be relevant to the construction phase. Impacts such as temporary loss of land, disruption to access, noise, dust and increased traffic are the most relevant to farming enterprises.
The impacts from the operation phase would consist of potential intermittent disturbance during inspection or repair routines.
The overall impact during construction is deemed to be mid-range and low at the operation phase.

4.2.2 Southern Branch

Mainly good quality agricultural land suitable and used for all types of main farming enterprises

4.2.2.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle and sheep production. In addition there are areas of tillage and equine enterprises and some areas of forestry. The study area being thirty-eight square kilometres in size will have represented within it all the main farming systems.

4.2.2.2 Number of Land owners Impacted

There are approximately 300 individual landowners within the study area. It is likely 75 would be affected by the pipeline.
The farms are mainly residential with each individual farms having a range of farm buildings suitable to the enterprise practised.

4.2.2.3 Land Quality

The soils encountered in the study area are broadly described as loamy drift with a limestone base. These soils are suitable for a wide range of agricultural uses. Areas within this study area would be prone to poor drainage and localised areas would have low productivity. The land quality would be described as good quality and would be suited to a wide range of farming enterprises. .

4.2.2.4 Crop Rotations Practised

The predominant crop within the identified study area is permanent pasture. Areas of tillage are commonly rotated with grass land.

4.2.2.5 Overall Impact

The principal impacts of the laying of an underground pipe line through farm land will be relevant to the construction phase. Impacts such as temporary loss of land, disruption to access, noise, dust and increased traffic are the most relevant to farming enterprises.
The impacts from the operation phase would consist of potential intermittent disturbance during inspection or repair routines.
The overall impact during construction is deemed to be mid-range and low at the operation phase.

4.2.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The

percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas.
It is likely that within a two kilometre wide corridor of nineteen kilometres in length there will be a significant number of intensive dairy farms. In addition many of the farms in both study areas also breed horses. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.3 The Birr Loop

4.3.1 Northern Branch

Mixed quality agricultural land and bog land

4.3.1.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some significant areas of forestry and there are a number of pig farms. In this large study area all the main farming systems are represented. The study are being 20 square kilometres.

4.3.1.2 Number of Land owners Impacted

There are approximately 160 individual landowners within the study area. It is likely 40 would be affected by the pipeline.

4.3.1.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of peat and bog land which is not used for agricultural production. Some areas exhibit impeded drainage.

4.3.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.1.5 Overall Impact

The overall impact is deemed to be mid-range during the construction phase.
The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.3.2 Southern Branch

Mixed quality agricultural land and bog land

4.3.2.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some areas of forestry and there are a number of pig farms. In this large study area ofeighteen square kilometres, all the main farming systems are represented.

4.3.2.2 Number of Land owners Impacted

There are approximately 145 individual landowners within the study area. It is likely 36 would be affected by the pipeline.

4.3.2.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of peat and bog land which is not used for agricultural production.

4.3.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.2.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.3.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas. Both study areas contain areas of bog land and forestry. These areas are not used for mainstream agricultural production. The areas of bog or forestry do not differ between the study areas.
It is likely that within a two kilometre wide corridor of ten kilometres in length there will be a significant number of intensive dairy farms. It is anticipated that the route

chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.4 The Edenderry Loop

4.4.1 Northern Branch

Mixed quality agricultural land and bog land

4.3.1.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some significant areas of forestry and there are a number of pig farms. In this large study area, comprising thirty six square kilometres, all the main farming systems are represented.

4.3.1.2 Number of Land owners Impacted

There are approximately 256 individual landowners within the study area. It is likely 64 would be affected by the pipeline.

4.3.1.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are substantial areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.3.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.1.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered low.

4.4.2 Southern Branch

Mixed quality agricultural land and bog land

4.3.2.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some significant areas of forestry and there are a number of pig farms. In this large study area, comprising twenty four square kilometres, all the main farming systems are represented.

4.3.2.2 Number of Land owners Impacted

There are approximately 192 individual landowners within the study area. It is likely 48 would be affected by the pipeline.

4.3.2.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are substantial areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.3.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.2.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase.
The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.4.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas. Both study areas contain extensive areas of bog land and forestry. These areas are not used for mainstream agricultural production. The areas of bog or forestry do not differ between the study areas.
It is likely that within a two kilometre wide corridor of thirteen kilometres in length there will be a significant number of intensive dairy farms. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.

The shortest route will be least constrained.

4.5 The Yellow River Loop

4.5.1 Northern Branch

Mixed quality agricultural land.

4.5.1.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some areas of forestry and there are a number of pig farms. In this large study area, comprising twenty four square kilometres, all the main farming systems are represented.

4.5.1.2 Number of Land owners Impacted

There are approximately 192 individual landowners within the study area. It is likely 48 would be affected by the pipeline.

4.5.1.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of river alluvium based soils.

4.5.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.5.1.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.5.2 Southern Branch

Mixed quality agricultural land and bog land

4.5.2.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in

addition to cattle and sheep maintain small equine enterprises there are some areas of forestry and there are a number of pig farms. In this large study area, comprising twenty square kilometres, all the main farming systems are represented.

4.5.2.2 Number of Land owners Impacted

There are approximately 160 individual landowners within the study area. It is likely 40 would be affected by the pipeline.

4.5.2.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.5.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.5.2.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.5.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas. The Southern study area contains some areas of bog land. These areas are not used for mainstream agricultural production.
It is likely that within a two kilometre wide corridor of twelve kilometres in length there will be a significant number of intensive dairy farms. It is also likely that significant equine establishments will be encountered. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.6 The Killinagh Loop

4.6.1 Northern Branch

Mixed quality agricultural land and bog land

4.3.1.1 Farm Enterprises

The predominant farm enterprises in the study area are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some significant areas of forestry and there are a number of pig farms. In this large study area, comprising twenty four square kilometres, all the main farming systems are represented.

4.3.1.2 Number of Land owners Impacted

There are approximately224 individual landowners within the study area. It is likely 56 would be affected by the pipeline.

4.3.1.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are substantial areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.3.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.1.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered low.

4.6.2 Southern Branch

Mixed quality agricultural land and bog land

4.3.2.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some

significant areas of forestry and there are a number of pig farms. In this large study area, comprising thirty square kilometres, all the main farming systems are represented.

4.3.2.2 Number of Land owners Impacted

There are approximately 240 individual landowners within the study area. It is likely 60 would be affected by the pipeline.

4.3.2.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are substantial areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.3.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.3.2.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase.
The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.6.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas. Both study areas contain extensive areas of bog land and forestry. These areas are not used for mainstream agricultural production. The areas of bog or forestry do not differ between the study areas.
It is likely that within a two kilometre wide corridor of fifteen kilometres in length there will be a significant number of intensive dairy farms. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.7 The Barreen Loop

4.7.1 Northern Branch

Mixed quality agricultural land and bog land

4.7.1.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some areas of forestry. In this large study area, comprising thirty two square kilometres, all the main farming systems are represented.

4.7.1.2 Number of Land owners Impacted

There are approximately 144 individual landowners within the study area. It is likely 48 would be affected by the pipeline.

4.7.1.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of silty alluvium based soils.

4.7.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.7.1.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase. The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.7.2 Southern Branch

Mixed quality agricultural land and bog land

4.7.2.1 Farm Enterprises

The predominant farm enterprises in the study are are grass based with mainly cattle, sheep and equine production. Tillage production in the area is not pronounced but there are some specialist tillage farms. Many mixed farms in addition to cattle and sheep maintain small equine enterprises there are some significant areas of forestry and there are a number of pig farms. In this large study area, comprising twenty eight square kilometres, all the main farming systems are represented.

4.7.2.2 Number of Land owners Impacted

There are approximately 126 individual landowners within the study area. It is likely 42 would be affected by the pipeline.

4.7.2.3 Land Quality

The soils encountered in this study are broadly described as loamy drift with a limestone base. This land would be described as good quality and would be suitable to a wide range of farming enterprises. In addition there are some areas of peat and bog land which is not used for agricultural production. Some intermediate areas where peat and mineral soils occur intermittently are of limited agricultural use and sometimes devoted to forestry.

4.7.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

4.7.2.5 Overall Impact

The construction phase impacts would consist of temporary loss of land and disturbance caused by interruptions to services, noise, dust and increased traffic. The overall impact is deemed to be mid-range during the construction phase.
The impact from the operational phase would consist of potential intermittent disturbance during inspection or repair routines and would be considered to be low.

4.7.3 Conclusion

Both the Northern and the Southern identified study areas have broadly similar characteristics while land quality will vary within each route corridor overall the proportion of productive agricultural land is similar in both study areas. The percentage of grass land within each study area is broadly similar. The farm sizes are broadly similar.
The enterprise mix, that is the number of cattle, dairy, sheep, tillage and equine farms shows no difference across the two separate study areas. Both study areas contain extensive areas of bog land and forestry. These areas are not used for mainstream agricultural production. There are some areas of Bog land in the southern study area.
It is likely that within a two kilometre wide corridor of fifteen kilometres in length there will be a significant number of intensive dairy farms. It is also likely that significant equine establishments will be encountered. It is anticipated that the route chosen within the two kilometre corridor will be such as to avoid a significant impact on intensive enterprises.
The shortest route will be least constrained.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna	Nenagh	Birr	Edenderry	Yellow River	Killinagh	Barreen
Agronomy	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range =Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained	-Construction impacts mid-range -Long term impacts predicted to be low -The shortest loop will be the least constrained

Table F10 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

In the previous sections we have summarised the results of the desk top study undertaken to determine the least constrained route option as between the Northern and Southern options of the seven potential loop adjustments to the main alignment as outlined below:

- Lough Eorna
- Nenagh
- Birr
- Edenderry
- Yellow River
- Killinagh
- Barreen

Each potential loop option was assessed across a range of criteria deemed relevant to agriculture and land use. The study focussed on farm enterprise; The number of landowners impacted the land quality and Crop rotations practised. In conclusion the study commented on the likely overall impact both at construction and operational phase.

All the potential corridors contained in the northern and southern loops were studied at a potential two kilometre width. The actual construction of the pipe line would require an approximate twenty meter permanent way leave with an additional twenty meter temporary construction way leave. Within a cross section of a two kilometre band, taking the observed farm sizes into account one would expect to find between four and six individual farm units. Therefore at a high level desk top study it is possible only to describe impacts in general terms in this context at this constraints study level the shortest route will impact on the least number of farms. Given that the study has found that there are no significant differences between the northern and southern loops , under the headings studied, it is concluded that the shortest linear length loop will be the least constrained.

5 Preliminary Route Corridor AB

5.1 Route Corridor A1

Route corridor A1 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route A1 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately fifty three kilometres in length.

5.1.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

5.1.2 Number of Land owners Impacted

There are approximately 850 landowners within the route corridor. It is likely that 220 landowners would be affected by the actual pipeline.

5.1.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. The land quality in general would be described as very good quality due to it's soils and typography.

5.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

5.1.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

5.2 Route Corridor A2

Route corridor A2 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route A2 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately fifty four kilometres in length.

5.2.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

5.2.2 Number of Land owners Impacted

There are approximately 860 landowners within the route corridor. It is likely 220 would be affected by the pipeline.

5.2.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. The land quality in general would be described as very good quality due to it's soils and typography.

5.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

5.2.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

5.3 Route Corridor A3

Route corridor A3 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route A3 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately fifty nine kilometres in length.

5.3.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

5.3.2 Number of Land owners Impacted

There are approximately 1060 landowners within the route corridor. It is likely 270 would be affected by the pipeline.

5.3.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. Some of the corridor is located at higher elevations which impacts on the agricultural productivity. There is evidence of areas of impeded drainage. The land quality in general would be described as good quality due to it's soils and typography.

5.3.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

5.3.5 Overall Impact

In the absence of defined route corridor and with the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

5.4 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Agronomy	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However A2 is the least constrained route corridor	• Construction impacts mid-range • Long term impacts predicted to be low

Table F10 - 4 Summary of the MCA for Route Corridors AB

5.5 Comparative Discussion

In the previous sections we have summarised the results of the desk top study undertaken to determine the least constrained route corridor option between the three potential as outlined below:

- Route Corridor A1
- Route Corridor A2
- Route Corridor A3

Each potential route corridor option was assessed across a range of criteria deemed relevant to agriculture and land use. The study focussed on farm enterprise; The number of landowners impacted; land quality and Crop rotations practised. In conclusion the study commented on the likely overall impact both at construction and operational phase.

All the potential corridors were studied at a two kilometre width. The actual construction of the pipe line would require an approximate twenty meter permanent way leave with an additional twenty meter temporary construction way leave. Within a cross section of a two kilometre band, taking the observed farm sizes into account one would expect to find between four and six individual farm units. Therefore at a high level desk top study it is possible only to describe impacts in general terms in this context at this constraints study level the shortest route will impact on the least number of farms. Given that the study has found that there are no significant differences between the Route Corridor A1, Route Corridor A2 and Route Corridor A3 , under the headings studied, it is concluded that the shortest linear length route will be the least constrained.
Route Corridor A2 is the least constrained.

6 Preliminary Route Corridor BC

6.1 Route Corridor B1

Route corridor B1 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route B1 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately thirty kilometres in length.

6.1.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed.The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

6.1.2 Number of Land owners Impacted

There are approximately 480 landowners within the route corridor. It is likely 120 would be affected by the pipeline.

6.1.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. The land quality in general would be described as good quality due to it's soils and typography.

6.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

6.1.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

6.2 Route Corridor B2

Route corridor B2 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route B2 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately twenty three kilometres in length.

6.2.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

6.2.2 Number of Land owners Impacted

There are approximately 368 landowners within the route corridor. It is likely 95 would be affected by the pipeline.

6.2.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. The land quality in general would be described as good quality due to it's soils and typography.

6.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

6.2.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

6.3 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Agriculture	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However B2 is the least constrained route corridor

Table F10 - 5 Summary of the MCA for C Route Corridors BC

6.4 Comparative Discussion

In the previous sections we have summarised the results of the desk top study undertaken to determine the least constrained route corridor option as between the two potential as outlined below:

- Route Corridor B1
- Route Corridor B2

Each potential loop option was assessed across a range of criteria deemed relevant to agriculture and land use. The study focussed on farm enterprise; The number of landowners impacted; land quality and Crop rotations practised. In conclusion the study commented on the likely overall impact both at construction and operational phase.
The potential corridors were studied at a two kilometre width. The actual construction of the pipe line would require an approximate twenty meter permanent way leave with an additional twenty meter temporary construction way leave. Within a cross section of a two kilometre band, taking the observed farm sizes into account one would expect to find between four and six individual farm units. Therefore at a high level desk top study it is possible only to describe impacts in general terms in this context at this constraints study level the shortest route will impact on the least number of farms. Given that the study has found that there are no significant differences between the Route Corridor B1, and Route Corridor B2 , under the headings studied, it is concluded that the shortest linear length route will be the least constrained.
Route Corridor B2 is the least constrained.

7 Preliminary Route Corridor CD

7.1 Route Corridor C1

Route corridor C1 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route C1 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately sixty four kilometres in length.

7.1.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

7.1.2 Number of Land owners Impacted

There are approximately 1025 landowners within the route corridor. It is likely 250 would be affected by the pipeline.

7.1.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land are encountered with significant areas of bog land in the western section. The land quality in general would be described as good to very good quality outside of the bog land areas.

7.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

7.1.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

7.2 Route Corridor C2

Route corridor C2 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route C2 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately sixty three kilometres in length.

7.2.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

7.2.2 Number of Land owners Impacted

There are approximately 1000 landowners within the route corridor. It is likely 250 would be affected by the pipeline.

7.2.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. Large areas of bog are encountered in the western and eastern sections. The land quality in general would be described as good quality due to it's soils and typography.

7.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

7.2.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

7.3 Route Corridor C3

Route corridor C1 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route C1 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately fifty two kilometres in length.

7.3.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

7.3.2 Number of Land owners Impacted

There are approximately 500 landowners within the route corridor. It is likely 125 would be affected by the pipeline.

7.3.3 Land Quality

The soils encountered along the western part of the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Appart from the western section of this corridor the predominant soils are peat and bog land with a limited agricultural use range. The land quality in general would be described as good quality where mineral soils are found and poor otherwise.

7.3.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

7.3.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

7.4 Route Corridor C4

Route corridor C4 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route C4 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately fifty six kilometres in length.

7.4.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry both at small and commercial scale is evident in areas of poorer land quality.

7.4.2 Number of Land owners Impacted

There are approximately 720 landowners within the route corridor. It is likely 180 would be affected by the pipeline.

7.4.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. A substantial part of the route corridor is bog land. The land quality in general would be described as good quality where mineral soils are encountered and poor otherwise.

7.4.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

7.4.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

7.5 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Agriculture	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However C3 is the least constrained route corridor	• Construction impacts mid-range • Long term impacts predicted to be low

Table F10 - 6 Summary of the MCA for Route Corridors CD

7.6 Comparative Discussion

In the previous sections we have summarised the results of the desk top study undertaken to determine the least constrained route corridor option between the four potential route corridor options as outlined below:

- Route Corridor C1
- Route Corridor C2
- Route Corridor C3
- Route Corridor C4

Each potential route corridor option was assessed across a range of criteria deemed relevant to agriculture and land use. The study focussed on farm enterprise; The number of landowners impacted; land quality and Crop rotations practised. In conclusion the study commented on the likely overall impact both at construction and operational phase.

The potential route corridors C1, C2, C3 and C4 were studied at a two kilometre width. The actual construction of the pipe line would require an approximate twenty meter permanent way leave with an additional twenty meter temporary construction way leave. Within a cross section of a two kilometre band, taking the observed farm sizes into account one would expect to find between four and six individual farm units. Therefore at a high level desk top study it is possible only to describe impacts in general terms in this context at this constraints study level the shortest route will impact on the least number of farms. Given that the study has found that there are no significant differences between the Route Corridor C1, Route Corridor C2 , Route Corridor C3 and Route corridor C4 under the headings studied, it is concluded that the shortest linear length route will be the least constrained.
Route Corridor C3 is the least constrained.

8 Preliminary Route Corridor DE

8.1 Route Corridor D1

Route corridor D1 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route D1 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately nineteen kilometres in length.

8.1.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. Forestry at a small scale is evident.

8.1.2 Number of Land owners Impacted

There are approximately 135 landowners within the route corridor. It is likely 45 would be affected by the pipeline.

8.1.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Some small areas of bog land are encountered. The land quality in general would be described as very good quality due to it's soils and typography.

8.1.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

8.1.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

8.2 Route Corridor D2

Route corridor D2 represents a two kilometre wide corridor option within which it is proposed to construct a large diameter water main to facilitate the transfer of water from the Parteen Basin to the Peamount Reservoir. Route D2 passes over mainly agricultural land and given its length, it would be expected to encounter a range of soil types and the full spectrum of farming enterprises. The route is approximately sixteen kilometres in length.

8.2.1 Farm Enterprises

Given the length of the route corridor all the main farm enterprises have been observed. The predominant farm enterprises are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and some areas devoted to intensive horticultural production. A substantial number of small scale, mainly recreational sports equine enterprises are found. In addition there are some commercial stud farms and horse training establishments. There are a number of pig farms located along the route. Forestry at a small scale is evident.

8.2.2 Number of Land owners Impacted

There are approximately 120 landowners within the route corridor. It is likely 40 would be affected by the pipeline.

8.2.3 Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. This is the predominant general soil classification found in Ireland. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. Areas of bog land some small and some more extensive are encountered. The land quality in general would be described as very good quality due to it's soils and typography.

8.2.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage are commonly rotated with grassland.

8.2.5 Overall Impact

In the absence of a defined route corridor and in the absence of individual farm surveys it is possible only to generalise about the overall impacts. The principal impacts at construction phase are predicted to be temporary loss of land, noise, dust and other general disturbance.
The constructional phase impact is predicted to be mid range.
At operational phase the principal impacts are predicted to be general disturbance caused by routine inspections and repairs.
The operational impact is predicted to be low.

8.3 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Agriculture	• Constructiion impacts mid-range • Long term impacts predicted to be low	• Construction impacts mid-range • Long term impacts predicted to be low • However D2 is the least constrained route corridor

Table F10 - 7 Summary of the MCA for Route Corridors DE

8.4 Comparative Discussion

In the previous sections, we have summarised the results of the desk top study undertaken to determine the least constrained route corridor option between the two potential as outlined below:

- Route Corridor D1
- Route Corridor D2

Each potential route corridor option was assessed across a range of criteria deemed relevant to agriculture and land use. The study focussed on farm enterprise; The number of landowners impacted; land quality and Crop rotations practised. In conclusion the study commented on the likely overall impact both at construction and operational phase.

Route corridor D1 and D2 were studied at a two kilometre width. The actual construction of the pipe line would require an approximate twenty meter permanent way leave with an additional twenty meter temporary construction way leave. Within a cross section of a two kilometre band, taking the observed farm sizes into account one would expect to find between three and five individual farm units. Therefore at a high level desk top study it is possible only to describe impacts in general terms in this context at this constraints study level the shortest route will impact on the least number of farms. Given that the study has found that there are no significant differences between the Route Corridor D1, and Route Corridor D2 , under the headings studied, it is concluded that the shortest linear length route will be the least constrained.
Route Corridor D2 is the least constrained.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F11: Soils, Geology and Hydrogeology

October 2015 **F02**

Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision-making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F11 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F11 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F11 is a statement on the specialism Soils, Geology and Hydrogeology and describes the decision-making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To determine effectively the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under fourteen Soils, Geology and Hydrogeology sub-criteria, including:

- Aquifer Classification - importance of the groundwater resource to a given area;
- Vulnerability Classification - potential for groundwater contamination;
- GSI Groundwater Protection Response matrix;
- Groundwater Supplies - identification of water supply springs and bored wells based on GSI and EPA records;
- Groundwater Source Protection Areas and Zones of Contribution as per available GSI and EPA data;

- Potential to impact on Geological Heritage Sites / County Geological Sites;
- Potential to interact with contaminated land;
- Potential to sterilise mineral resource;
- Potential to encounter shallow bedrock during construction (interactions with other disciplines during construction - noise, dust etc.);
- Potential impact on karst features;
- Potential to encounter soft ground;
- Soils Types;
- Sub Soil Types; and
- Depth to rock.

The assessment of the options was completed using relevant Soils, Geology and Hydrogeology databases sourced from the Geological Survey of Ireland (GSI), the Environmental Protection Agency (EPA) and local authority datasets and County Development Plans.

Both desktop studies and site visits were undertaken to inform this assessment.

1.2.1 Desk Top Study

A desktop study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

Each location option is assessed in terms of the number of geological/hydrogeological constraints in each area and the significance of each constraint. The constraints are identified by assessing the area using the sub-criteria listed above.

The constraints that will be of most relevance for Soils, Geology and Hydrogeology are those that may result in a negative impact on the local and/or regional geological and hydrogeological environment during the construction and/or operational phases of the development.

The constraint is significant if it is confirmed that the impact will be considerable and that it will be difficult to propose and implement mitigation measures to negate the identified potential impact.

Disturbance to features such as peatland or bog might result in the release of elevated suspended solids downstream of the development during the construction phase. It also might be preferable to avoid construction in an area identified as having Extreme Groundwater Vulnerability overlying a Regionally Important Karstified Aquifer.

Another example is the identification of karst on the GIS viewer which will be identified as a constraint as there may be the potential for impact on at least one karst feature in that area during construction. This impact may cause direct contamination of the underlying aquifer or an associated downstream habitat.

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F11– 1 Peamount

The Peamount site is located in West County Dublin, in an area comprised primarily of managed Greenfield farmland. The site is bordered to the north by the Grand Canal waterway, to the west by managed green fields and to the south and east by the Regional Road, R210. Peamount Hospital is located within the southern area of the site.

The geology in this area is comprised of primarily deep, poorly drained mineral soils (Gleys) with some grey, brown podzolic soils and Limestone Till subsoils, overlying

a dark grey to black limestone and shale bedrock (Calp). The underlying aquifer is described as a Locally Important Aquifer (Ll) - bedrock which is Moderately Productive only in Local Zones. The groundwater body at this location is identified by the EPA as “Dublin Urban” and is described as “poorly productive bedrock”.

No significant constraints, as described in Section 1.2.2 above, were identified at the Peamount Location.

No karst features are identified at Peamount, for example caves, springs, swallow holes etc. There are no recorded Mineral Locations in this area and no Irish Geological Heritage sites. There are no recorded EPA Source Protection Areas (for drinking water supplies).

There is potential for areas of Extreme groundwater vulnerability to be encountered during the construction phase where depth to bedrock is shallow or where rock has been recorded near the surface. However, best practice construction methodologies will largely mitigate the potential for negative impact.

Best practice construction methods will include the development of a Construction Environmental Management Plan (CEMP) for the project. Measures to address the potential impact of a number of activities on site including the use of fuel on site, the disturbance and on-site stock-piling of overburden, use of machinery on site and preferred seasonal working conditions will be included in the CEMP.

2.3 Matrix of Multi Criteria Analysis

Soils, Geology and Hydrogeology	Peamount
Aquifer Classification - importance of the groundwater resource to a given area	**Low Potential:** Ll - low potential impact, moderately productive
Vulnerability Classification - potential for groundwater contamination	**Mid-range Potential:** Extreme vulnerability (with some rock at surface)
GSI Groundwater Protection Response matrix	**Very low Potential**: No data available for this area
Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	**Very low Potential**: No features identified in this area
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Very low Potential**: None within the vicinity of Peamount
Potential to impact on Irish Geological Heritage Sites / County Geological Sites	**No potential impact** identified as no Irish Geological Heritages sites are recorded in this area
Potential to interact with contaminated land	**Very low Potential**: Land is primarily managed grassland
Potential to sterilise mineral resource	**Very low Potential:** No mines/quarries identified
Potential to encounter shallow bedrock during construction (interactions with other disciplines during construction - noise, dust etc.)	**Mid-range Potential:** areas where rock is at surface or near surface

Potential impact on karst features	**Very low Potential**: No karst features identified in this area
Potential to encounter soft ground	**No potential Impact:** No peat or wetland areas recorded in this area
Soils Types	**Very low Potential** for negative impact as no peat/bog identified in this area
Sub Soil Types	**Very low Potential** for negative impact as no peat/bog identified in this area (Till)
Depth to rock	**Mid-range Potential**: <3m. Potential for direct impact on bedrock during construction, with potential for impact on the underlying groundwater aquifer

Table F11- 2 Summary of the MCA for Peamount

2.4 Discussion

No significant constraints relevant to Soils, Geology and Hydrogeology were identified at the Peamount Terminal Point site location.

No Geological Heritage sites, karst features, areas of mineral resource or groundwater Source Protection Areas are recorded in this area.

The underlying aquifer is described by the GSI as Ll (Locally Important Aquifer, only productive in local zones) and the groundwater body at this location is identified by the EPA as “Dublin Urban” and is described as “poorly productive bedrock”.

Although there is potential for areas of Extreme vulnerability to be encountered during the construction phase where depth to bedrock is shallow, best practice construction methodologies will mitigate this impact.

In summary, the potential impact on Soils, Geology and Hydrogeology features at this location, as a result of the proposed development, is low.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F11 – 2.

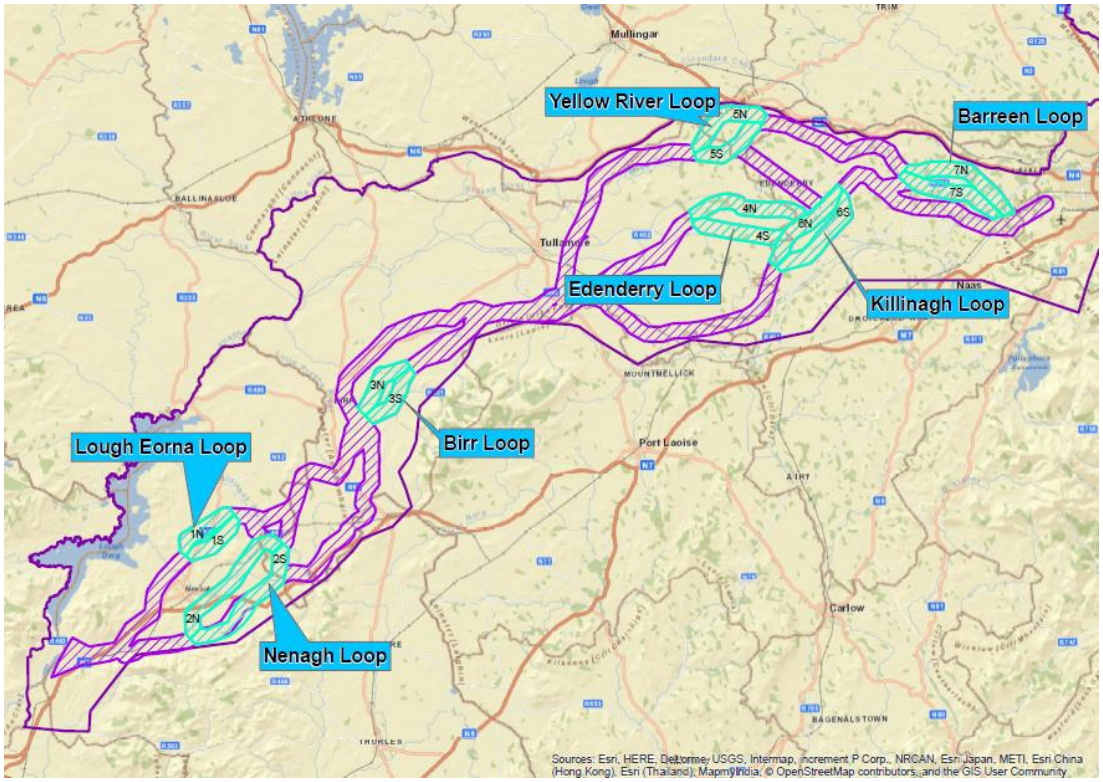


Figure F11 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison, an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

Figure F11-2 shows the location of the following Loop Options:

- 1N & 1S: The Lough Eorna Loop (Northern and Southern Branches/Options)
- 2N & 2S: The Nenagh Loop (Northern and Southern Branches/Options)
- 3N & 3S: The Birr Loop (Northern and Southern Branches/Options)
- 4N & 4S: The Edenderry Loop (Northern and Southern Branches/Options)
- 5N & 5S: The Yellow River Loop (Northern and Southern Branches/Options)
- 6N & 6S: The Killinagh Loop (Northern and Southern Branches/Options)
- 7N & 7S: The Barreen Loop (Northern and Southern Branches/Options).

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop (Loop 1)

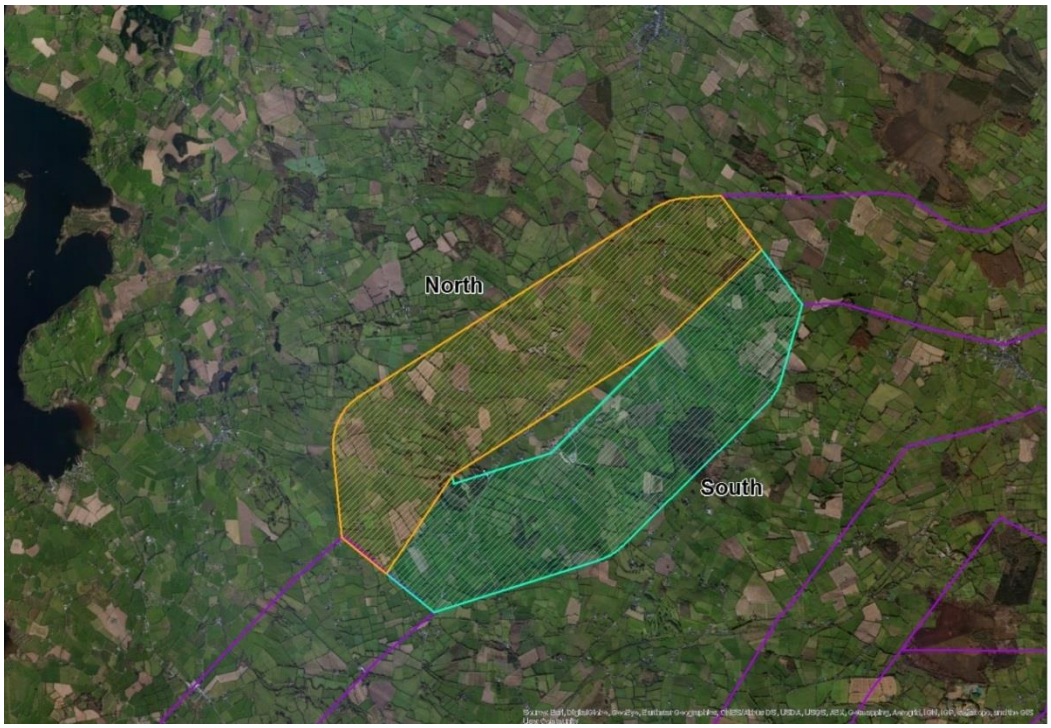


Figure F11 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

Rock is close to the surface in the north eastern corner of the Loop and the underlying aquifer in this area is identified as a Regionally Important Karstified Aquifer.

Karst features are identified in this section of the Loop. Shallow holes are recorded to the north of the northern branch of this Loop with possible unidentified karst features to the west of Lough Eorna.

4.1.2 Southern Branch

No Irish Geological Heritage sites were recorded in this area.

Areas of cutover bog are identified in some areas of the southern branch. Rock is close to the surface in the south west and north eastern areas of the Loop.

There are larger areas of more vulnerable groundwater in this Loop Option than in the northern branch (GSI classification in southern branch: High vulnerability).

No karst features are recorded in this section of the Lough Eorna Loop.

4.1.3 Comparative Discussion

There is little difference between the two branches of the Lough Eorna Loop but the southern branch is considered least constrained as there is less potential karstification in this area.

4.2 The Nenagh Loop (Loop 2)

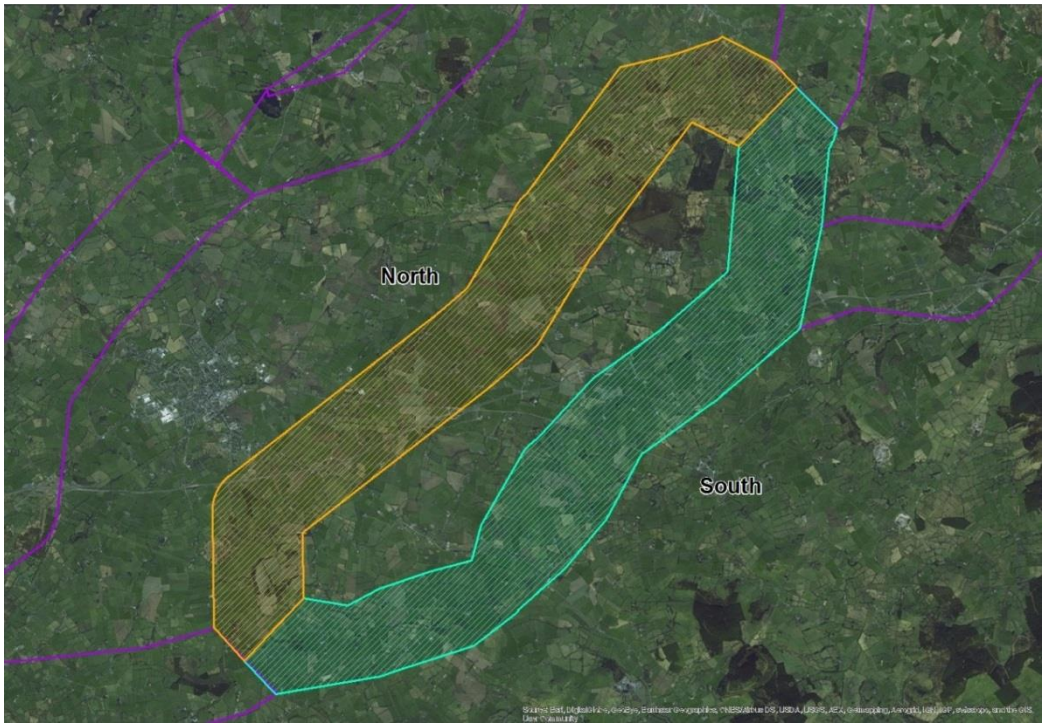


Figure F11 – 4 The Nenagh Loop

4.2.1 Northern Branch

No significant constraints were identified in the northern branch of the Nenagh Loop.

No Irish Geological Heritage sites were recorded in this area.

Rock is close to the surface in small areas of the northern branch of this Loop.

The underlying aquifer is identified as a Locally Important Aquifer, productive only in local zones. A groundwater supply is sourced within this area and is identified as Elmhill. There is also a surface water supply source in this area.

4.2.2 Southern Branch

No Irish Geological Heritage sites were recorded in this area.
There are larger areas of more vulnerable groundwater than in the northern branch (High vulnerability).

The underlying aquifer is identified as both a Locally Important Aquifer, productive only in local zones in some areas and a Poor Aquifer in other areas of this southern branch of the Nenagh Loop.

An alkaline fen is located in this area. Alkaline fens are considered extremely sensitive to changes in groundwater levels. The presence of the alkaline fen may constrain the routing of the pipeline within this corridor. Potential exists for this feature to be avoided at further stages of the project.

4.2.3 Comparative Discussion

There is little difference between the two branches of the Nenagh Loop. Therefore, there is no preference for one option over the other.

4.3 The Birr Loop (Loop 3)

Figure F11 – 5 The Birr Loop

4.3.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

Areas of equal size of High groundwater vulnerability were recorded in the northern and southern branches of the Birr Loop.

A Regionally Important Aquifer is located to the North East of the northern branch of the Loop.

Cutover bog is evident in places (more than in the southern branch).

An alkaline fen/ transition mire is located in this area. Alkaline fens are considered extremely sensitive to changes in groundwater levels. The presence of the alkaline fen may constrain the routing of the pipeline in this corridor. Potential exists for this feature to be avoided at further stages of the project.

4.3.2 Southern Branch

No Irish Geological Heritage sites were recorded in this area.

As detailed above, areas of equal size of High groundwater vulnerability were recorded in the northern and southern branches of the Birr Loop.

Rock at surface is recorded in the north east of the southern branch of the Loop.

Cutover bog is evident in places (less than in the northern branch). The presence of peat may require additional construction in these areas and require additional handling of materials. It is proposed to avoid peat where possible however given the distribution of peat in the study area, some peat will be crossed by the pipeline.

4.3.3 Comparative Discussion

There is little difference between the two branches of the Birr Loop but the southern branch is considered least constrained as there is less cutover bog in this area.

4.4 The Edenderry Loop (Loop 4)

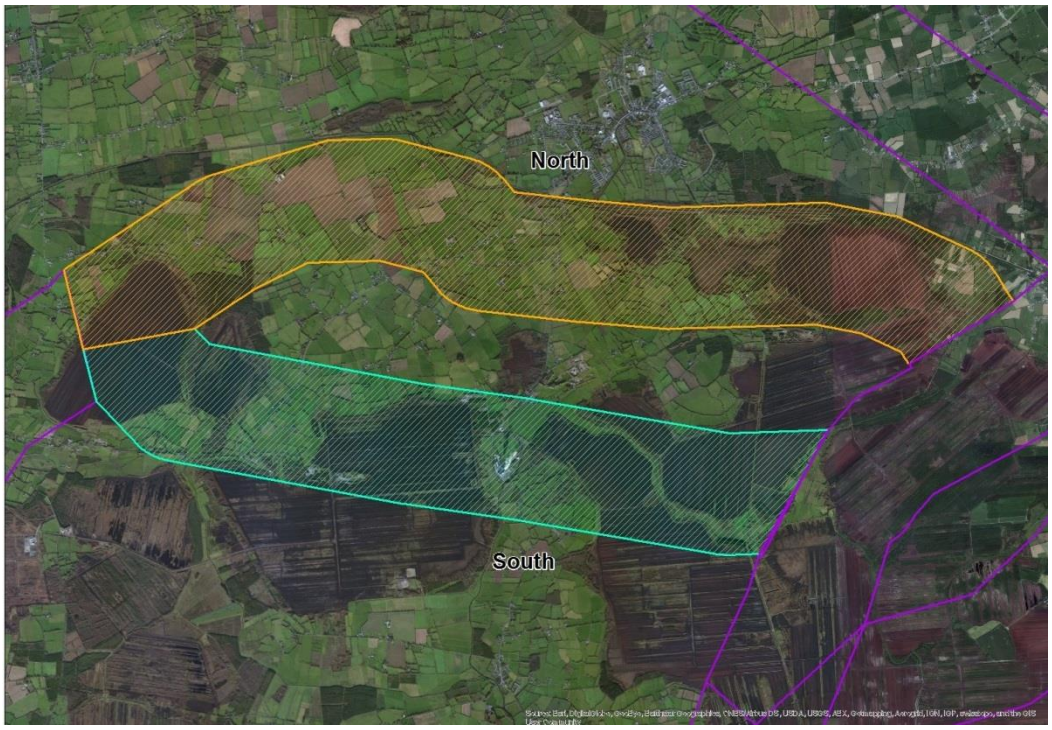


Figure F11 – 6 The Edenderry Loop

4.4.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

The area is underlain by a Locally Important Aquifer (moderately productive).

Large areas of cutover bog are evident in places (but less than in the southern branch).

According to the GSI and EPA records, a groundwater supply is sourced within this area.

4.4.2 Southern Branch

One Irish Geological Heritage site is recorded in this area and is identified as a County Geological Site (CGS), “Esker Bridge”.

The area is underlain by a Locally Important Aquifer (moderately productive).

Large areas of cutover bog are evident in the corridor (more than in the northern branch). The presence of peat may require additional construction in these areas and require additional handling of materials. It is proposed to avoid peat where possible however given the distribution of peat in the study area, some peat will be crossed by the pipeline.

4.4.3 Comparative Discussion

There is little difference between the two branches of the Edenderry Loop but the northern branch is considered least constrained as there is less cutover bog in this area and no evidence of any geological heritage sites.

4.5 The Yellow River Loop (Loop 5)

4.5.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

Areas of equal size of High groundwater vulnerability were recorded in the northern and southern branches of the Yellow River Loop.

Areas of cutover bog and Extreme (E) vulnerability are evident in places (more than in the southern branch).

A large quarry/cement factory (LAGAN Cement) is located in this area.

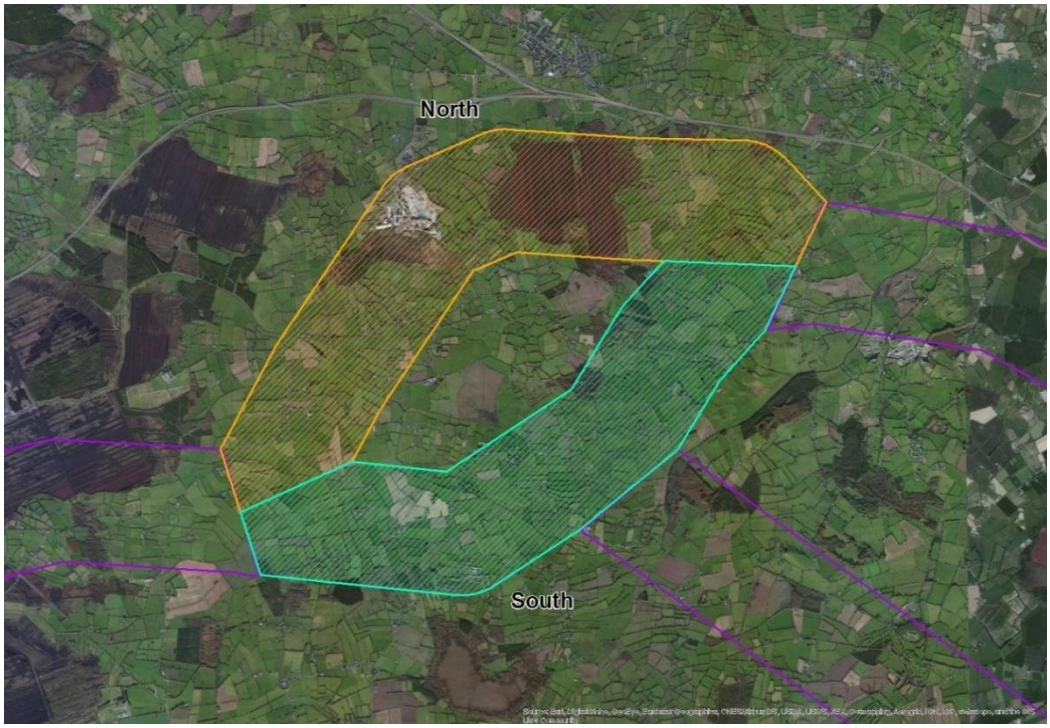


Figure F11 – 7 The Yellow River Loop

4.5.2 Southern Branch

No Irish Geological Heritage sites were recorded in this area.

Areas of equal size of High groundwater vulnerability were recorded in the northern and southern branches of the Yellow River Loop.

Small areas of cutover bog and extreme (E) vulnerability are evident in places (less than in the northern branch).

4.5.3 Comparative Discussion

There is little difference between the two branches of the Yellow River Loop but the southern branch is considered least constrained as there is less cutover bog in this area. There is also a commercial quarry/cement factory in the northern area.

4.6 The Killinagh Loop (Loop 6)

4.6.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

Areas of High groundwater vulnerability were recorded in the northern branch of the Killinagh Loop.

Large areas of cutover bog and High vulnerability are evident in places.

Areas of the northern branch are underlain by a Regionally Important Aquifer (karstified) (more than the southern branch).

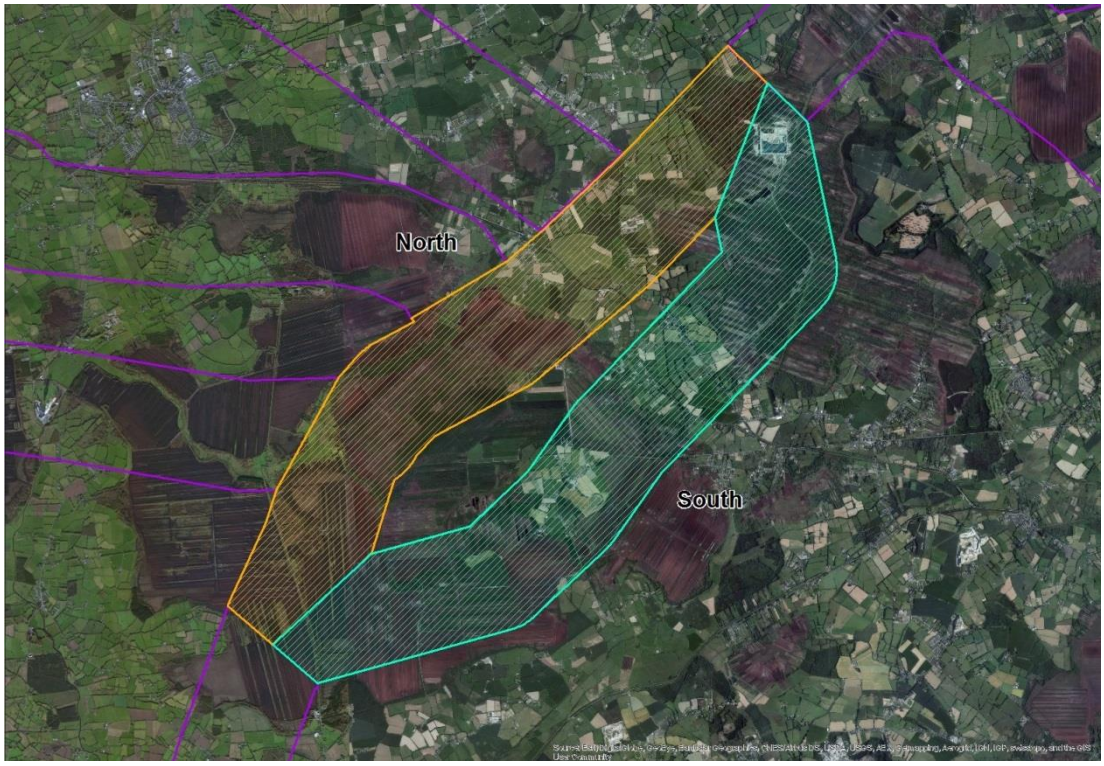


Figure F11 – 8 The Killinagh Loop

4.6.2 Southern Branch

No Irish Geological Heritage sites were recorded in this area.

Large areas of cutover bog are evident in places (more than in the northern branch).

Areas of the southern branch are underlain by a Regionally Important Aquifer (karstified) (less than the northern branch).

A large landfill is located in the centre of the loop corridor (Drehid Landfill) and may extend across the width of the loop corridor. It may not be possible to route the pipeline through the southern corridor as a consequence.

4.6.3 Comparative Discussion

There is little difference between the two branches of the Killinagh Loop but the northern branch is considered least constrained as there will be less flexibility in the southern branch if the Drehid Landfill is located within the corridor.

4.7 The Barreen Loop (Loop 7)

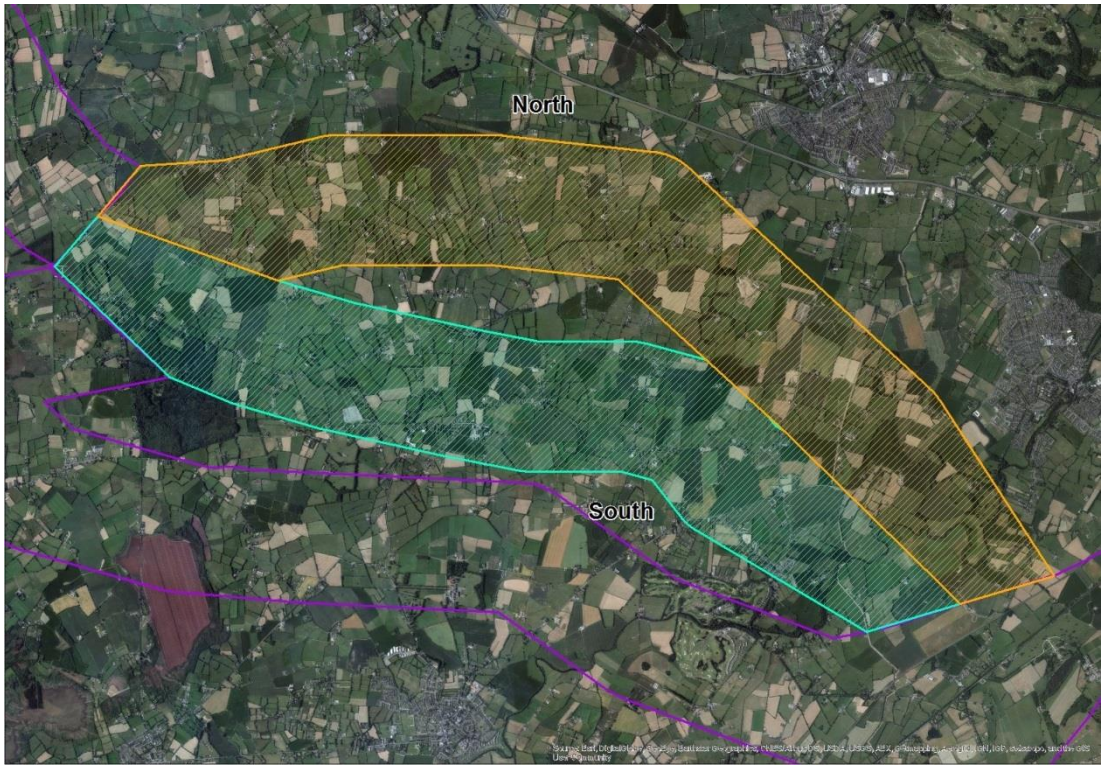


Figure F11 – 9 The Barreen Loop

4.7.1 Northern Branch

No Irish Geological Heritage sites were recorded in this area.

Equally sized areas of rock at surface and Extreme Vulnerability as the southern branch are evident in this area. There are large areas of High Vulnerability with respect to groundwater.

A number of quarries are located in this area and may need to be avoided.

4.7.2 Southern Branch

Two Irish Geological Heritage sites are recorded in this area and are identified as County Geological Sites (CGS). They include Liffey Oxbow Lake (KE013) and St. Patrick's Well (KE020).

Equally sized areas of rock at surface and Extreme Vulnerability as the northern branch are evident in this area. Small areas of cutover bog are noted.

4.7.3 Comparative Study

There is little difference between the two branches of the Barreen Loop as the northern branch contains quarries and the southern branch contains CGSs. Therefore, neither option is selected as the overall preference. Careful design can ensure that the identified features in either branch are avoided.

4.8 Matrix of Multi Criteria Analysis

Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Mid-range: No IGH Sites. Rock at surface in NE corner. Regionally important karstified aquifer in NE area, Karst features recorded.	**Low:** No IGH Sites. Rock at surface in SW and NE areas. Larger areas of more vulnerable GW (High) than 1N. Areas of cutover bog. No karst features.	**Low:** No IGH Sites, cutover bog in NE corner, LI aquifer. Small areas of rock at surface. GW body karstic (gravels)	**Low:** No IGH Sites. Larger area of High vulnerability than 2N. LI and Poor aquifer. Areas of rock at surface. GW body karstic (gravels), Closer to SPZ than 2N.	**Mid-range:** No IGH Sites, equal area of High vulnerability to 3S, regionally important aquifer to NE, more cutover bog than 3S, No SPZ.	**Low:** No IGH Sites. Equal area of High vulnerability to 3N. Less cutover bog than 3N. No SPZ. Rock at surface in NE.	**Low:** No IGH Sites, a lot of cutover bog (less than 4S), LI/Lm	**Mid-range:** One IGH Site (CGS): "Esker Bridge". A lot of cutover bog (more than 4N). LI/Lm.	**Mid-range:** No IGH Sites. Equally high Vulnerability as 5S. More areas of cutover bog and more areas of extreme vulnerability.	**Low:** No IGH Sites. Equally high Vulnerability as 5N. Small areas of cutover bog and small areas of extreme vulnerability.	**Mid-range:** No IGH Sites. A lot of cutover bog. Areas of high vulnerability . Regionally Important Aquifer (karstified) in more areas than 6S.	**Mid-range:** No IGH Sites. A lot of cutover bog (more than 6N). Areas of Regionally Important Aquifer (karstified) less areas than 6N.	**Mid-range:** No IGH Sites. Equal areas of rock and Extreme vulnerability as 7S. More areas of High vulnerability than 7S.	**Mid-range:** 2 CGS Sites: Liffey Oxbow Lake and St. Patrick's Well. Small areas of cutover bog and equal areas of rock at surface and Extreme vulnerability as 7N.

Table F11 - 3 Summary of the MCA for Corridor sub-options or "Loops"

5 Preliminary Route Corridor A

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F11 – 10 below.

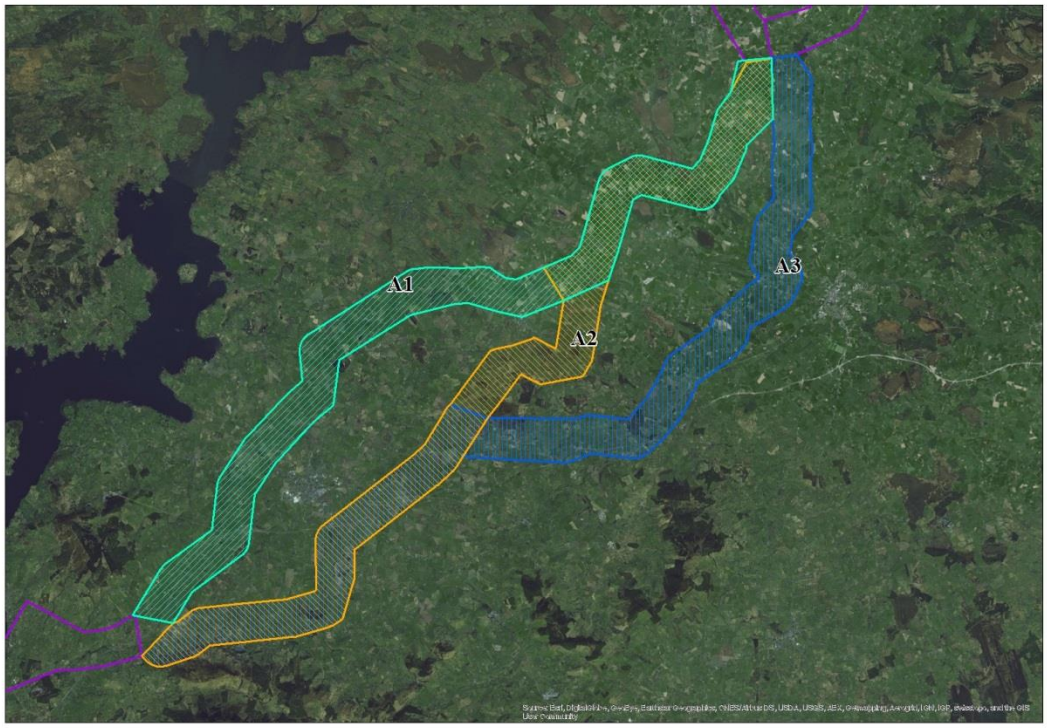


Figure F11 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

A number of constraints were identified in Route Corridor A1.

No Irish Geological Heritage sites were recorded in this area.

Rock is close to the surface in a number of elevated areas and the underlying aquifer in this area is also identified as a Regionally Important Karstified Aquifer / Locally important Aquifer. Some areas of intact peat are also located along the corridor.

A number of groundwater supplies are located along the corridor including Patrickswell borehole and Ardcroney borehole.

Karst features are identified in this section. A number of springs and shallow holes are located to the north east of Ardcroney with possible unidentified karst features to the west of Lough Eorna, County Tipperary.

Gortmore tailings pond is located to the southern edge of the corridor but can be avoided through careful planning to avoid potentially contaminated soil areas adjacent to Silvermines (historical mine).

5.3 Route Corridor A2

A number of constraints were identified in Route Corridor A2. No Irish Geological Heritage sites were recorded in this area.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified as a Regionally Important Karstified Aquifer/ Locally important Aquifer. Some areas of intact peat are located along the corridor.

A number of groundwater supplies are located along the corridor including Elmhill, Bawn and Cunnahurt boreholes.

Gortmore tailings pond is located within the corridor and careful planning would be required to avoid potentially contaminated soil areas adjacent to Silvermines (historical mine).

5.4 Route Corridor A3

A number of constraints were identified in Route Corridor A3. Two Geological Heritage sites were recorded in this area to the northwest of Roscrea near the Tipperary / Offaly county border. These sites are identified as Gloster tufa-forming (petrifying) spring and Millpark stream tufa CGS.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified as a Regionally Important Karstified Aquifer/ Locally important Aquifer.

A number of groundwater supplies are located along the corridor including Guillfoyles, Dunkerrin, Village well boreholes and Busherstown spring.

Some small areas of intact peat are located along this corridor.

Similarly to the corridor options A1 and A2 above, Gortmore tailings pond is located within corridor A3 and careful planning and detailed design would be required to avoid potentially contaminated soil areas adjacent to Silvermines.

Ballynavevy Landfill is also located within the A3 corridor and again this would require careful planning and design to avoid potentially contaminated soil areas adjacent to Ballynavevy Landfill.

A number of large sand and gravel pits/quarries are identified near Roscrea. Potential sterilisation of mineral resources exists in this area and consultation with quarry operators is recommended if this route is selected as the preferred option.

5.5 Matrix of Multi Criteria Analysis

Criteria	Corridor A1	Corridor A2	Corridor A3
Aquifer Classification - importance of the groundwater resource to a given area	**Mid-range:** Rkd, Lk, Lm and LL aquifers.	**Mid-range:** Rkd, Lm and LL aquifers.	**Mid-range:** Rkd, Lm and LL aquifers.
Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly High to Moderate Groundwater Vulnerability. Some areas of Extreme Vulnerability	**Low:** Mainly High to Moderate Vulnerability. Small areas of Extreme Vulnerability	**Low:** Mainly High to Moderate Vulnerability. Some areas of Extreme Vulnerability.
GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
Groundwater Supplies - identification of water supply springs and bored wells based on GSI and EPA records	**Mid-range:** Patrickswell Boreholes located upgradient of route - Low risk. Ardcroney borehole located outside Corridor. Cloughjordan borehole located outside corridor.	**Mid-range:** Bawn, Cunnahurt and Elmhill boreholes in Corridor. No SPZ delineated	**Mid-range:** Guillfoyles, Busherstown Spring, Dunkerrin and Village Well in Corridor. No SPZ delineated
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Mid-range:** As above but no SPZ delineated	**Mid-range:** As above but no SPZ delineated	**Mid-range:** As above but no SPZ delineated
Potential to impact on Geological Heritage Sites / County Geological Sites	**Very Low:** No potential impact identified as no Irish Geological Heritages sites are recorded in this area	**Mid-range:** A number of sites at Silvermines mining district to the south of the Route Corridor	**Mid-range:** A number of sites at Silvermines mining district to the south of the Route Corridor. Gloster and Millpark to the North and South of route Corridor. Area is only preliminarily identified and requires definition.
Potential to interact with contaminated land	**Mid-range:** Gortmore Tailings pond located near Silvermines. Cloughjordan landfill.	**Mid-range:** Gortmore Tailings pond located near Silvermines. Narrow corridor between Tailings and Higher Ground	**Mid-range:** Gortmore Tailings pond located near Silvermines. Ballynavevy Landfill located to the centre of route, may provide pinch point.
Potential to sterilise mineral resource	**Low:** A number of small quarries. No large scale quarry identified	**Low:** A number of small quarries. No large scale quarry identified	**High:** A number of quarries near Roscrea may cause pinch point on route

Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Low:** Small areas of rock close to surface, in particular near Nenagh.	**Low:** Small areas of rock close to surface.	**Low:** Small areas of rock close to surface.
Potential impact on karst features	**Mid-range:** Moderate to high potential for impact. Swallow hole identified near Ardcroney so additional features possible in area. A number of sinking streams in the corridor west of Ardcroney.	**Low:** Moderate to low, none identified in Corridor.	**Low:** Moderate to low, none identified in Corridor.
Potential to encounter soft ground	**Mid-range:** small areas of intact peat mainly north of Cloughjordan/Shinrone	**Mid-range:** Low Moderate, some areas of peat mainly near Cloughjordan	**Mid-range:** Low, small areas of peat along route
Soils Types	**Low:** Large variation –low potential impact on environment	**Low:** Large variation –low potential impact on environment.	**Low:** Large variation –low potential impact on environment.
Sub Soil Types	**Low:** Large variation. Predominately Till with some gravel in particular near Birr. Low Potential impact.	**Low:** Large variation. Predominately Till with some gravel in particular near Birr and Roscrea Low Potential impact.	**Low:** Large variation. Predominately Till with some gravel in particular near Birr and Roscrea. Low Potential impact.
Depth to rock	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required).

Table F11- 4 Summary of the MCA for Route Corridors A

5.6 Comparative Discussion

Based on a review of the constraints, A3 is considered the most constrained option of the possible corridors. While A1 and A2 are similar, A2 is considered the least constrained corridor.

The underlying aquifer classifications are similar for all corridors. The corridors are primarily underlain by sections of Regionally and Locally Important Aquifers. Therefore, the potential impact on the aquifers in A1, A2 and A3, as a result of the proposed development, is low-moderate.

Groundwater Source Protection Areas (SPAs) are an important feature to consider as these zones are associated with significant groundwater abstraction locations where limits have been set on the activities that can take place in the Inner and Outer Zones of Protection. A number of groundwater abstraction points were identified in each of the three corridors. Consultation with Irish Water and relevant authorities and other bodies will be important if the project is ultimately routed through this area of the SPA.

There are no Irish Geological Heritage Sites identified in Corridor A1. One Geological Heritage site is recorded within A2 and is defined as a County Geological Site (CGS). This feature is associated with the Silvermines area. To the eastern section of Corridor A3, two tufa (Petrifying) springs are identified near Roscrea. Construction close to tufa springs may have a significant impact. All features are provisionally identified as County Geological Sites.

Karst features are present to the north of Corridor A1. A swallow hole and sinking stream is identified near Ardcroney village with possibly others in the area that would require further investigation. No karst features were identified at present in Corridor A2 or A3.

There are no recorded mines or areas of potential mineral resource recorded within either corridor option. The Silvermines is located to the south of corridors A2 and A3.

A number of sand and gravel pits/quarries are evident in Corridor A3, to the north of Roscrea. If A3 is selected as the preferred option for this development, consultation with the quarries operators will be required in order to mitigate against any potential impact on current and future operations.

Brownfield sites were identified in each of the three corridors. The most significant sites include Gortmore Tailings facility at the confluence of the three corridors. A large landfill, Ballynavevy Landfill is located in corridor A3. Further consultation and detailed design would be required at brownfield locations.

In summary, A3 is considered the most constrained option with little difference between the Soils, Geology and Hydrogeology Constraints identified within the Route Corridor Options A1 and A2.

6 Preliminary Route Corridor B

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F11 – 11 below.

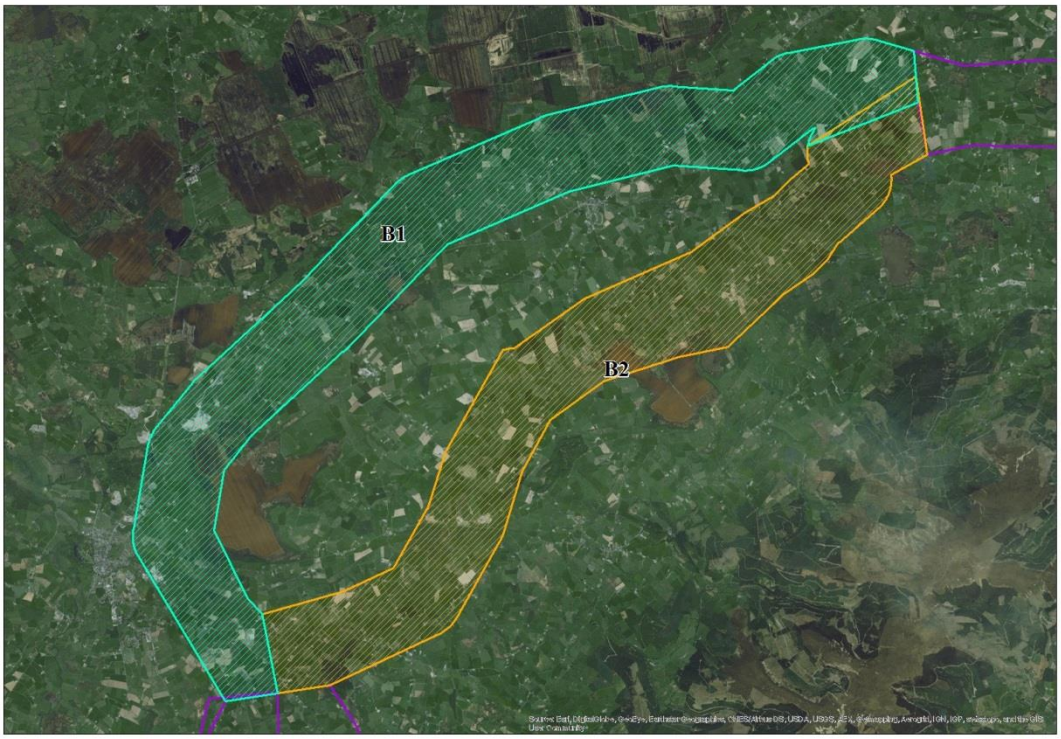


Figure F11 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

A number of constraints were identified in Route Corridor B1. A Geological Heritage site was recorded in this corridor. Birr-Five Alley Kilcormac Esker CGS/ proposed Natural Heritage Area (pNHA) runs along the corridor however the CGS/pNHA boundaries are not delineated.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified as a Regionally Important Karstified Aquifer/ Locally important Aquifer.

A number of groundwater supplies are located along the corridor including the Kilcormac groundwater supply boreholes.

Large areas of cutover peat are located along the route corridor with some intact peat area.

A number of historical landfills are located along the corridor including Kilcormac and Birr.

A number of large sand and gravel pits/quarries are identified near Birr. Potential sterilisation of mineral resources exists in this area.

6.3 Route Corridor B2

No significant constraints were identified in Route Corridor B2. No Geological Heritage sites were recorded in this corridor.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified primarily as a locally important Aquifer with small sections of Regionally Important Karstified Aquifer.

A number of groundwater supplies are located along the corridor including Newgate and Mountbolus, County Offaly.

Small areas of cutover peat area located along the corridor. No contaminated sites or landfills were identified within the corridor.

6.4 Matrix of Multi Criteria Analysis

Criteria	Corridor B1	Corridor B2
Aquifer Classification - importance of the groundwater resource to a given area	**Mid-range:** Mainly Rkd, some LL	**Low:** Mainly Ll, some Rkd, lm
Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly High to Moderate	**Low:** Mainly High to Moderate, some areas of Extreme on elevated locations
GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
Groundwater Supplies - identification of water supply springs and bored wells based on GSI and EPA records	**Mid-range:** Camcor Stream abstraction and Kilcormac Wells located near Kilcormac	**Mid-range:** Newgate Well, Mountbolus
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Low:** As above, SPZ not delineated	**Low:** As above, SPZ not delineated
Potential to impact on Geological Heritage Sites / County Geological Sites	**Mid-range:** Birr Five Alley Kilcormac Esker system through entire area however only marked as a point at present on maps. Potential Geological NHA along majority of route corridor	**Low:** None Identified
Potential to interact with contaminated land	**Mid-range:** Birr Landfill and Kilcormac Landfill. Due to the large number of pits along the esker system possibly some dumping sites in old quarries along esker system	**Low:** None Identified
Potential to sterilise mineral resource	**High:** Large quarries /pits near Birr. Also peat extraction. High possibility of some conflicts	**Low:** Moderate to low possibility, no large pits identified but some present along corridor
Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Low:** Moderate to low potential	**Mid-range:** Moderate possibility between Kilcormac and Cadamstown
Potential impact on karst features	**Mid-range:** a number of karst features along line route. Karst springs are located to the edge of the corridor	**Low:** no karst features identified along line route.

Criteria	Corridor B1	Corridor B2
Potential to encounter soft ground	**Mid-range:** High possibility, extensive peat and alluvial adjacent to esker system	**Low:**, some peat extraction areas along corridor
Soils Types	**Low:** Varied. Large areas of peat soils and podzols.	**Low:** Varied
Sub Soil Types	**Low:** Principally Gravels, Alluvial and Peat	**Low:** Till with some peat and gravels
Depth to rock	**Low:** <5m in most areas	**Low:** Varies –Impact dependent on risk to underlying groundwater (localised inspection required)

Table F11 - 5 Summary of the MCA for Route Corridors B

6.5 Comparative Discussion

Corridor B1 is underlain by sections of Regionally and Locally Important Aquifers with B2 primarily underlain by Locally Important Aquifers. A number of groundwater abstraction points were identified in both corridors B1 and B2. Consultation with Irish Water and relevant authorities will be important if the project is ultimately routed through this area of the SPA.

There are no Irish Geological Heritage Sites identified in corridor B2. One Geological Heritage site is recorded within B1, the Birr – Five Alley – Kilcormac Esker County Geological Site (CGS)/ potential NHA. While identified as a point location at present, this CGS/pNHA may extend the full length of corridor B1.

Karst features are present in Corridor B1. A series of springs are located to the north of the N52 Birr – Tullamore road in County Offaly. No karst features were identified at present in Corridor B2.

There are no recorded mines or areas of potential mineral resource recorded within either corridor option. A number of large sand and gravel pits/quarries are evident in Corridor B1, to the east of Birr. If B1 is selected as the preferred option for this development, consultation with the quarries operators will be required in order to mitigate against any potential impact on current and future operations.

Brownfield sites were identified in corridor B1, including the former town landfills for Birr and Kilcormac. Extensive peat is located in corridor B1 to the north of Five Alley and Kilcormac town.

Based on a review of the soils, geology and hydrogeology constraints, B2 is considered the least constrained option of the corridors considered, due to the presence of extensive areas of peat and the potential to sterilise mineral resources along corridor B1.

7 Preliminary Route Corridor C

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F11 – 12 below.

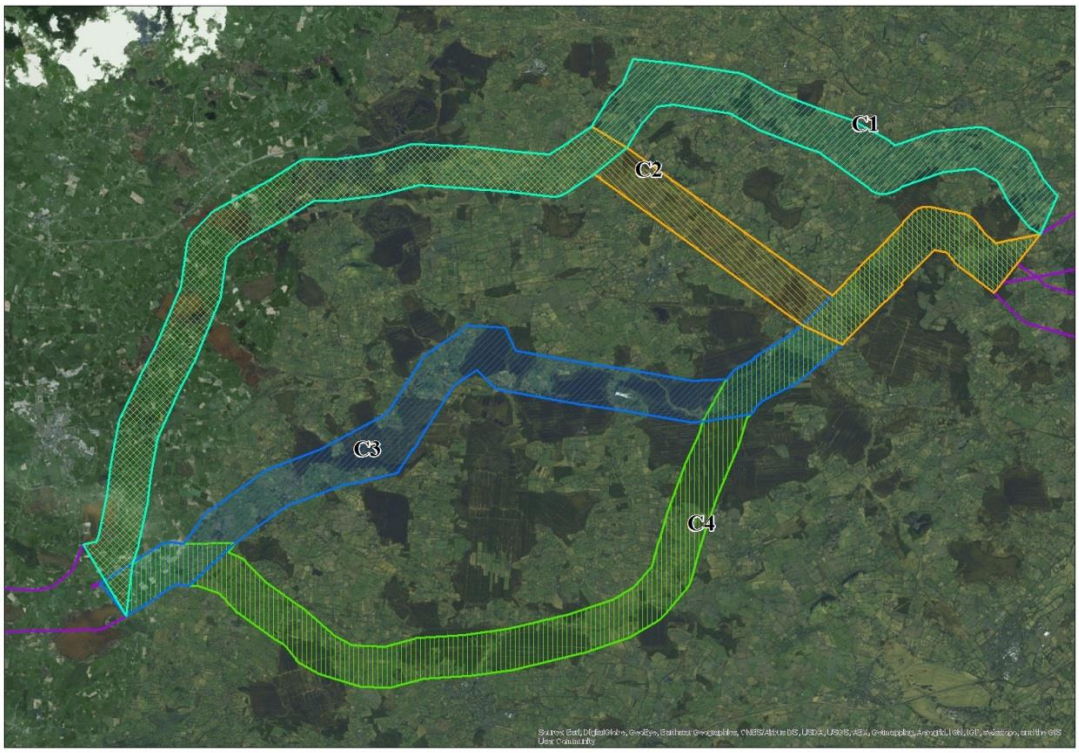


Figure F11 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

A number of constraints were identified in Route Corridor C1. A Geological Heritage site, Rahugh Ridge esker CGS is located to the west of the corridor; however the CGS/pNHA boundaries are not delineated at present.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified as a locally important Aquifer.

A number of groundwater supplies are located along the corridor including the Wood of O groundwater supply borehole, north of Tullamore, County Offaly.

Large areas of cutover peat is located along the route corridor with some potential for intact peat however most areas are in industrial use.

A large sand and gravel pit/quarry is identified near Derryarkin, County Offaly. Potential sterilisation of mineral resources exists in this area.

7.3 Route Corridor C2

A number of constraints were identified in Route Corridor C2. A Geological Heritage site, Carrick Hill CGS/pNHA is located within the route corridor.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified as a locally important Aquifer with some small sections of Regionally Important Karstified Aquifer. No groundwater supplies are located along the corridor.

Large areas of cutover peat is located along the route corridor with some potential for intact peat however most areas are in industrial use or former extraction areas. A large area of intact peat is located to the south of Derrinturn, County Kildare.

A large sand and gravel pit/quarry is identified near Derryarkin. Potential sterilisation of mineral resources exists in this area.

Drehid waste management facility is located to along the edge of the route corridor, east of Derrinturn.

7.4 Route Corridor C3

No significant constraints were identified in Route Corridor C3. No Geological Heritage sites were recorded in this corridor.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified primarily as a locally important Aquifer with small sections of Regionally Important Karstified Aquifer. Extensive areas of cutover peat are located along the corridor.

A number of groundwater supplies are located along the corridor including Danganbeg spring, Toberfin spring, Clonarrow borehole and Dalgan Spring.

Drehid waste management facility is located to along the edge of the route corridor, east of Derrinturn. Edenderry power station is also located within the route corridor.

7.5 Route Corridor C4

No significant constraints were identified in Route Corridor C4. No Geological Heritage sites were recorded in this corridor.

Rock is close to the surface in a number of areas along Corridor C4. The underlying aquifer in this corridor is also identified primarily as a locally important Aquifer with small sections of Regionally Important Karstified Aquifer. Extensive areas of cutover peat are also located along the corridor.

Kilantoge groundwater supply is located within the corridor.

Drehid waste management facility is located to along the edge of the route corridor, east of Derrinturn.

7.6 Matrix of Multi Criteria Analysis

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Aquifer Classification - importance of the groundwater resource to a given area	**Low:** Mainly locally important aquifers - LL and LM	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd	**Low:** Mainly locally important aquifers - LL and LM. Small section of Regionally important aquifers Rkd
Vulnerability Classification - potential for groundwater contamination	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly Moderate Vulnerability. Some areas of low vulnerability	**Low:** Mainly High to Moderate. Some areas of low vulnerability
GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
Groundwater Supplies - identification of water supply springs and bored wells based on GSI and EPA records	**Mid-range:** Wood of O Borehole located in corridor	**Low:** None Identified	**Mid-range:** Danganbeg spring, Toberfin Spring, Clonarrow BH, Dalgan Spr located in corridor	**Mid-range:** Kilnantoge BH adjacent to Slate River and within corridor
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Mid-range:** As above SPZ not delineated	**Low:** NA	**Mid-range:** As above	**Mid-range:** As above, no SPZ delineated

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to impact on Geological Heritage Sites / County Geological Sites	**Low:** Rahugh Ridge (Esker) located on western boundary, Esker not fully defined but may extend into Corridor	**Mid-range:** Carrick Hill	**Mid-range:** Esker Bridge to the edge of Corridor, boundary not defined	**Low:** None Identified
Potential to interact with contaminated land	**Low:** None Identified	**Low:** Drehid Landfill to the edge of corridor	**Mid-range:** Drehid Landfill to the edge of corridor, Edenderry power plant and ash pit to the centre of the route corridor	**Low:** Drehid Landfill to the edge of corridor
Potential to sterilise mineral resource	**High:** Large risk, presence of Derryarkin Pit, south of Rochfordbridge with extensive Wind farm proposed for the area. some peat extraction fields along route, possible conflict with BNM extraction plans	**High:** Large risk, presence of Derryarkin Pit, south of Rochfordbridge with extensive Wind farm proposed for the area. some peat extraction fields along route, possible conflict with BNM extraction plans	**Mid-range:** Low to moderate, some peat extraction fields along route, possible conflict with BNM extraction plans	**Mid-range:** Low to moderate, some peat extraction fields along route, possible conflict with BNM extraction plans
Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface	**Low:** potential overall, some small areas of Rock close to surface
Potential impact on karst features	**Low:** low to moderate possibility. Some karst prone bedrock along route corridor, No major features identified	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified.	**Mid-range:** moderate possibility. Some karst prone bedrock along route corridor, No major features identified

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Potential to encounter soft ground	**Mid-range:** High possibility of soft ground, extensive peat along route	**High:** extensive peat along route. Some areas of high bog south of Derrinturn.	**Mid-range:** High possibility of soft ground, extensive peat along route	**Mid-range:** High possibility of soft ground, extensive peat along route
Soils Types	**Low:** Highly variable	**Low:** Highly variable	**Low:** Highly variable	**Low:** Highly variable
Sub Soil Types	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.	**Mid-range:** Significant areas of peat/alluvial with mainly till on higher ground.
Depth to rock	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m	**Low:** Variable, generally >5m

Table F11- 6 Summary of the MCA for Route Corridors C

7.7 Comparative Discussion

The underlying aquifer classifications are similar for all corridors. The corridors are primarily underlain by sections of Locally Important Aquifers. Therefore, the potential impact on the aquifers as a result of the proposed development is similar.

A number of groundwater abstraction points were identified in three of the four corridors. No groundwater supply source was identified in C2. Consultation with Irish Water and relevant authorities will be important if the project is ultimately routed through any of the various SPAs.

Geological Heritage Sites were identified in corridors C1, C2 and C3. The boundaries of the Rahugh Ridge esker CGS, located in corridor C1, are not delineated at present. Similarly the boundaries of Esker Bridge CGS are not delineated at present and may extend into C3. Carrick Hill Quarry CGS is located in C2.

There are no recorded mines recorded in the corridor options. A large mineral extraction (sand and gravel) area is identified in C1 and C2. Existing and future reserved may extend across C1 and C2. If C1 or C2 is selected as the preferred option for this development, consultation with the quarries operators will be required in order to mitigate against any potential impact on current and future operations.

A large landfill, Drehid Waste Management Facility is partially located in C2, C3 and C4 corridors. Further consultation and detailed design would be required to route around brownfield locations.

Based on a review of the soils, geology and hydrogeology constraints, C1 and C2 are the most constrained options of the possible corridors, due to possible mineral sterilisation and extensive peat areas within these corridors. Extensive areas of peat are located along C3 and C4. There is little difference between C3 and C4 but C3 is marginally the least constrained due to less cutover bog along this corridor.

8 Preliminary Route Corridor D

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F3 – 13 below.

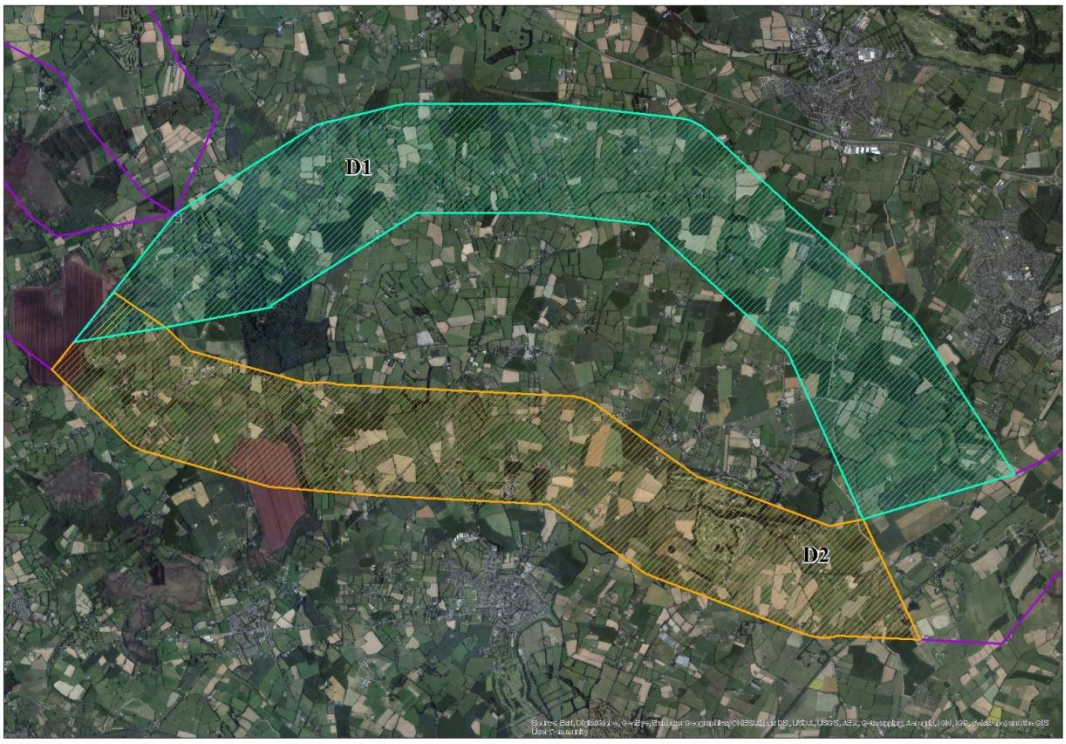


Figure F3 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

No significant constraints were identified in Route Corridor D1. Two Geological Heritage sites were recorded within the route corridor in County Kildare, namely St Patricks Well CGS and The Liffey Oxbow Lake CGS...

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified primarily as a Locally important Aquifer. No groundwater supply is located along the corridor.

No Contaminated Sites were identified along the corridor.

8.3 Route Corridor D2

No significant constraints were identified in Route Corridor D1. A Geological Heritage site, Peters Well CGS, is located within the route corridor.

Rock is close to the surface in a number of areas and the underlying aquifer in this area is also identified primarily as a Locally important Aquifer with small sections of Regionally Important Karstified Aquifer. A number of cutover peat areas were identified along the corridor.

No groundwater supply is located along the corridor. No Contaminated Sites were identified along the corridor

8.4 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Aquifer Classification - importance of the groundwater resource to a given area	**Low:** Mainly LL with some Pl	**Mid-range:** Mainly LL with Some Rkd
Vulnerability Classification - potential for groundwater contamination	**Low:** Some Extreme, mainly high to moderate	**Low:** Some Extreme, mainly high to moderate
GSI Groundwater Protection Response matrix	**Mid-range:** No data available for this area	**Mid-range:** No data available for this area
Groundwater Supplies - identification of water supply springs and bored wells based on GSI and EPA records	**Low:** none identified, possibly some large private supplies	**Low:** none identified, possibly some large private supplies
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Low:** None identified	**Low:** None identified
Potential to impact on Geological Heritage Sites / County Geological Sites	**Mid-range:** St Patricks Well - Geothermal, possibly high importance, consultation with GSI required. Liffey Oxbow Lake	**Low:** St Peters Well, geothermal
Potential to interact with contaminated land	**Low:** No large quarries identified	**Low:** No large quarries identified
Potential to sterilise mineral resource	**Low:**- No significant quarries identified in the corridor	**Low:** No significant quarries identified in the corridor
Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc.)	**Mid-range:** a number of areas with rock close to surface	**Mid-range:** a number of areas with rock close to surface
Potential impact on karst features	**Low:** none Identified	**Low:** none Identified
Potential to encounter soft ground	**Low:** Predominately till deposits	**Low:** Predominately till deposits

Soils Types	**Low:** Predominantly well drained soils	**Low:** Predominantly well drained soils
Sub Soil Types	**Low:** Predominantly till with gravels to the south of the Liffey. Occasional alluvial	**Low:** Predominantly till with gravels to the south of the Liffey. Occasional alluvial. Peat soils near Prosperous
Depth to rock	**Low:** Variable	**Low:** Variable

Table F11- 7 Summary of the MCA for Route Corridors D

8.5 Comparative Discussion

One Geological Heritage site is recorded within corridor D2 with two identified within D1. No karst features were identified at present in Corridor D1 or D2. A Regionally Important Karstified Aquifer underlies the River Liffey in Corridor D2. If D2 is selected as the preferred option for this development, detailed assessment is required to confirm potential hydrogeological impacts of horizontal directional drilling under the River Liffey. There are no recorded mines or areas of potential mineral resource recorded within either corridor option. No brownfield sites were identified in either corridor.

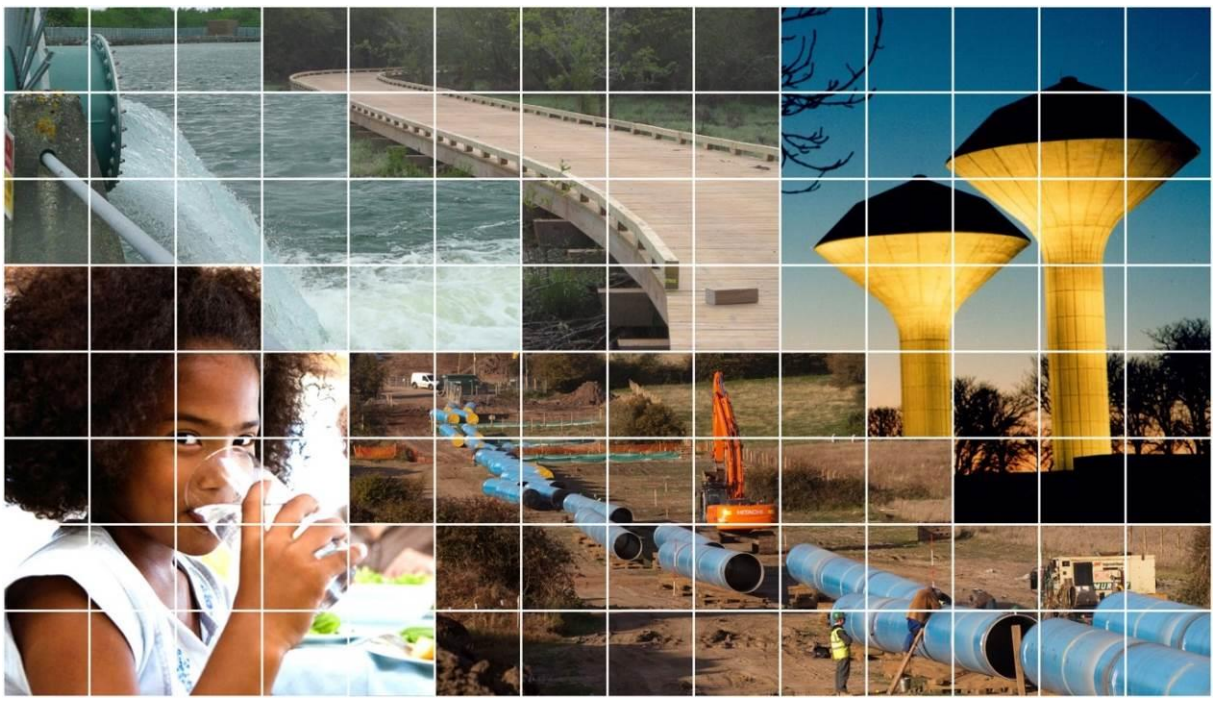
Based on a review of the route corridors, there is little difference between the two corridor options; however D1 is marginally the least constrained due to there being less peat along this corridor.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F12: Planning Policy

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F12 – 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F12 – 1Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F12 is a statement on the specialism Planning Policy and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

Note that 'planning constraints' does not refer to other matters that may determine whether planning permission is granted. Planning policy is only one of many considerations that include:

- Conformity with relevant application procedures
- Protection of environment, cultural heritage and amenity
- Availability of infrastructure
- Protection of Health and Safety
- Sustainable Development
- Proper Planning and Sustainable Development
- Protection of Residential Amenity

Thus, the report does not attempt to address other issues addressed in the Development Plan (such as ecology, flooding, hydrology, archaeology, architectural heritage, etc.) which, although related to planning and land use policy, are assessed by the relevant suitably qualified experts.

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

For each of the pipeline corridors and loops, it is intended to review each option with respect to defined land use policy and planning criteria.

The purpose is to ensure that the route serves areas that are most suitable for future development – having regard to existing and established plans and policies for growth and development.

Such plans – which have already been the subject of detailed public consultation and strategic environmental assessment – have already determined a hierarchy of suitability. Those determinations were based upon considerations of a wide range of demographic, infrastructural, social, economic and environmental factors.

The transfer of water services functions to Irish Water has opened a unique opportunity to take a strategic view of providing water services at a national level and as a result, the project has now been referenced to the three regions within which Irish Water operates.

This report focuses on the opportunities to supply water to support the development of areas and prioritises areas that have already been identified for growth in each of the County Development Plans, as well as the Regional Planning Guidelines - the "Benefitting Corridor". It should be noted that water is *only one service* that is required to support growth; there is a corresponding need to address waste water issues in many urban and rural areas, as well as the need to ensure the availability of a workforce within sustainable travel distances, transportation infrastructure, adequate broadband, power supply and other infrastructure services. Furthermore, future growth of towns will be determined by 'proper planning and sustainable development' as outlined in the Planning Acts. Spatial plans, Regional Planning Guidelines, and County Development Plans will determine where growth occurs within a legislative framework.

The table below identifies characteristics of areas considered 'suitable' for development according to the relevant spatial plan:

Spatial Plan designation	Most suitable	Suitable	Less Suitable	Least suitable
Gateway/Hub	e.g. Tullamore			
Large Growth Town/major areas for growth	e.g. Nenagh/ Roscrea			
Moderate Growth town		e.g. Borrisokane		
Small town		e.g. Cloughjordan/ Rathangan		
Village subject to Settlement Plan and small growth			e.g. Ardcroney	
Rural area				Craigs/Hamlets

The methodology adopted for the preparation of this report entailed a review of relevant spatial plans as set out in the applicable Regional and County Development Plans. Towns and villages that have already been identified as being suitable for further growth in the relevant spatial plans, along the pipeline corridors are identified and suitability is expressed on the basis of proximity to those towns, though the difference in most cases is marginal. One corridor may be slightly further away from a town, but that does not necessarily preclude that corridor from having the potential to serve that town in the future.

The pipeline infrastructure will be located underground for the entire length of the development. There is almost no infrastructure located above ground. Thus, while there will be potential construction impact associated with the development, once operational, there is negligible operational impact on surrounding communities.

With respect to land use, in the main, the proposed corridors have avoided settlements and zoned lands. Therefore, there will be negligible impact on land use. The corridors run through unzoned lands and therefore potential wayleaves will have a negligible effect on the use of lands for agricultural purposes, for example. Future development will have to take account of resulting wayleaves.

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

Figure F12 – 1 Peamount

Location
This location is adjacent to Peamount Hospital and the existing water reservoir. It is located north of the Peamount Road, the R120 and is south-east of Celbridge town.

It is currently in agricultural use with low density residential development along the adjoining roads.

Land Use Zoning

Part of the area is currently zoned for Distribution, Logistics and Warehousing and to facilitate opportunities for manufacturing, research and development, and light industry. Casement (Baldonnel) Airport and Newcastle village, as well as Adamstown SDZ, are all within the vicinity of the location.

Local Objectives

Within the area, Objectives OBJ02 and OBJ03 are relevant. These objectives relate to the land use. There are road proposals and proposals for Traveller Accommodation as well as a protected structure within the identified location. There are objectives to develop Peamount as a centre of excellence and there is an objective (LZ03) to facilitate the preparation of a detailed framework plan for the identification of future development along the rail corridor from the city boundary to Adamstown.

Other Objectives

Weston Airport is located to the north and the location is within the conical approach zone of the airport.

Airport Safety and Noise Zones

The proposed location is within the noise boundary of Casement airport.

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Planning Policy	Need to carefully site TPR within overall location.
Existing Land Use	Hospital/Agriculture/Existing reservoir
Zoning	Peamount Hospital & local policy objective Obj03: To provide for distribution, warehouse and industry; and objective OBJ02: To facilitate opportunities for manufacturing, R&D etc.
Airport Public Safety and Noise Zones	Casement/Baldonnel Airport: Noise boundary; Dept of defence inner zone.
Local Objectives	There are road proposals; many Protected Structures; Local objectives on the site - TA - To provide for Traveller Accommodation; proposals for an Amenity Layby; Zoning Obj: LZ03; Local Objective LO 33 –for a regional park, LO34 To facilitate the development of Peamount as a centre of excellence , LO35 -Enterprise lands – subject to a Framework Plan
Other Local Objectives	Peamount Hospital development
Land Uses in the vicinity	Baldonnel/Casement Airport; Newcastle village (1.5km); Adamstown SDZ (1km)
Zoning present in the vicinity	Industry
Airport Public Safety and Noise Zones in the vicinity	Baldonnel inner zone
Local Objectives in the vicinity	Baldonnel Airport
Other Local Objectives in the vicinity	LZ08:Within the industrial zoned lands at Greenogue, Newcastle, designated as Zoning Objective 'EP3' on Development Plan Maps, the use classes Office-Based Industry and Offices shall not be permitted as stand alone developments independent of industrial/warehousing type uses

Table F12 - 2 Summary of the MCA for Peamount

2.4 Conclusion

There are numerous objectives for the area noted in the South Dublin County Development Plan. The location is within the safety and noise zones of both Weston and Baldonnel/Casement Airports. The Irish Aviation Authority and the Department of Defence must be included in consultations at an early stage of development. The final *actual* site of the reservoir must take account of the numerous objectives the Council has for the area and minimise any potential conflicts at the outset. The location of the hospital must also be a consideration, particularly during construction.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F13 – 1.

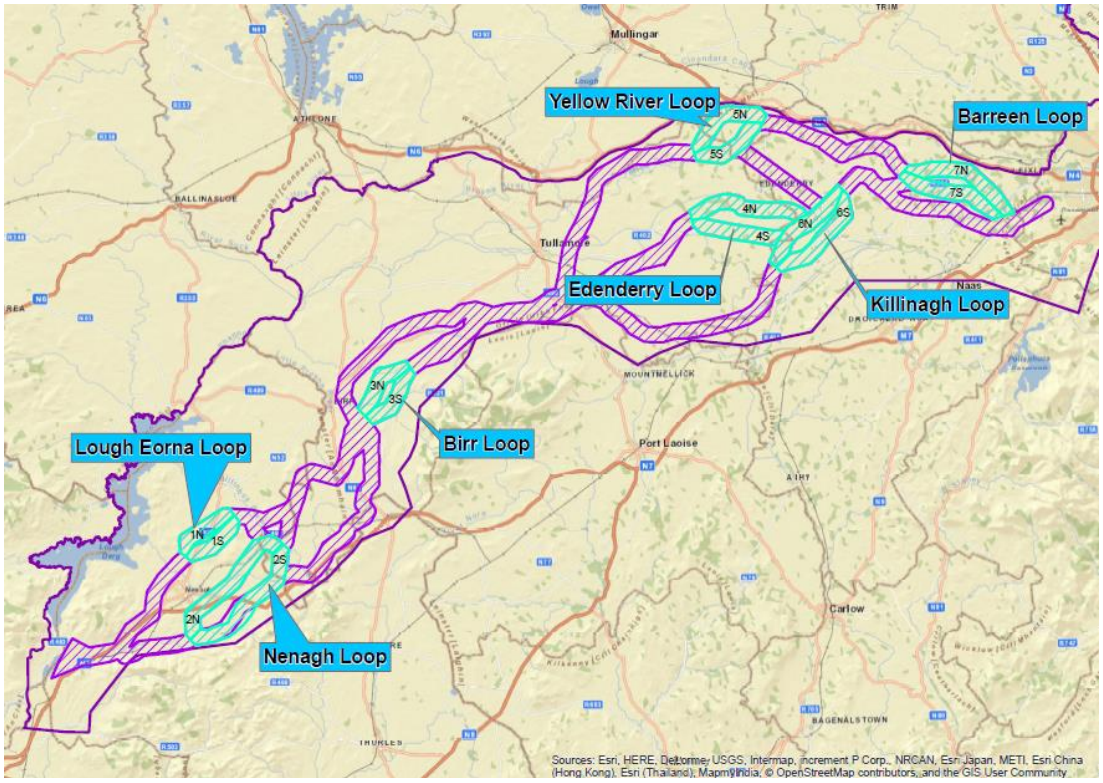


Figure F12 – 2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop

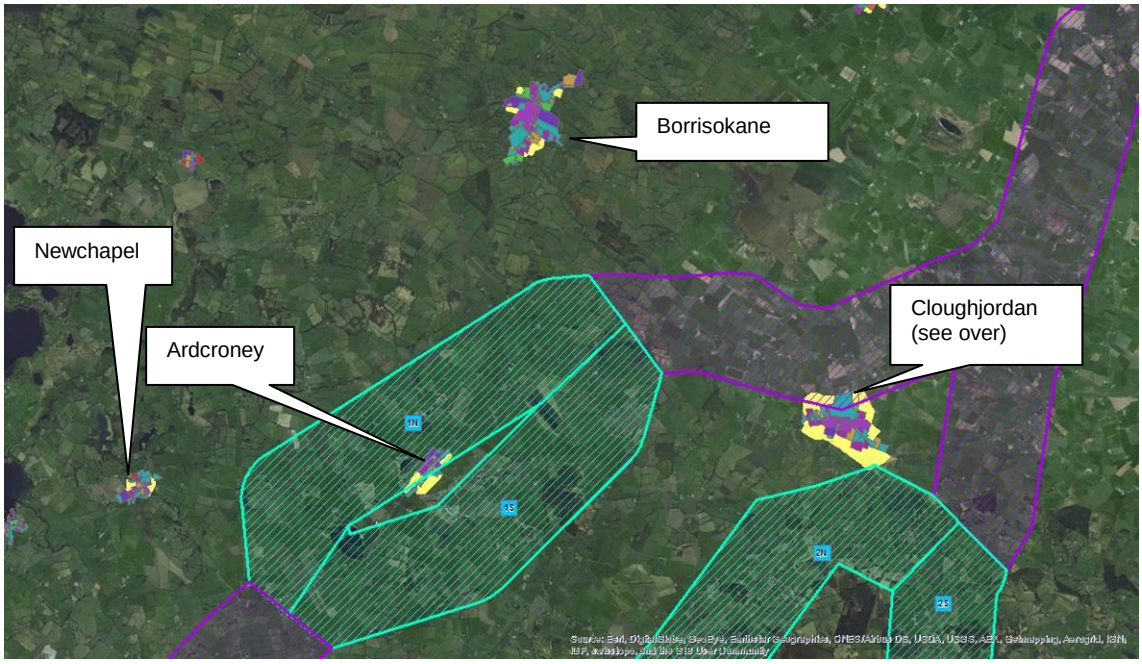


Figure F12 – 3 The Lough Eorna Loop

4.1.1 Northern Branch

The northern branch includes the village of Ardcroney which is the subject of a settlement plan. The continued development of Borrisokane, on a sustainable basis, will be pursued by the Council. Borrisokane is considered a Tier 2 secondary Service Centre, just north of the northern branch.

4.1.2 Southern Branch

The southern branch could also serve Borrisokane.

4.1.3 Conclusion

Both options potentially could serve the identified areas for growth, in particular the Tier 2 town of Borrisokane. **The northern branch is marginally more suitable.**

4.2 The Nenagh Loop

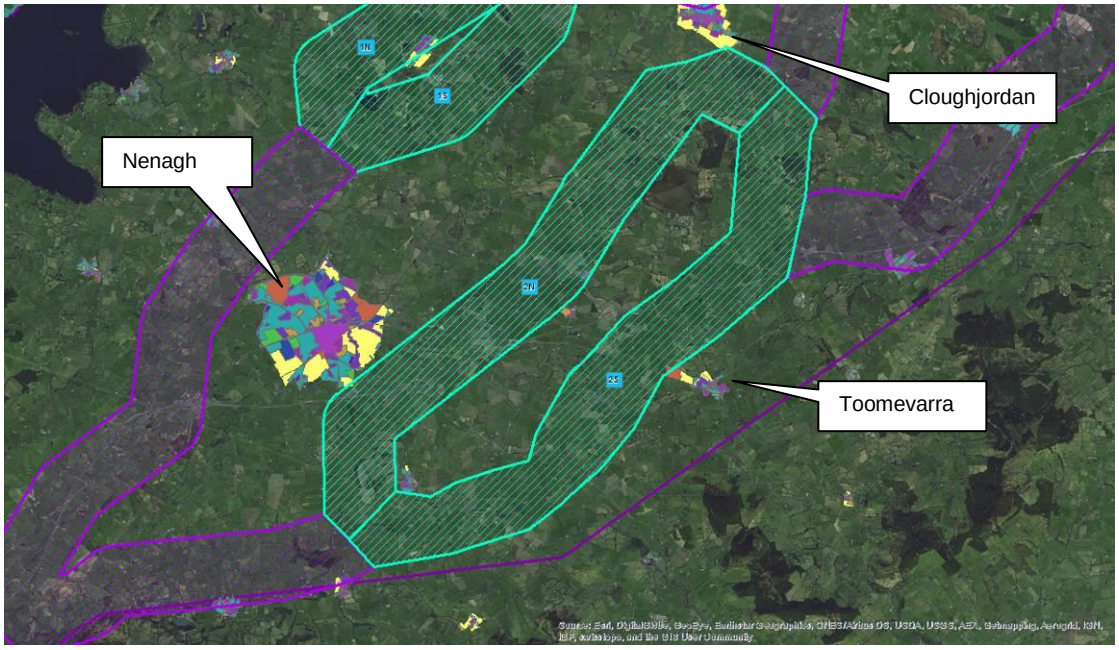


Figure F12 – 4 The Nenagh Loop

4.2.1 Northern Branch

The northern branch runs to the south of Nenagh. Nenagh is identified as a Tier 1 Primary Services Centre. The Development Plan supports the growth of Nenagh and lists expected growth over the lifetime of the Plan and in accordance with the Mid West Regional Planning Guidelines 2010. The northern branch could provide opportunities to serve Cloughjordan – a Tier 3 centre.

4.2.2 Southern Branch

The southern branch runs to the north of Toomevarra – a Tier 4 centre.

4.2.3 Conclusion

The northern branch is therefore more suitable, as it provides more opportunities to serve the towns that have already been identified for growth in the relevant spatial plans – in particular, Nenagh.

4.3 The Birr Loop

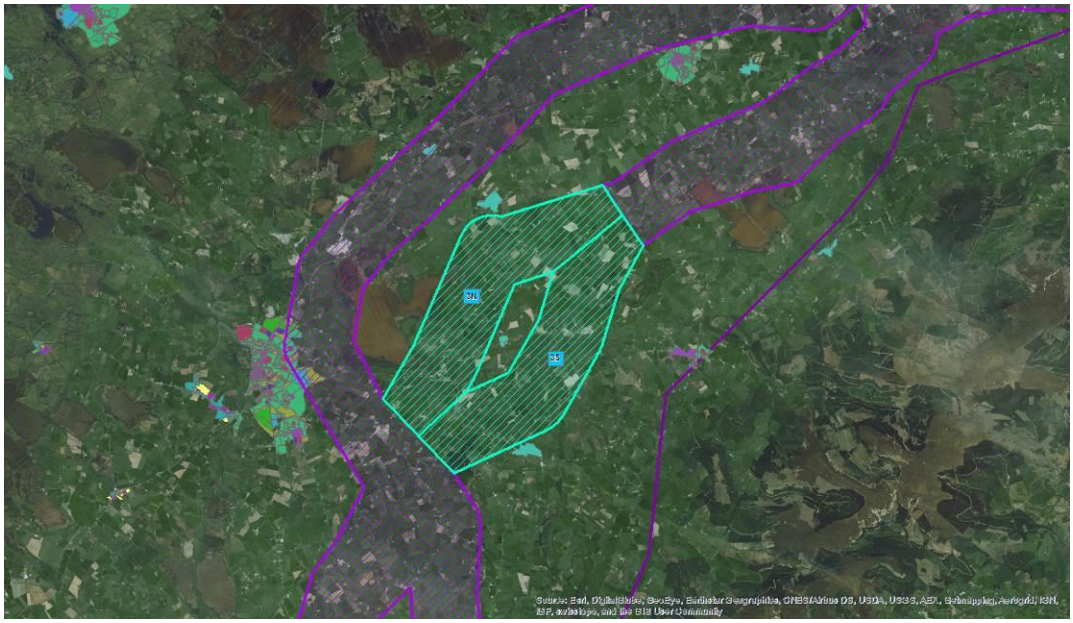


Figure F12 – 5 The Birr Loop

4.3.1 Northern Branch

Birr is the subject of a Town and Environs Development Plan and is identified as a 'Key Service Town' in the County Development Plan. The northern loop would be more suitable.

4.3.2 Southern Branch

The southern route is less suitable, but it is quite possible that Birr could be served from this loop.

4.3.3 Conclusion

The northern branch is more suitable because of its proximity to Birr.

4.4 The Edenderry Loop

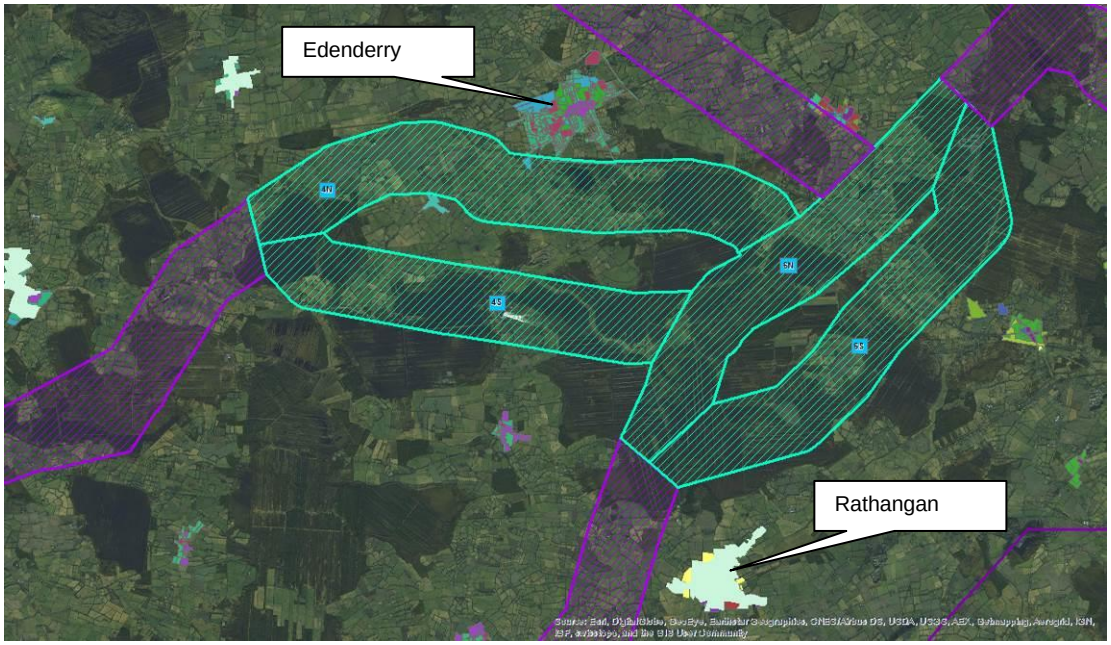


Figure F12 – 6 The Edenderry Loop

4.4.1 Northern Branch

Edenderry is considered a 'Key Service Town' in Offaly and is subject to a Local Area Plan. The Offaly County Development Plan notes that the role of large towns is to strengthen the settlement pattern and the Plan provides for continued population growth in the town.

4.4.2 Southern Branch

The southern branch is further removed from Edenderry.

4.4.3 Conclusion

The northern branch is more suitable due to its proximity to Edenderry.

4.5 The Yellow River Loop

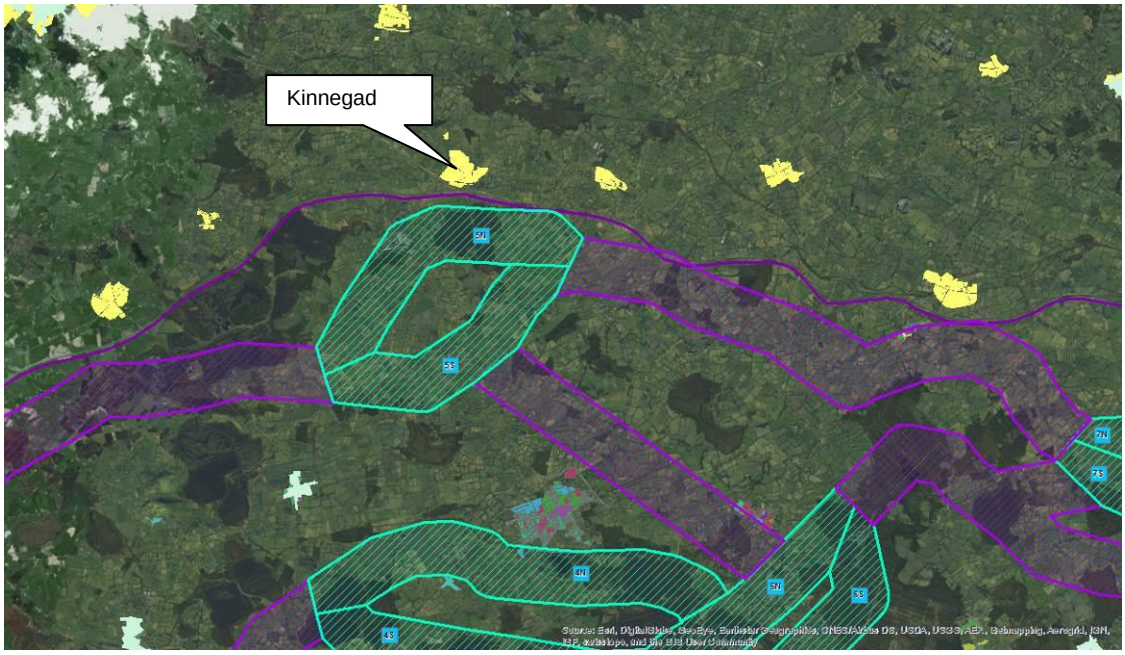


Figure F12 – 7 The Yellow River Loop

4.5.1 Northern Branch

The northern branch is proximate to Kinnegad town. Kinnegad has experienced significant population growth over the last two census periods and is considered a Tier 3 Service Town, with Moate and Kilbeggan.

4.5.2 Southern Branch

The southern branch is not immediately proximate to any area identified in the spatial plans for growth.

4.5.3 Conclusion

The northern branch is more suitable.

4.6 The Killinagh Loop

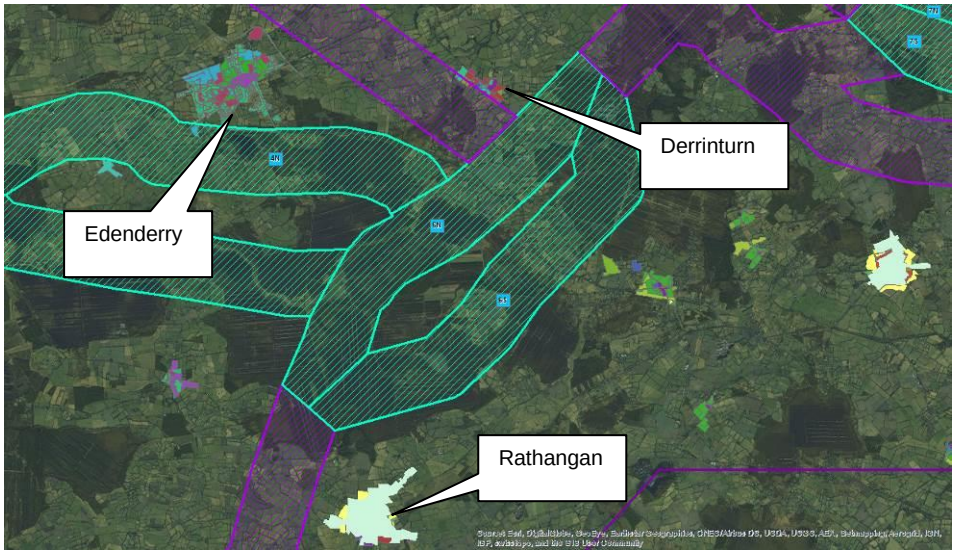


Figure F12 – 8 The Killinagh Loop

4.6.1 Northern Branch

The northern branch is closest to the villages of Edenderry and Derrinturn.

4.6.2 Southern Branch

The southern branch is close to the village of Allenwood and Rathangan.

4.6.3 Conclusion

The northern branch is more suitable.

4.7 The Barreen Loop

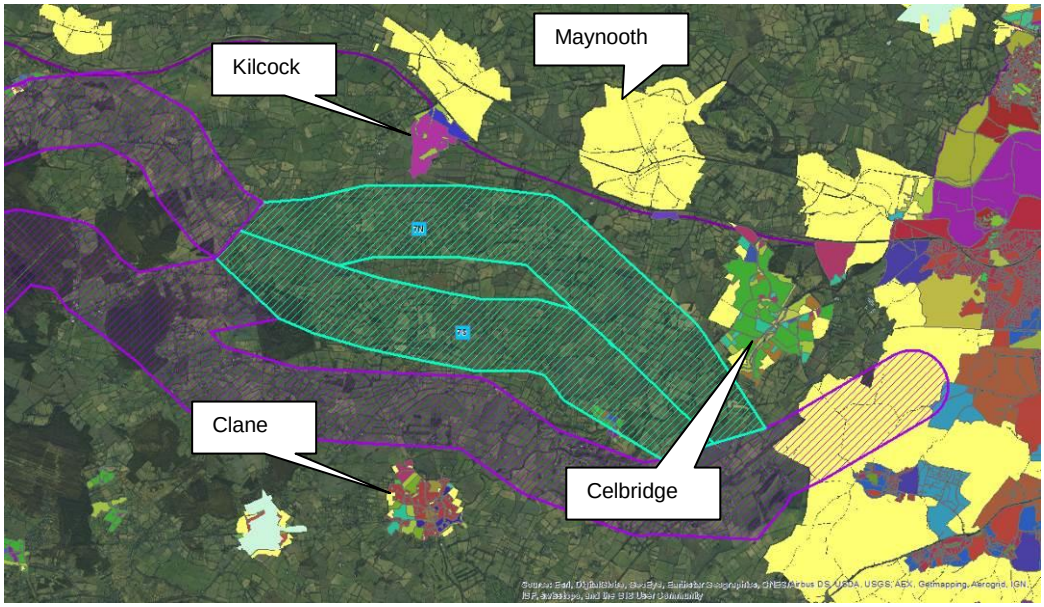


Figure F12 – 9 The Barreen Loop

4.7.1 Northern Branch

The northern branch is closer to the towns identified as 'Large Growth Towns' of Maynooth and Leixlip and the 'Moderate Sustainable Growth' town of Celbridge, according to the Kildare County Development Plan 2011 – 2017 and the Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

4.7.2 Southern Branch

The southern branch is close to Clane which is considered a 'small town' in the Development Plan.

4.7.3 Conclusion

The northern branch is more suitable.

4.8 Matrix of Multi Criteria Analysis

Criteria	Lough Eorna	Nenagh	Birr	Edenderry	Yellow River	Killinagh	Barreen
Planning Policy							
Pipelines suitable to provide water to areas already identified for growth	Northern branch suitable to serve Borrisokane	Northern branch suitable to serve Nenagh	Northern branch suitable to serve Birr	Northern branch suitable to serve Edenderry	Northern branch suitable to serve Kinnegad	Northern branch suitable to serve Edenderry	Northern branch suitable to serve Maynooth and Leixlip

Table F12 - 3 Summary of the MCA for Corridor sub-options or "Loops"

4.9 Comparative Discussion

As previously stated, the purpose of this report is to ensure that the route serves areas that are most suitable for future development – having regard to existing and established plans and policies for growth and development.

Such plans – which have already been the subject of detailed public consultation and strategic environmental assessment – have already determined a hierarchy of suitability.

This report focuses on the opportunities to supply water to support the development of areas and prioritises areas that have already been identified for growth in each of the County Development Plans, as well as the Regional Planning Guidelines - the "Benefitting Corridor".

In most instances, the difference between the loops is marginal. Should a southern loop be deemed more preferable when all of the specialists findings are analysed, a review of that pipe corridor can determine its suitability to serve towns identified for growth in the relevant spatial plans.

5 Preliminary Route Corridor AB

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F12 – 10 below.

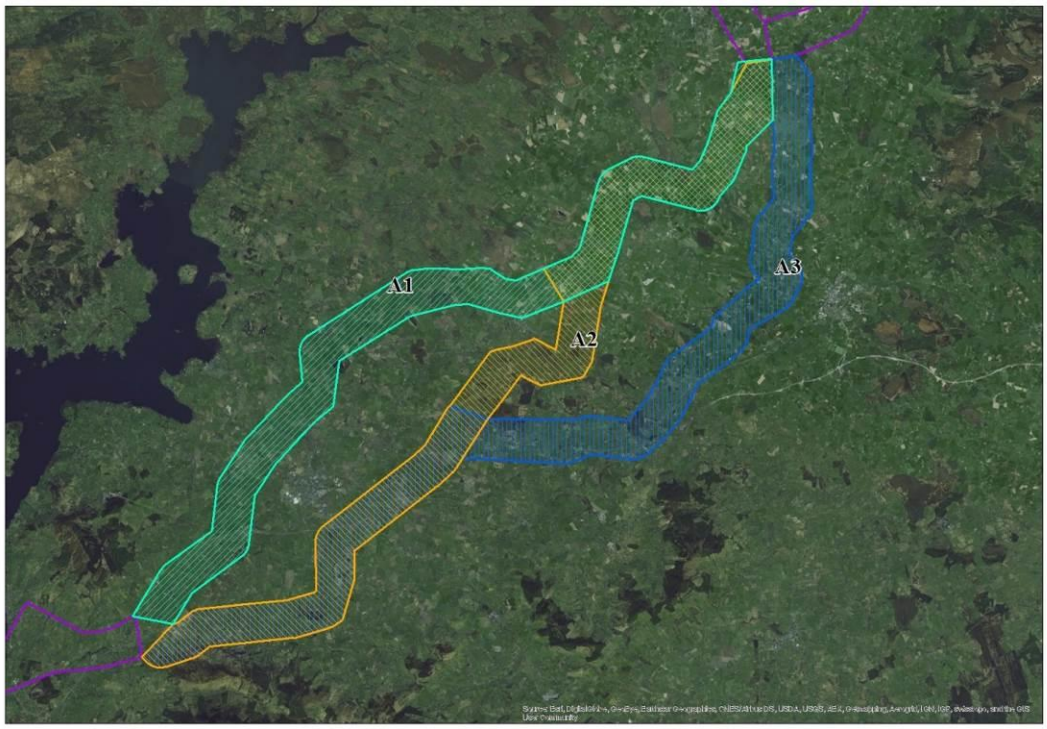


Figure F12 – 10 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Corridors A1 and A2 are both well placed to serve Nenagh. Corridor A1 is also well placed to serve Borrisokane. Nenagh is identified as a Tier 1 Primary Services Centre. The Development Plan supports the growth of Nenagh and lists expected growth over the lifetime of the Plan and in accordance with the Mid West Regional Planning Guidelines 2010.

5.3 Route Corridor A2

As noted above, the main Tier 1 Primary Services town of Nenagh can be served by A2.

5.4 Route Corridor A3

This corridor can serve Roscrea, which is also identified as a Tier 1 Primary Services town along with Nenagh. Roscrea is subject to a Local Area Plan 2012 prepared by Tipperary County Council and is recognised as a 'Medium Sized Town', as well as Nenagh, in the Mid-West Regional Planning Guidelines.

5.5 Matrix of Multi Criteria Analysis

Criteria	A1	A2	A3
Planning policy			
Pipelines suitable to provide water to areas already identified for growth	Pipelines suitable to serve Nenagh and Borrisokane	Pipelines suitable to serve Nenagh	Pipelines suitable to serve Roscrea

Table E12 – 4 Summary of the MCA for Route Corridors AB

5.6 Comparative Discussion

Options A1 and A2 both can serve Nenagh. A3 can serve Roscrea also. A combination of A2 and A3 is marginally more suitable because of the proximity of Nenagh and Roscrea along this route – both towns identified for growth in the relevant spatial plans.

6 Preliminary Route Corridor BC

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F12 – 11 below.

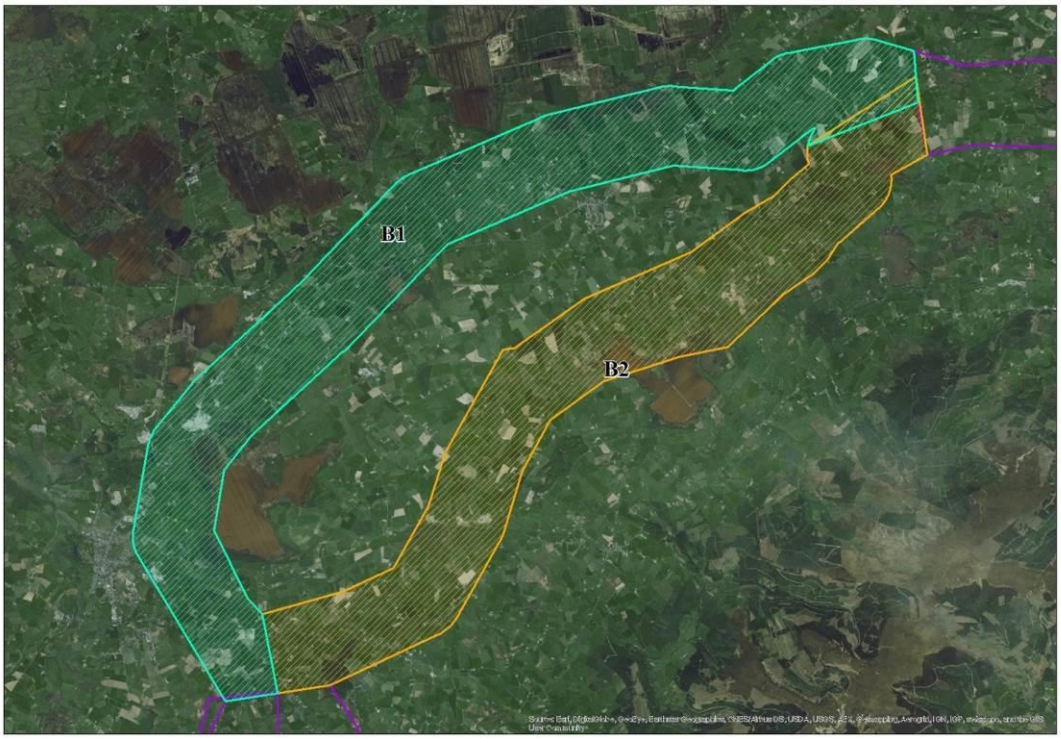


Figure F12 – 11 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

This corridor is proximate to Birr. Birr is the subject of a Town and Environs Development Plan and is identified as a 'Key Service Town' in the County Development Plan. Offaly is included in the Midlands Regional Planning Guidelines 2010 – 2022, which also identify Birr as a Key Service Town.

6.3 Route Corridor B2

Birr could potentially be served by this corridor also.

6.4 Matrix of Multi Criteria Analysis

Criteria	B1	B2
Water		
Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve Birr	Pipeline suitable to serve Birr

Table E12 – 5 Summary of the MCA for C Route Corridors BC

6.5 Comparative Discussion

Both pipeline corridors could serve Birr. Birr is the subject of a Town and Environs Development Plan and is identified as a 'Key Service Town' in the County Development Plan.

7 Preliminary Route Corridor CD

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F12 – 12 below.

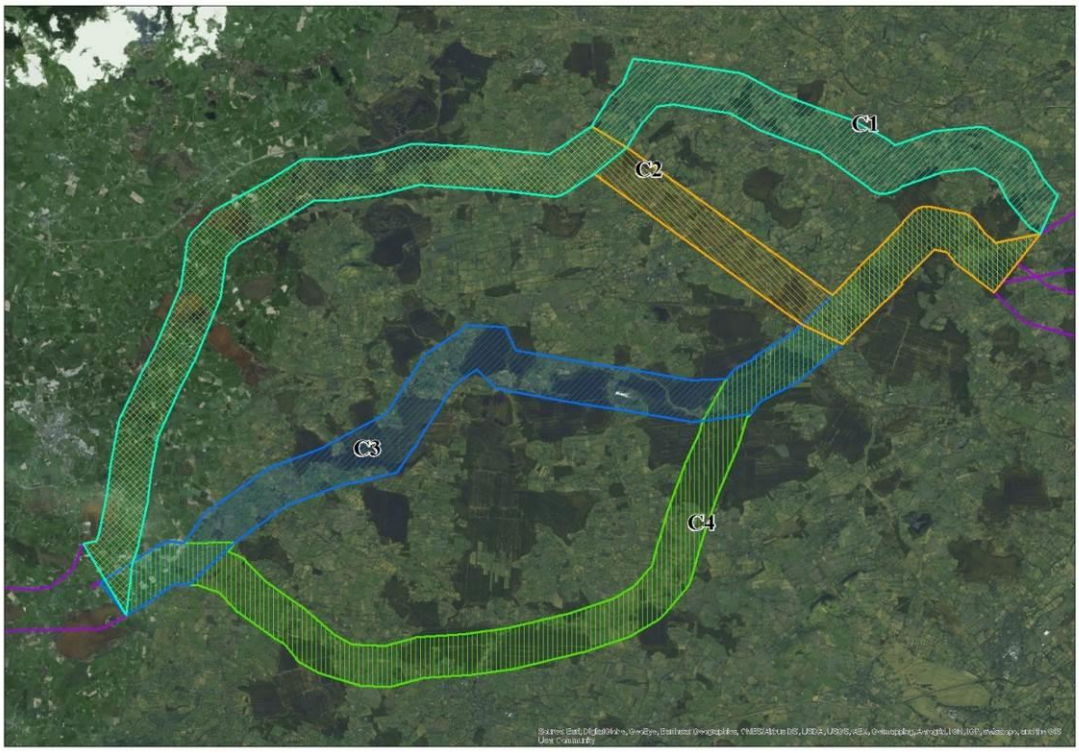


Figure F12 – 12 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

Corridor C1 can potentially serve Tullamore – part of the Midlands gateway as identified by the National Spatial Strategy and subject to the Tullamore Town and Environs Development Plan 2010 – 2016, prepared by Offaly County Council.

7.3 Route Corridor C2

C2 is proximate to Edenderry and Derrinturn

7.4 Route Corridor C3

C3 is proximate to Daingean and Edenderry.

7.5 Route Corridor C4

C4 is proximate to Mountmellick, Portarlington, Killenard, Monasterevin and Rathangan.

Portarlington is subject to a Local Area Plan 2012 – 2018, prepared jointly by Offaly and Laois County Council. Mountmellick is also subject to a Local Area Plan 2012 – 2018, prepared by Laois County Council. Monasterevin is subject to a Local Area Plan 2015 – 2021, and Rathangan as a small town is included in the Kildare County Development Plan.

7.6 Matrix of Multi Criteria Analysis

Criteria	C1	C2	C3	C4
Planning Policy				
Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve Gateway town of Tullamore	Pipeline suitable to serve Edenderry.	Pipeline suitable to serve Edenderry.	Pipeline suitable to serve Portarlington, Mountmellick, Monasterevin

Table E12 - 6 Summary of the MCA for Route Corridors CD

7.7 Comparative Discussion

C1 or C4 would be marginally more suitable due to the proximity to the gateway of Tullamore and the towns of Portarlington and Rathangan. Tullamore is part of the Midlands gateway as identified by the National Spatial Strategy and subject to the Tullamore Town and Environs Development Plan 2010 – 2016, prepared by Offaly County Council. Pipelines C2 and C3 are suitable to serve Edenderry.

8 Preliminary Route Corridor DE

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F12 – 13 below.

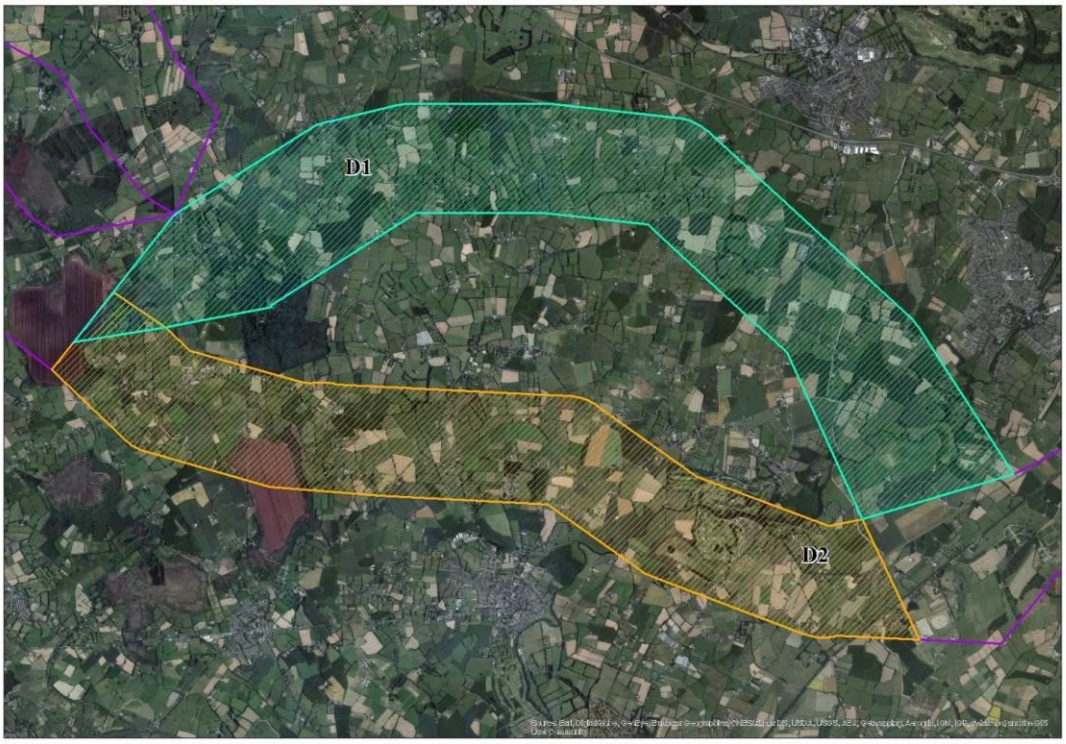


Figure F12 – 13 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

Corridor D1 is proximate to the towns of Kilcock, Maynooth, Celbridge and Leixlip. It could also potentially serve parts of south Meath.

The towns of Maynooth and Leixlip are identified as 'Large Growth Towns' and Celbridge is identified as a 'Moderate Sustainable Growth' town, according to the Kildare County Development Plan 2011 – 2017, and the Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022.

8.3 Route Corridor D2

D2 is proximate to Clane which is identified as a small town.

8.4 Matrix of Multi Criteria Analysis

Criteria	D1	D2
Water		
Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve large growth towns	Pipeline could serve large area of North Kildare

Table E12 – 7 Summary of the MCA for Route Corridors DE

8.5 Comparative Discussion

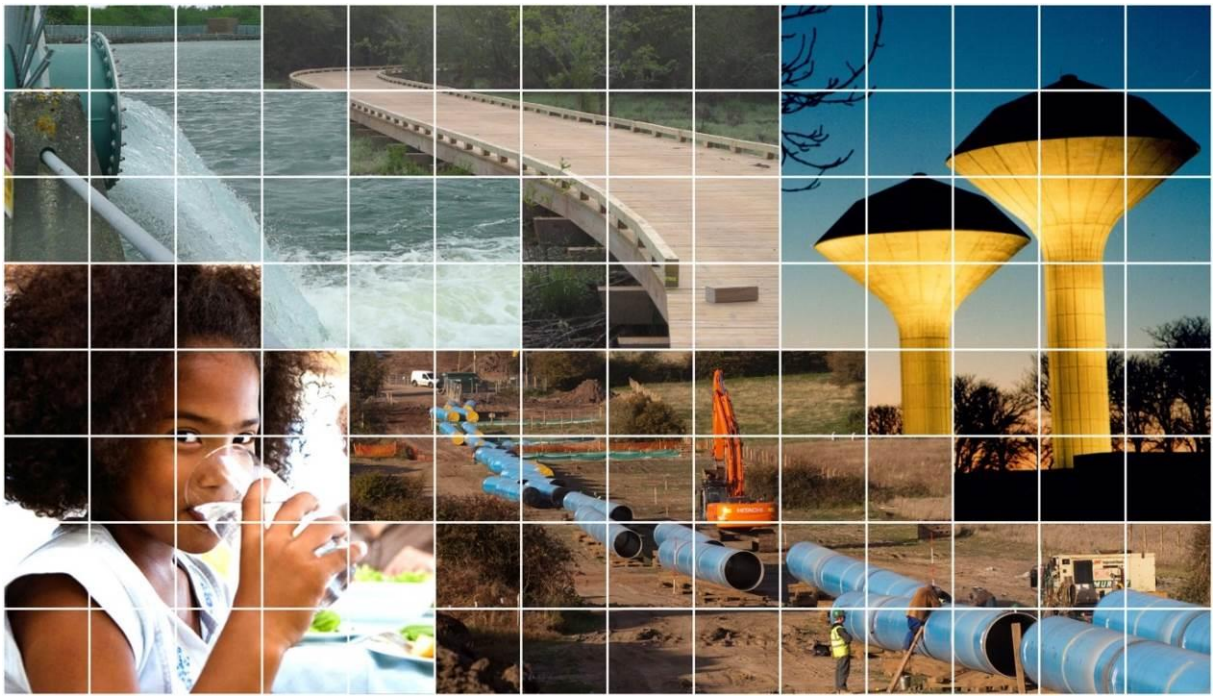
It is likely that either of these two options could serve a wide area in north Kildare, which is identified as a primary growth area. According to the Regional Planning Guidelines for the Greater Dublin Area, the towns of Maynooth and Leixlip are identified as 'Large Growth Towns II'. Dunboyne in south Meath is also in this category. Option D1 is more suitable because of the proximity.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F13: Engineering & Design

October 2015 **F02**



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1 Introduction

1.1 Background to Report

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria Analysis and explicitly considers multiple criteria (see Table F13-1), within a decision-making environment.

Table F13-1 Appraisal Criteria

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

The assessments are presented as individual statements within this Appendix F.

This Appendix F13 is a statement on the specialism Engineering & Design and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under 5 no. Engineering & Design sub-criteria.

- Obstructions;
- Ground Conditions;
- Accessibility;
- Idealistic Elevation; and
- Flooding.

1.2.1 Assessment Material

The sources of information utilised in the assessment included:

- 1:100,000 Scale Bedrock Mapping (Geological Survey of Ireland)
- Karst Database (Geological Survey of Ireland)
- Teagasc Subsoil Mapping (2004)
- Roads Network Database (National Roads Authority)
- Rivers and Streams Database (Environmental Protection Agency)
- OPW PRFA Flood Mapping

2 Termination Point Reservoir

2.1 Engineering Screening of the Termination Reservoir Sites

2.1.1 2011 Integration Report

The Strategic Environmental Assessment (SEA) examined a number of key issues which arose, directly or indirectly, in relation to the integration of water supplies from a new source into the Dublin Region Water Supply Network. Principal among these included:

- An optimised location for the Termination Point Reservoir (TPR); and
- Optimised connection arrangements between the TPR and the existing reservoirs at Saggart and Peamount.

In taking this 'optimised' approach, it was intended to:

- Select the most appropriate termination location for the treated water transmission pipeline, effectively establishing a location for a TPR; and
- Select the connection routes from the TPR location to the existing Saggart and Peamount Reservoirs.

This assessment took due regard of earlier studies that had proposed that a location near Baldonnel Airport would be suitable, for the following reasons:

- Proximity to the existing strategic infrastructure of Leixlip Water Treatment Plant (WTP) and Saggart Reservoir; and
- Optimum elevation for
    - Pipeline's hydraulic profile between the River Shannon (Lough Ree at that time) and Dublin; and
    - Gravity supply potential to Peamount Reservoir.
- Protection from competing land use pressures due to the proximity of Baldonnel airport.

The subsequent SEA study assessed alternative locations for siting the TPR in greater detail considering five (5) locations for assessment, namely:

- Baldonnel;
- Athgoe;
- Lyons;
- Clonaghlis; and
- Peamount.

The principal criteria were based on suitability of the elevation at the termination point, where the TPR would be sited, and the routes from there to Saggart and Peamount Reservoirs.

In order to satisfy certain hydraulic engineering considerations, and to provide a cost effective solution, it was concluded that the most suitable location for the TPR was in the elevation range 100 – 110m OD. In addition, the practicality of construction of

both the reservoir and the connecting pipelines was a consideration in option selection.

Whilst one of the principle criteria was suitability of the elevation at the termination point, it was acknowledged that the Peamount location did not meet the elevation range of 100 – 110m OD, but due to the effectiveness of the connecting routes for that option, adaptive measures were considered in order to satisfy the elevation criterion.

The locations of the five sites are shown in the following Figure F13-1.

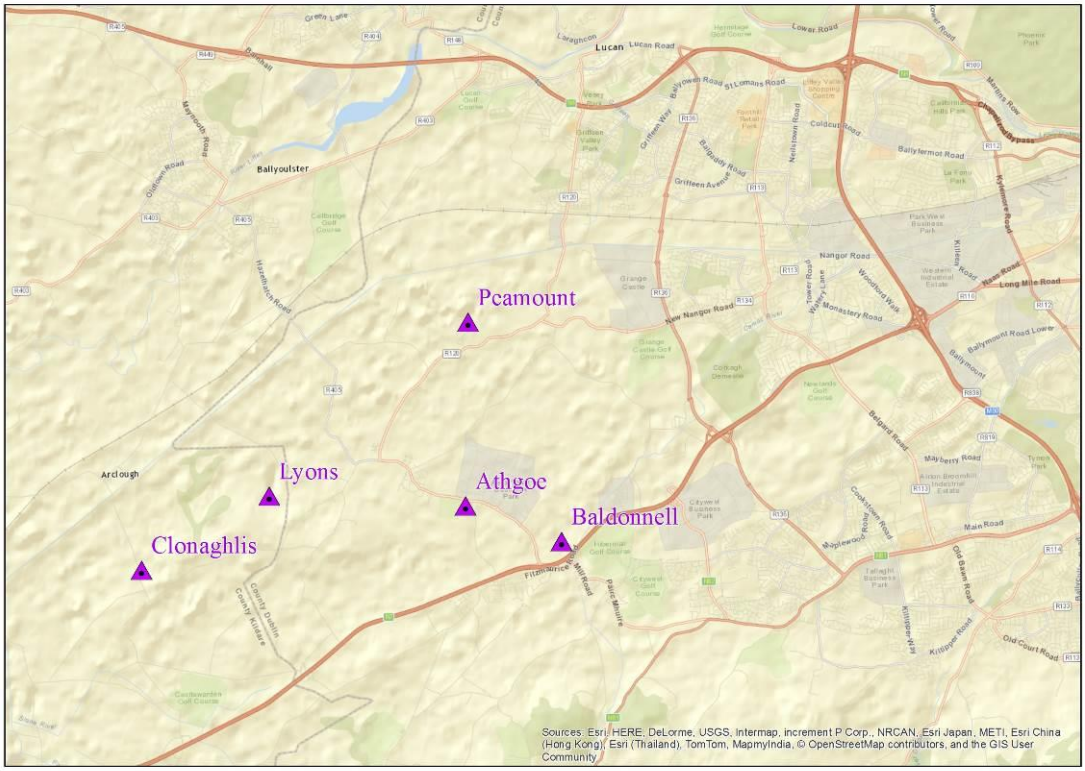


Figure F13-1 Potential Terminal Point Locations

2.1.2 EIA Review

Whilst identification of termination point locations included an assessment of treated water pipelines from the supply source, and between the TPR and the existing facilities at Peamount / Saggart, it was necessary to establish the merits and validity of the potential TPR sites. Pipeline routing and hydraulic profile were important considerations in the earlier “Integration Study Report”. In particular, the elevation of the terminal point location was a key factor; ultimately optimisation being a balance between hydraulic engineering and whole life cycle costs.

The earlier “Integration Study” assumed a source supply directed through Garryhinch, County Offaly. However, a source has yet to be finalised and a particular supply route has yet to be fully established. In addition, the basis for integrating a new source supply within the existing Eastern Region has changed over the intervening period. Originally, it was expected that the capacity of the TPR would be of the order of 42 ML (recognising the role of raw water storage at Garryhinch) but the current projected requirements are 205 ML. This followed a detailed strategic review of storage and distribution in the Eastern Region, asset

interconnectivity and demand projections. Consequently, the dynamic balance between hydraulic engineering and whole life cycle costs is suggesting that it would be preferable for the TPR to be in a lower elevation range of 70 – 80m OD.

In terms of the five (5) identified sites this has a significant impact on their suitability; and indeed four (4) of the sites, which were determined with reference to the key constraint of an elevation in the range of 100 – 110m OD, do not meet the current criteria of an elevation in the range of 70 – 80m OD.

Consequently, the study area, presented in Figure F13 – 2, is limited to the environs of the remaining identified location i.e. Peamount.

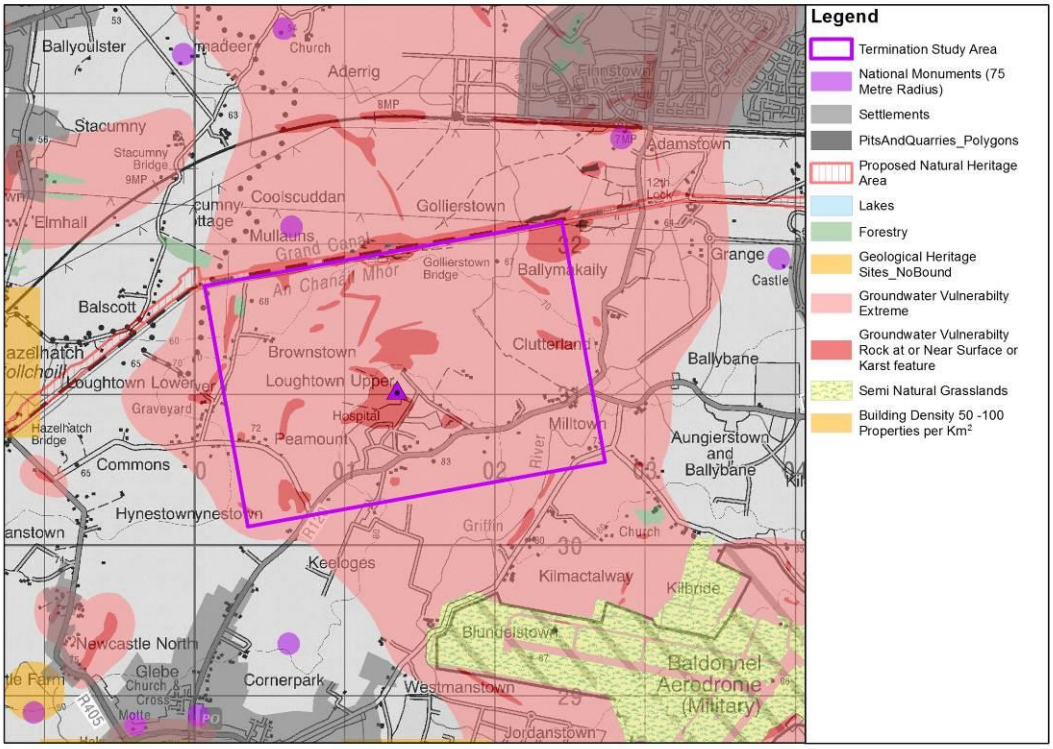


Figure F13-2 Peamount Location

2.1.3 Conclusion

A ‘high level’ screening exercise was undertaken of the five locations identified in the “Integration Study Report”, namely:

- Baldonnel;
- Athgoe;
- Lyons;
- Clonaghlis; and
- Peamount.

Due to a review of the site selection criteria (necessitated by current project requirements) four locations were excluded from any further consideration, primarily on the basis that they no longer met the key constraint of an elevation in the range of 70 – 80m OD. These were:

- Baldonnel;
- Athgoe;

- Lyons; and
- Clonaghlis.

Consequently, the one remaining location is to be taken forward for MCA to identify a specific site that would be suitable for construction of the TPR.

An assessment of the engineering suitability of the termination point location was undertaken which confirmed Peamount as technically viable.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F13-3.

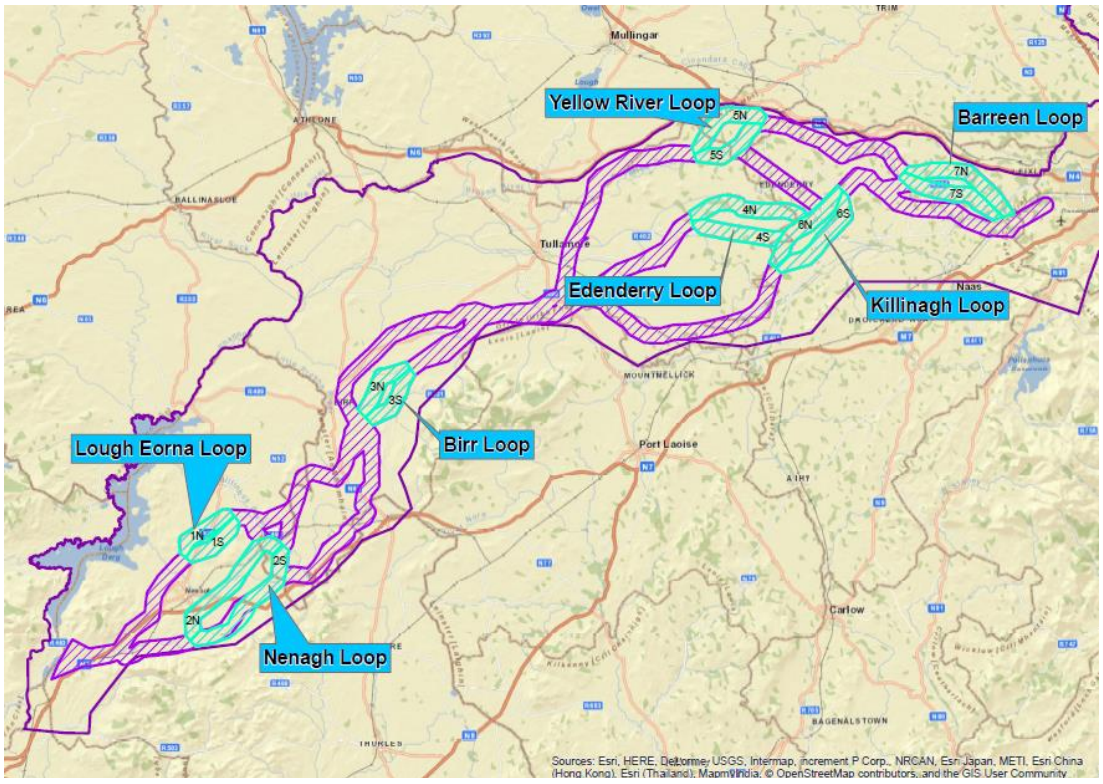


Figure F13-3 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

The engineering assessment considered primarily the following aspects.

Obstructions

Any proposed engineering solution will be directly influenced by the number of physical obstructions to be crossed by the pipeline, e.g. roads, rivers, railways, etc.

The ‘Preliminary Route Corridors’ will, to varying degrees, have multiple crossings of major obstructions (e.g. national, primary & secondary roads, major rivers and railways) and minor crossings (e.g. local and regional roads, minor rivers and streams). The engineering intent is to limit the number of crossings to a minimum.

Note: For the purposes of this assessment, and unless noted otherwise, no more than one crossing has been assumed for each obstruction encountered.

Ground Conditions

The design and specification of bedding and surround details for a particular pipeline, and the requirement for associated support structures, will be a function of local ground conditions. It is not possible at this stage to assess the potential impact of the bedrock on the route selection due to the lack of available data on depth to bedrock and strength characteristics, both of which will be key components in assessing the impact on project programme and cost.

However, a desktop assessment was carried out on that data which was available from the Geological Survey of Ireland (GSI) which included the following:

- *Karst*

  Karst is the name given to a landscape characterised by remarkable surface and underground forms, created by the action of the water on the permeable limestones. Surface and underground features occur where fissures and fractures have been widened by dissolution to allow the passage of groundwater. As groundwater flows through fissures and fractures, the rock is dissolved to form caves and caverns of varying sizes.

  Karst features can provide particular problems for construction projects due to the uncertainty arising from the unpredictability of the extent and depth of underground cavities which can result in inadequate foundation support and can also incur significant costs to complete remediation works.

  The objective of this desktop study is to avoid areas where karst features have been mapped.

- *Subsoils*

  Subsoils are essentially unconsolidated material overlying bedrock. For the purposes of this desktop study, the objective is to exclude areas where poor

ground (e.g. peat, lake deposits and soils containing alluvial or fluvioglacial deposits) is mapped.

These soil types introduce additional constructability issues e.g. establishing a firm foundation and can require extensive ground improvement measures (both temporary and permanent) to ensure a robust design. From experience, these soils often require large scale dewatering works during the construction phase. The use of expensive ground stabilisation options such as mechanically stabilized geogrids and piling may be necessary.

Accessibility

Sufficient access will be required along the routes to allow the Contractor to undertake the works in a timely manner. The works will involve the use of large plant, equipment and materials. The national and regional road networks will be relied upon to facilitate access. Where the existing road network is insufficient to facilitate construction activity, or where the local authorities have load/width restrictions in place, alternative access routes may be required. This will involve one or all of the following works:

- Upgrading the existing road network subject to agreement with the local authorities (note: this may include upgrade works to proposed diversionary routes as well); and
- Building temporary access roads along the routes to facilitate access.

The objective was to identify a route which had the least potential for upgrade works to existing road infrastruture, limited temporary access roads, or both.

Idealistic Elevation

Initial consideration of elevations along the “Preliminary Route Corridors” has identified the potential to utilise gravitational flow from a highpoint in the Midlands area through to the termination point in Peamount. Pipeline elevations are preferred which maximise the potential to convey water by gravitation. This minimum high point has been determined to be 130 m ordnance datum (OD).

The objective was to identify a favourable elevation profile subject to the project constraints.

Flooding

The assessment accounts for the potential impacts from flooding as defined by the Preliminary Flood Risk Assessment (PFRA) carried out by the Office of Public Works (OPW).

The objective was to identify a corridor which has the least potential to expose infrastructural elements to fluvial and/or pluvial flooding based on the PFRA, and predicted flood extents within and adjacent to the site.

4 Pipeline Sub - Options or "Loops"

4.1 The Lough Eorna 'Loop'

4.1.1 Overview of Lough Eorna 'Loop' Options

The loops originate near Ballycommon in County Offaly, cross the N52 near Ardcrony before re-joining to the south of Borrisokane; see Figure F13-4.

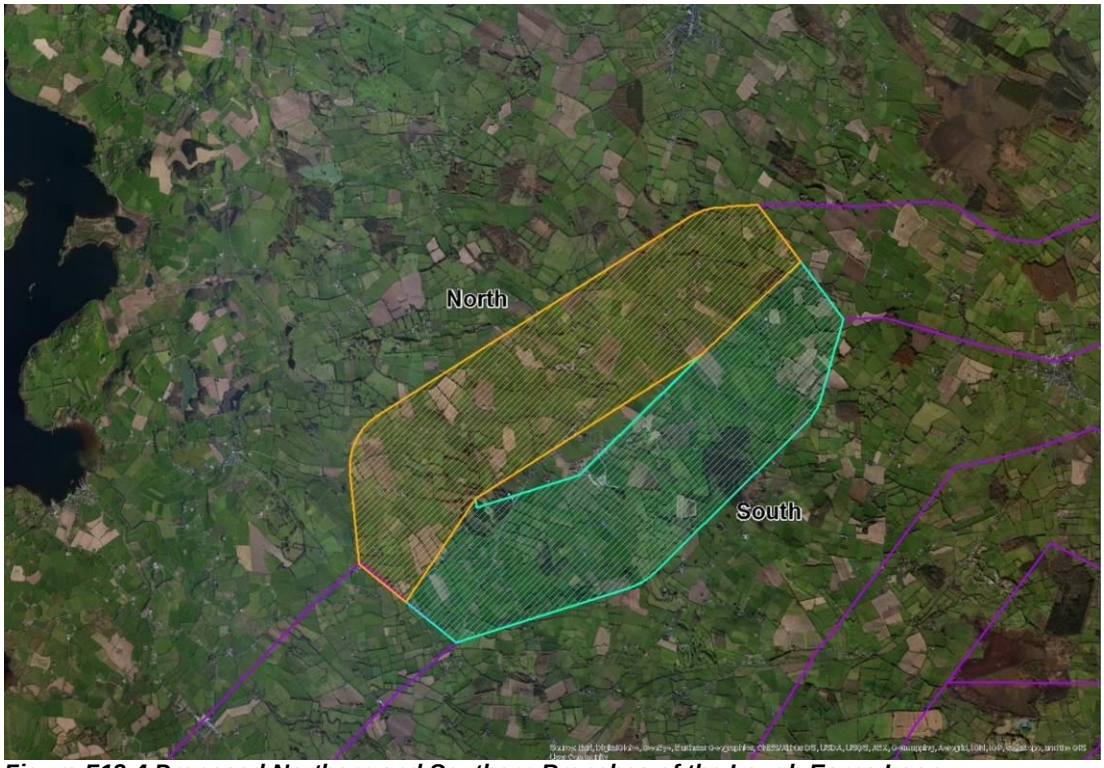


Figure F13-4 Proposed Northern and Southern Branches of the Lough Eorna Loop

4.1.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13 – 2.

Table F13-2 Obstructions (Crossings – Lough Eorna 'Loops')

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	1 (N52)	1 (N52)
Regional Roads	-	-
Local Roads	9	4
Major Rivers* (Stream Order)	-	-
Minor Rivers/Streams*	2	3
Railways	-	-
Total (Major Crossings**)	1	1
Total (Minor Crossings)	11	7

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Southern Loop has the least number of minor crossings. All routes have the same number of major crossings.

4.1.3 Ground Conditions

4.1.3.1 Karst

A number of karst features have been noted along the route of the Northern Loop to the east of Ardcrony. No features were noted along the route of the Southern Loop; see Figure F13 – 5.

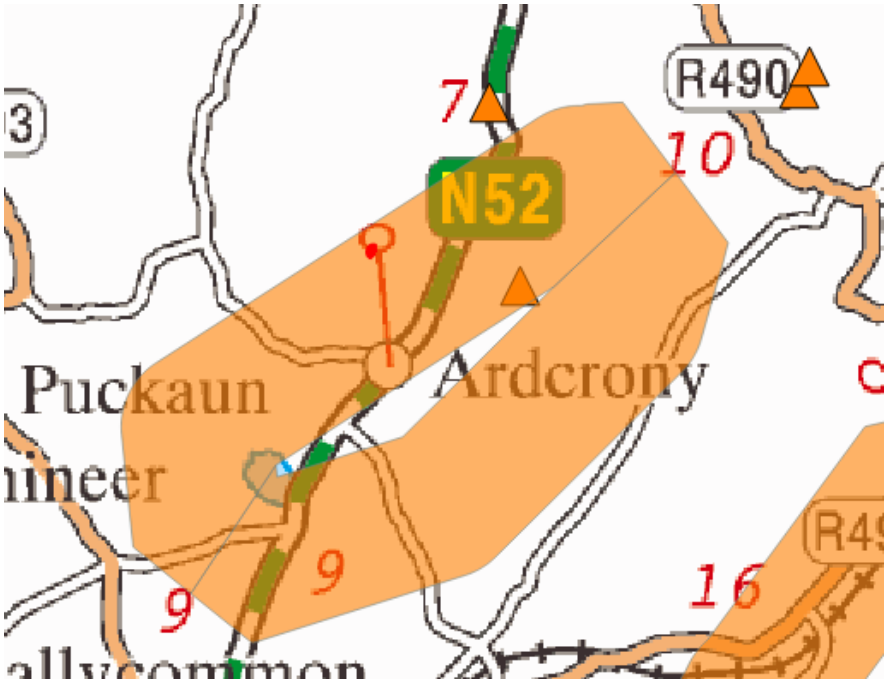


Figure F13-5 Karst Features (Lough Eorna Loop)

4.1.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 6. The soil present along all routes is primarily Limestone till ("light blue" colour in Figure F13-6). Significant areas of peat ("pink" colour in Figure F13-6) will be encountered along the Southern Loop to the east of Ardcrony.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13 – 3 below:

Table F13-3 Breakdown of Subsoils Encountered (Lough Eorna 'Loops')

Subsoil Type	Colour[1]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	84.3	73.8
Cutover Peat	Pink	4.9	12.2
Glaciofluvial sands and gravels	Purple	2.4	2.5
Alluvium	Yellow	1.2	2.5
Esker Sands and Gravels	Blue	2.6	1.7
Lake sediments	Green	3.6	3.6
Other Soil Types	-	1.0	3.7
Total		100	100

[1] Refer to Figure F13 – 6.

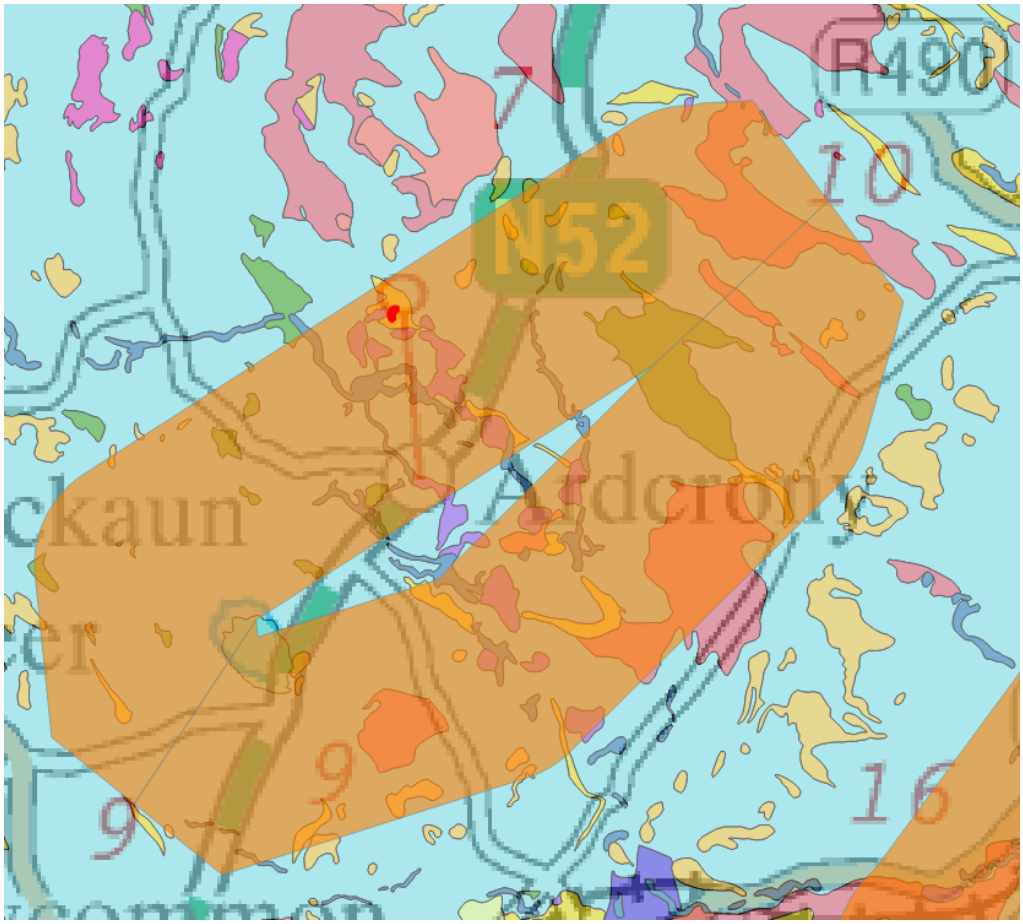


Figure F13-6 Subsoils Map (Lough Eorna Loop)

4.1.4 Accessibility

Transport of materials can be facilitated primarily via secondary national roads along the routes, with some use of local and regional roads (see Figure F13 – 5).

The Northern Loop can be accessed via the N52. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the N52. Some supplementary upgrade works may be required to utilise local roads in the area.

The Northern Loop has the best potential for access from the N52 along its route, while the Southern Loop has a higher potential to require supplementary upgrade works to utilise local roads.

4.1.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13 – 7 and F13 – 8. Neither profile will adversely affect the hydraulic performance of the pumping system during the operation stage.

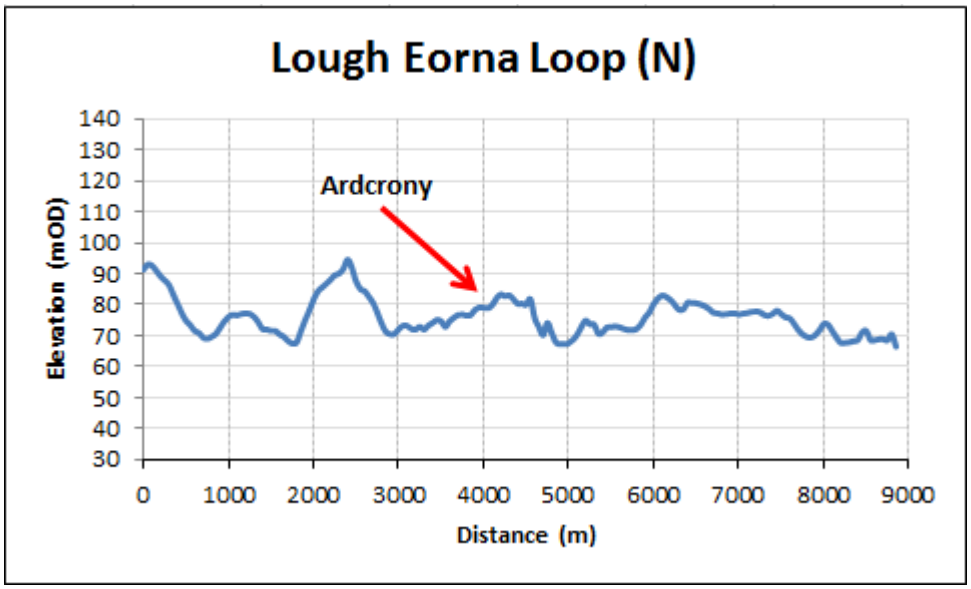


Figure F13-7 Lough Eorna Northern Loop Elevation Profile

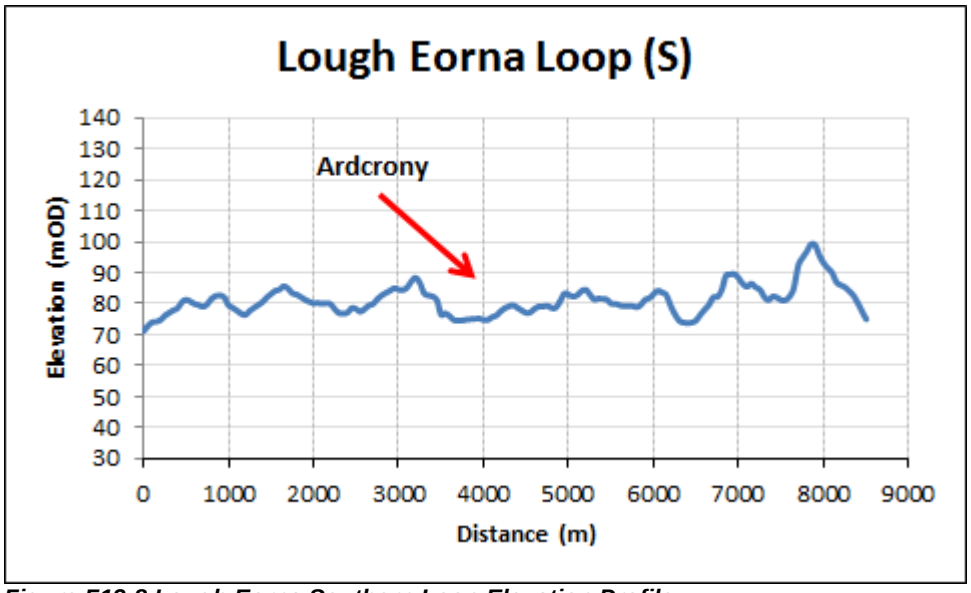


Figure F13-8 Lough Eorna Southern Loop Elevation Profile

4.1.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-4.

Table F13-4 Breakdown of Flood Types (Lough Eorna 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	5	8

The Northern Loop has the most potential to avoid predicted flood zones.

4.1.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Northern Loop** of Lough Eorna is the least constrained on the basis of the following:

1. It has the least potential for encountering poor ground conditions;
2. It has favourable access from secondary roads along its route; and
3. It has the most potential for avoiding flood zones.

A number of karst features have been mapped along this loop; however through appropriate design measures these can be avoided.

4.2 The Nenagh 'Loop'

4.2.1 Overview of Nenagh 'Loop' Options

The loops originate near the village of Dolla in Tipperary before crossing the M7/N7 to the east of Nenagh before re-joining near Cloghjordan; see Figure F13-9.

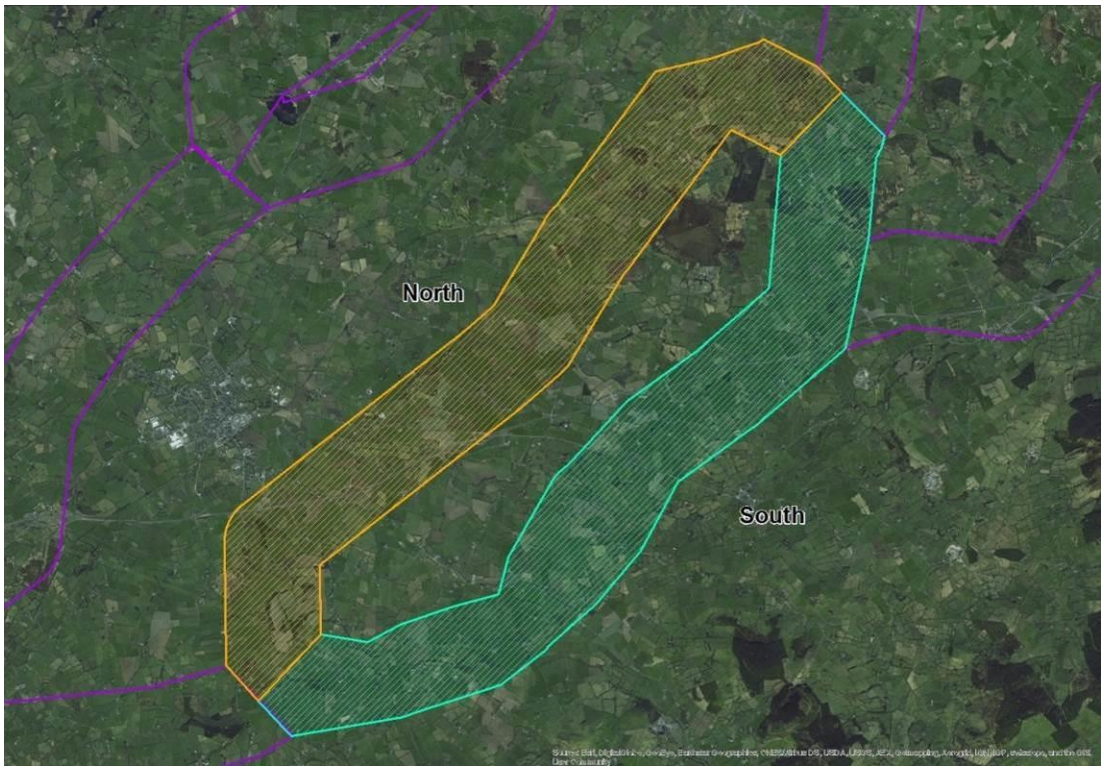


Figure F13-9 Proposed Northern and Southern Loops of the Nenagh Loop

4.2.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-5.

Table F13-5 Obstructions (Crossings – Nenagh Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	2 (M7,N7)	2 (M7,N7)
National Secondary Roads	-	-
Regional Roads	2 (R498, R494)	2 (R498, R499)
Local Roads	8	10
Major Rivers* (Stream Order)	2 (Nenagh[4], Ollatrim[4])	2 (Nenagh[4], Ollatrim[4])
Minor Rivers/Streams*	8	7
Railways	-	-
Total (Major Crossings**)	4	4
Total (Minor Crossings)	18	19

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

It is noted that a railway is located within the Northern Loop. Given the broad corridor the route crosses the rail line at two locations; however, in practice, the pipe configuration will endeavour to mitigate the number of major crossings.

The Northern Loop has the least number of minor crossings. All routes have the same number of major crossings.

4.2.3 Ground Conditions

4.2.3.1 Karst

No features were noted along any of the routes; see Figure F13-10.

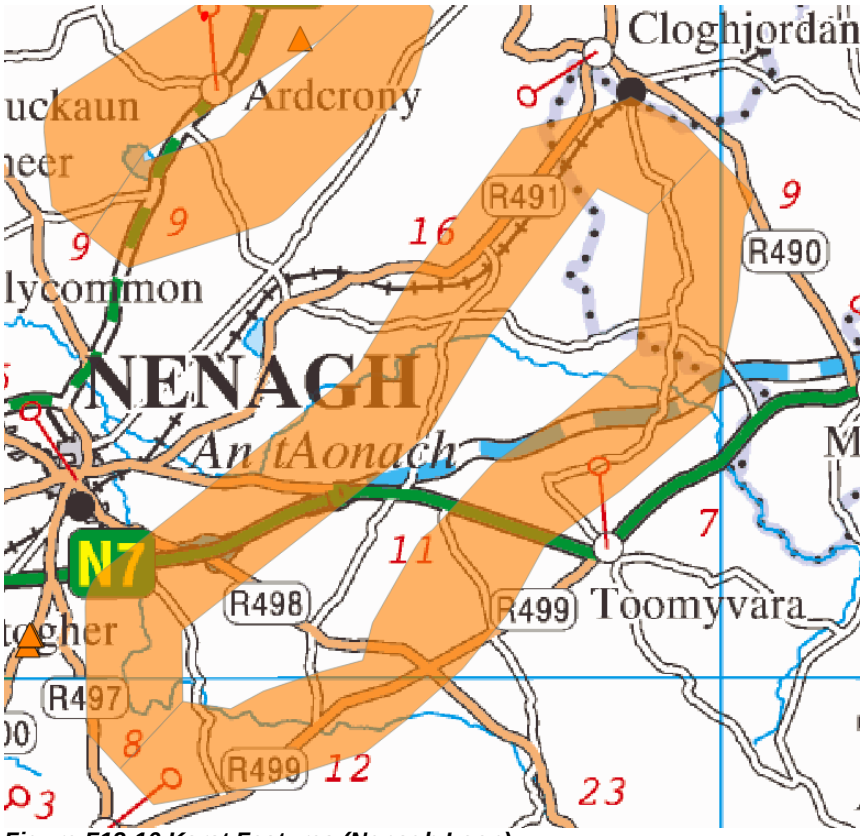


Figure F13-10 Karst Features (Nenagh Loop)

4.2.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 11. The soil present along all routes is primarily Limestone till (“light blue” colour in F13-11). Both corridors will encounter similar ground conditions, with slightly higher quantities of peat (“pink” colour) and alluvium (“yellow” colour in F13-11) encountered along the Northern Loop.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13 – 6 below:

Table F13-6 Breakdown of Subsoils Encountered (Nenagh Loop)

Subsoil Type	Colour[2]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	72.0	66.1
Cutover Peat	Pink	12.9	9.9
Glaciofluvial sands and gravels	Purple	4.7	4.6
Alluvium	Yellow	8.7	7.8
Sandstone till (Devonian)	Red	-	10.6
Other Soil Types	-	1.7	1.0
Total		100	100

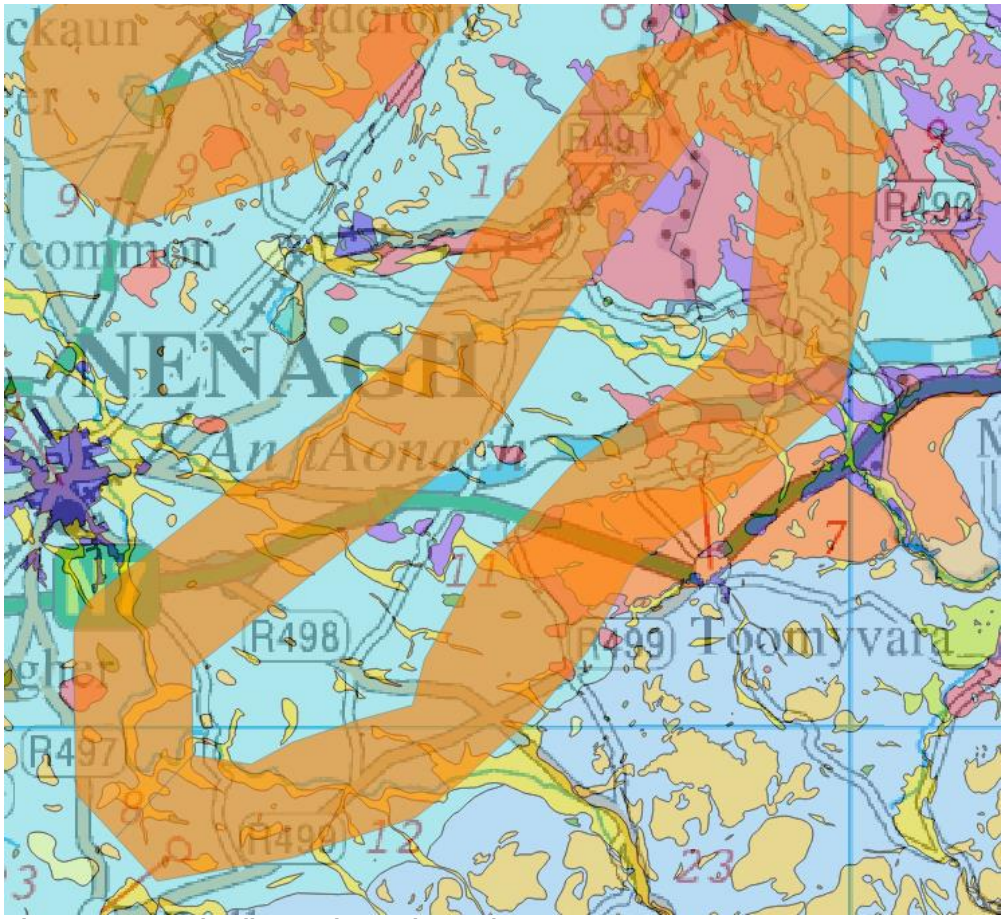


Figure F13-11 Subsoils Map (Nenagh Loop)

4.2.4 Accessibility

Transport of materials can be facilitated primarily via a combination of primary and secondary national roads along the majority of the routes, with some use of local and regional roads (refer to Figure F13 – 9).

The Northern Loop can be accessed via the M7/N7, R494 and R491. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the M7/N7, R498, R494, R499 and R490. Some supplementary upgrade works may be required to utilise local roads in the area.

[2] Refer to Figure F13-9.

The Southern Loop has the most potential for access from the national primary and secondary road networks along its route.

4.2.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-12 and F13-13.

The Northern Loop has a preferable profile for a more efficient hydraulic performance. A 40m change in elevation occurs between 9 and 11km on the Southern Loop.

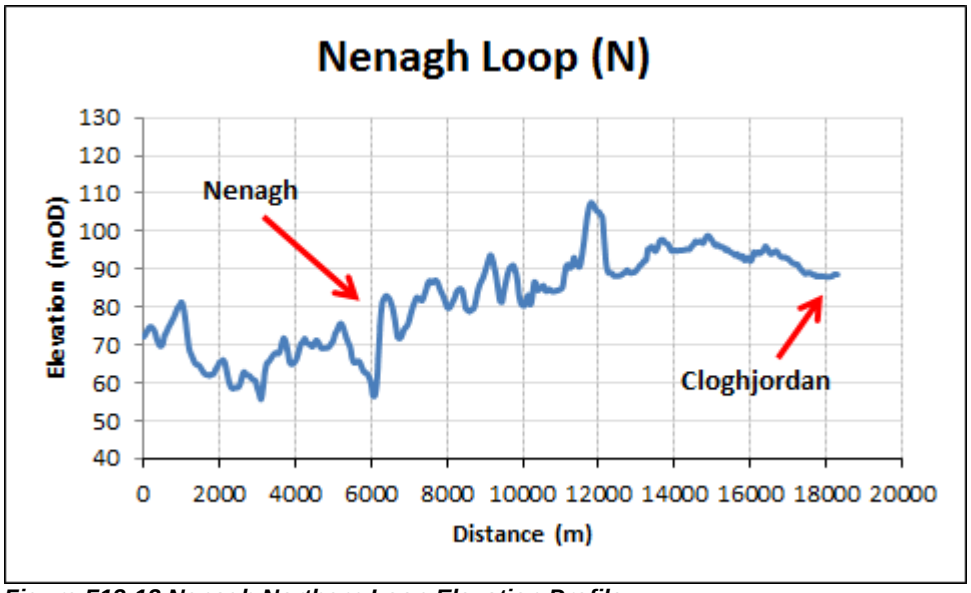


Figure F13-12 Nenagh Northern Loop Elevation Profile

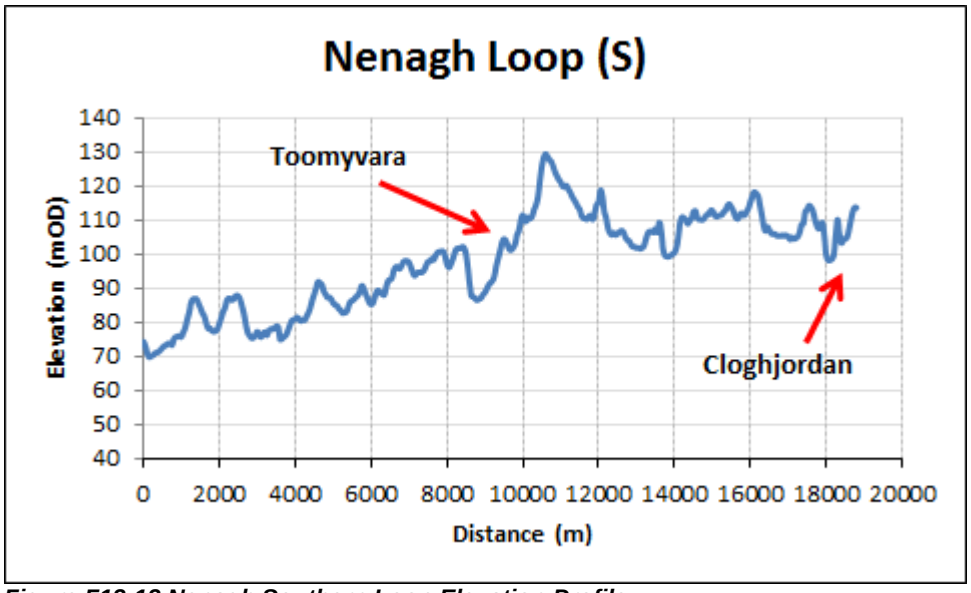


Figure F13-13 Nenagh Southern Loop Elevation Profile

4.2.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-7.

Table F13-7 Breakdown of Flood Types (Nenagh 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	11	7

The Southern Loop has the most potential to avoid predicted flood zones.

4.2.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Northern Loop** of Nenagh is the least constrained on the basis of the following:

1. The corridor has an acceptable elevation profile.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

4.3 The Birr 'Loop'

4.3.1 Overview of Birr 'Loop' Options

The loops originate to the west of Clareen village before crossing the R440 to the east of Birr; see Figure F13-14.

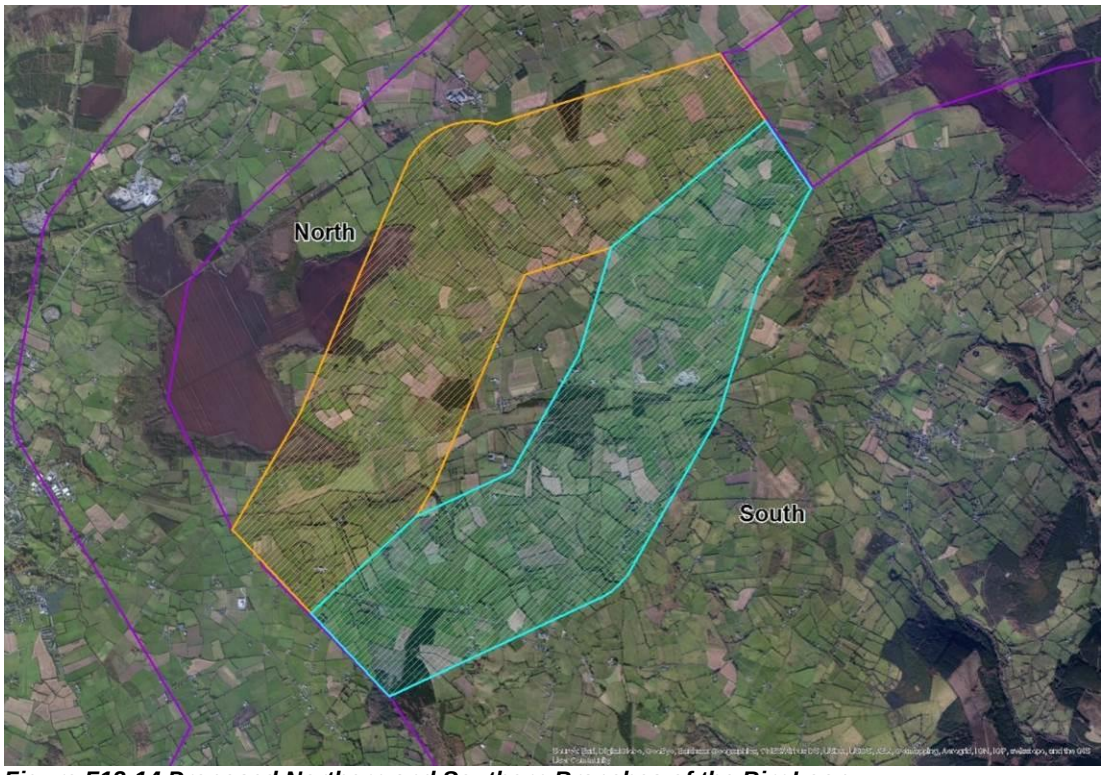


Figure F13-14 Proposed Northern and Southern Branches of the Birr Loop

4.3.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-8.

Table F13-8 Obstructions (Crossings – Birr Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	1 (R440)	1 (R440)
Local Roads	7	4
Major Rivers* (Stream Order)	1 (Camcor[4])	-
Minor Rivers/Streams*	2	6
Railways	-	-
Total (Major Crossings**)	1	-
Total (Minor Crossings)	10	11

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Southern Loop has the least number of major crossings, while the Northern Loop has the least number of minor crossings.

4.3.3 Ground Conditions

4.3.3.1 Karst

No features were noted along any of the routes; see Figure F13-15.

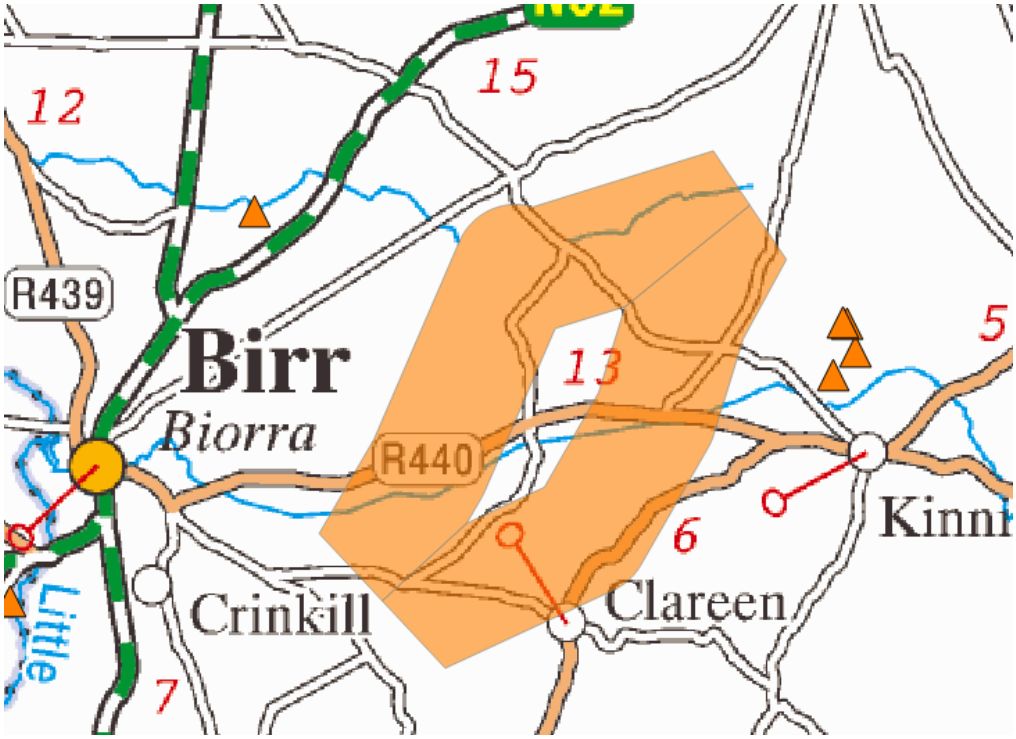


Figure F13-15 Karst Features (Birr Loop)

4.3.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 16. The soil present along all routes is primarily Limestone till ("light blue" colour in Figure F13-16). More significant quantities of peat ("pink" colour in Figure F13-16) will be encountered along the Northern Loop, while more significant quantities of glaciofluvial ("purple" colour in Figure 13-16) and alluvium ("yellow" colour in Figure 13-16) will be encountered along the Southern Loop.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-9 below:

Table F13-9 Breakdown of Subsoils Encountered (Birr Loop)

Subsoil Type	Colour[3]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	73.3	63.3
Cutover Peat	Pink	15.9	8.8
Glaciofluvial sands and gravels	Purple	1.9	9.9
Alluvium	Yellow	8.1	14.3
Other Soil Types	-	0.8	3.7
Total		100	100

[3] Refer to Figure 13-16

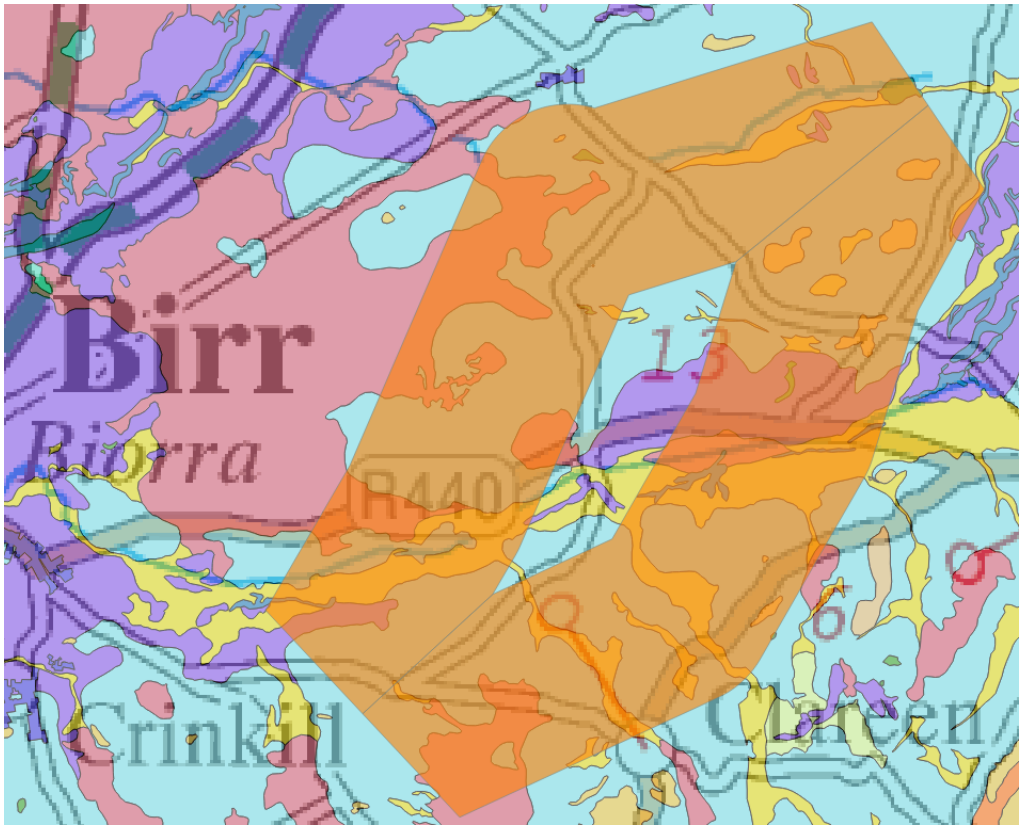


Figure F13-16 Subsoils Map (Birr Loop)

4.3.4 Accessibility

Transport of materials can be facilitated primarily through the use of local and regional roads (refer to Figure F13 – 14).

The Northern Loop can be accessed via the R440. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the R440 and R421. Some supplementary upgrade works may be required to utilise local roads in the area.

Both routes will result in similar challenges with access along the proposed corridor.

4.3.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-17 and F13-18.

The Northern Loop has a preferable profile for a more efficient hydraulic performance. A steep change in elevation occurs at approximately 5km on the Southern Loop.

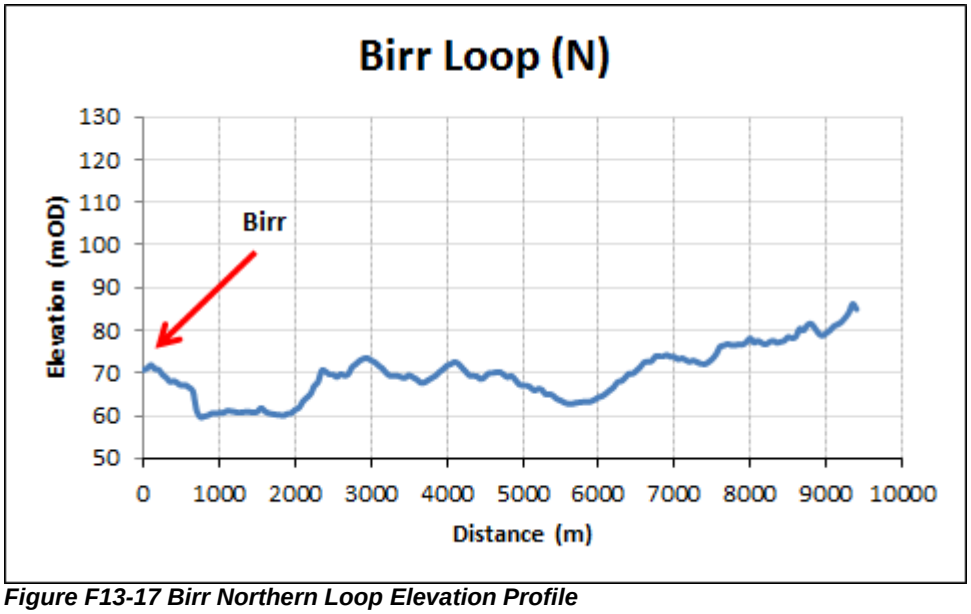


Figure F13-17 Birr Northern Loop Elevation Profile

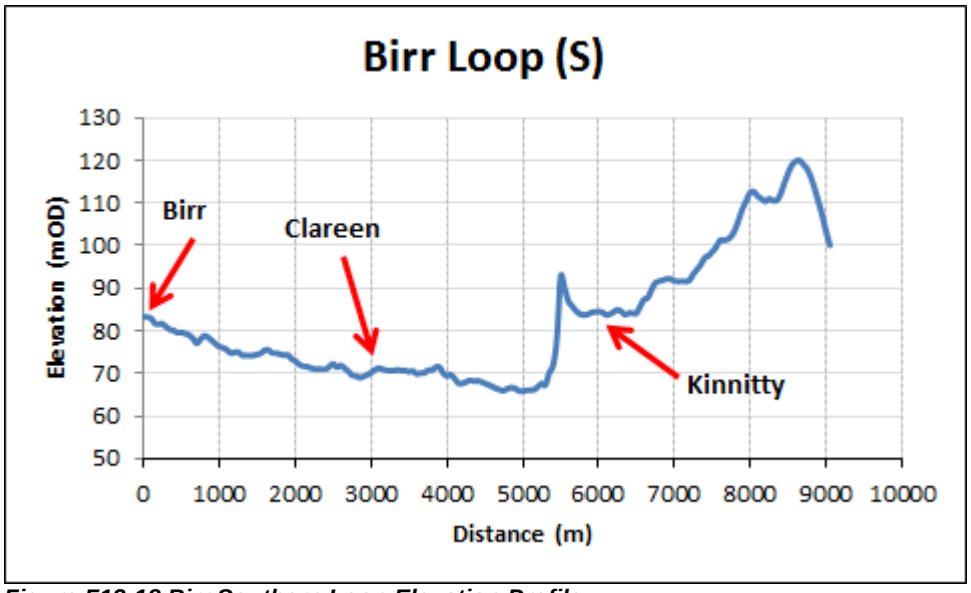


Figure F13-18 Birr Southern Loop Elevation Profile

4.3.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13 – 10.

Table F13-10 Breakdown of Flood Types (Birr 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	8	15

The Northern Loop has the most potential to avoid predicted flood zones.

4.3.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Northern Loop** of Birr is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
1. The corridor has an acceptable elevation profile;
2. Most potential to avoid flood zones.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

4.4 The Edenderry Loop

4.4.1 Overview of Edenderry Loop Options

The loops originate near Ballyhugh in County Offaly and are routed between Edenderry/Grand Canal to the north and the Bog of Allen to the south; see Figure F13-19.

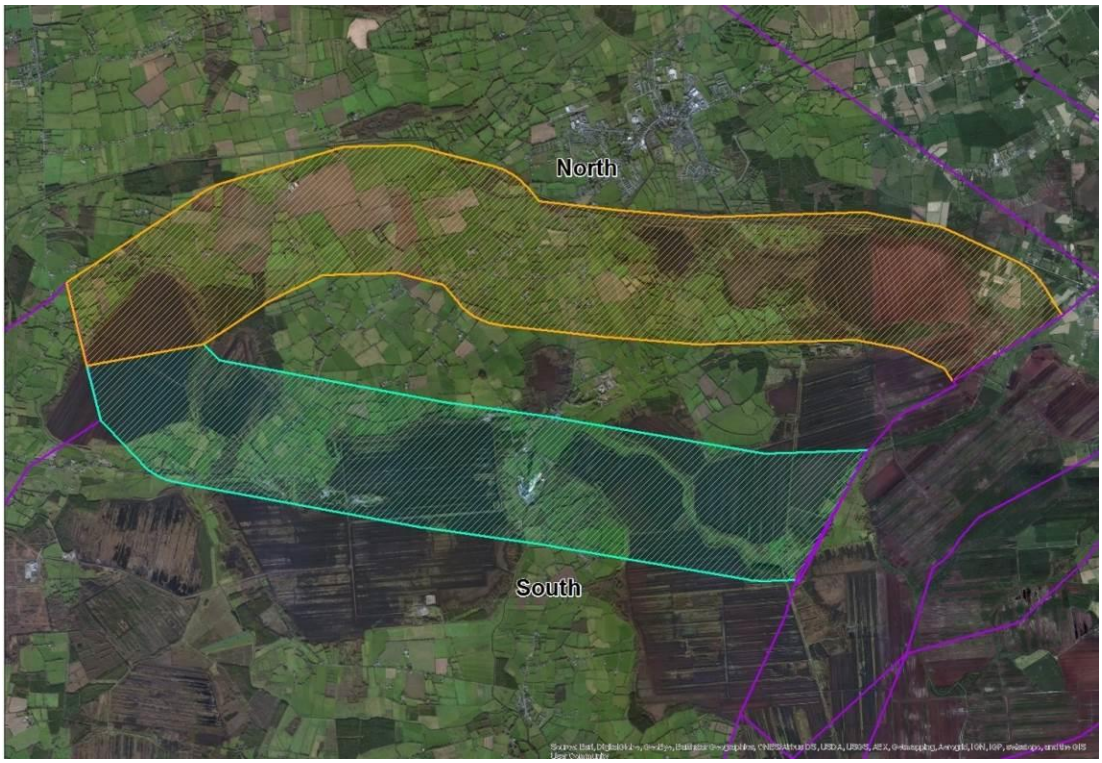


Figure F13-19 Proposed Northern and Southern Branches of the Edenderry Loop

4.4.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-11.

Table F13-11 Obstructions (Crossings – Edenderry Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	2 (R402, R401)	2 (R402, R401)
Local Roads	9	1
Major Rivers* (Stream Order)	-	1 (Figile[4])
Minor Rivers/Streams*	5	1
Railways	-	-
Total (Major Crossings**)	-	1
Total (Minor Crossings)	16	4

* Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Southern Loop has the least number of major and minor crossings.

4.4.3 Ground Conditions

4.4.3.1 Karst

No features were noted along any of the routes; see Figure F13-20.

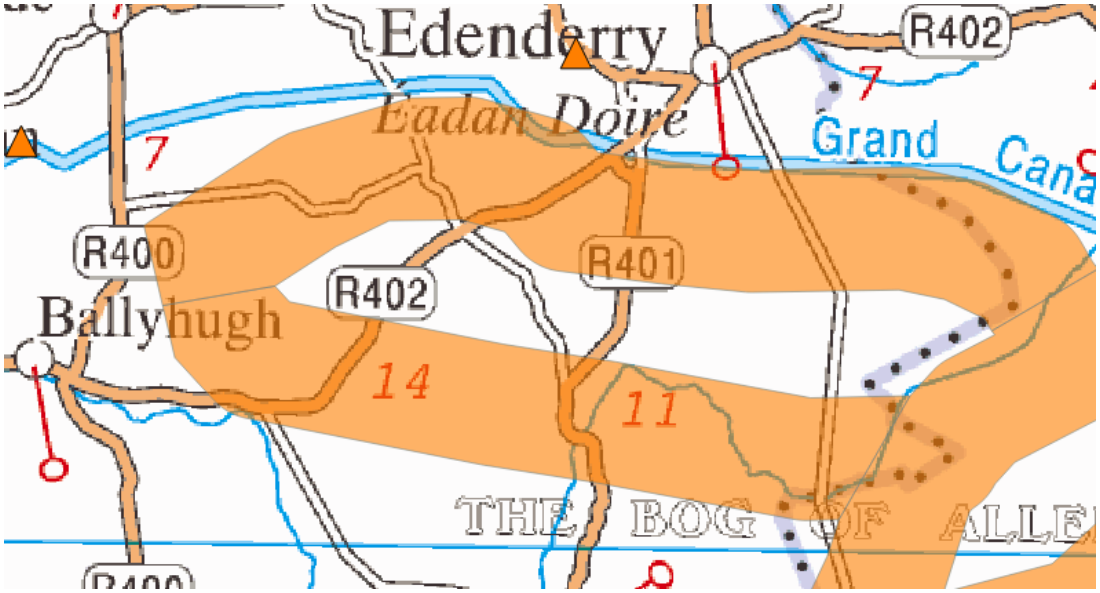


Figure F13-20 Karst Features (Edenderry Loop)

4.4.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 21. The soil present along all routes is primarily Cutover peat ("pink" colour in Figure F13-21) and Limestone till ("light blue" colour in Figure F13-21). More significant quantities of peat ("pink" colour in Figure 13-21) will be encountered along the Southern Loop.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-12 below:

Table F13-12 Breakdown of Subsoils Encountered (Edenderry Loop)

Subsoil Type	Colour[4]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	36.2	9.2
Cutover Peat	Pink	60.9	87.4
Glaciofluvial sands and gravels	Purple	1.0	2.6
Alluvium	Yellow	1.3	0.1
Other Soil Types	-	0.6	0.7
Total		100	100

[4] Refer to Figure F13-21

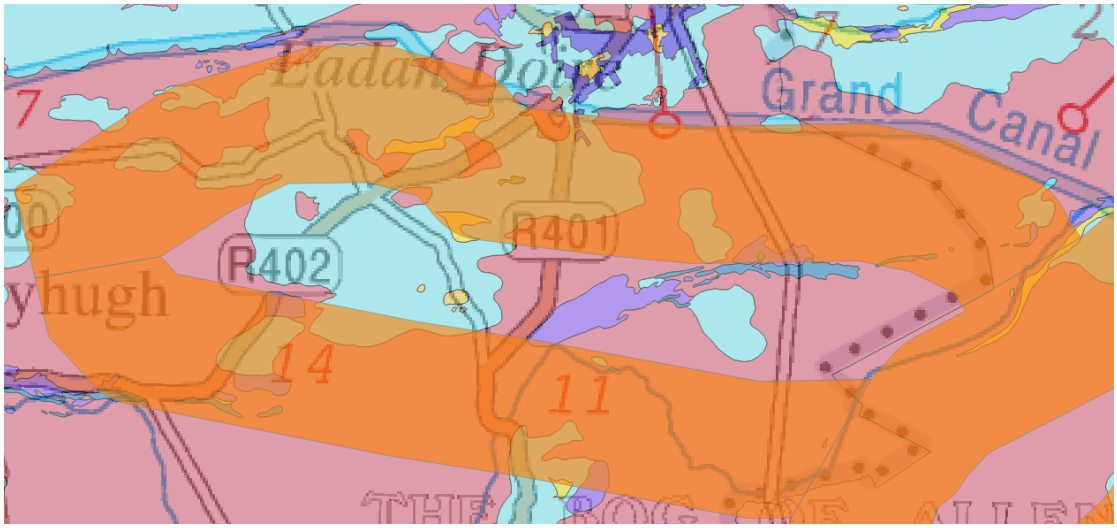


Figure F13-21 Subsoils Map (Edenderry Loop)

4.4.4 Accessibility

Transport of materials can be facilitated primarily through the use of local and regional roads (refer to Figure F13 – 19).

The Northern Loop can be accessed via the R401 and R402. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the R401 and R402. Some supplementary upgrade works may be required to utilise local roads in the area.

Both routes will result in similar challenges with access along the proposed corridor.

4.4.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-22 and F13-23.

The Southern Loop has a preferable profile for a more efficient hydraulic performance. A significant elevation change occurs at approximately 9km on the Northern Loop near Edenderry.

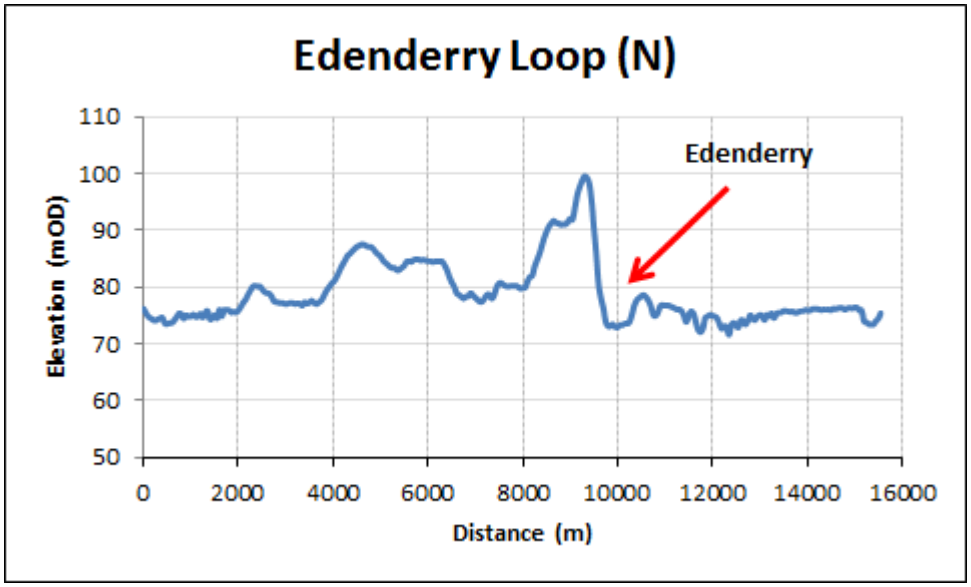


Figure F13-22 Edenderry Northern Loop Elevation Profile

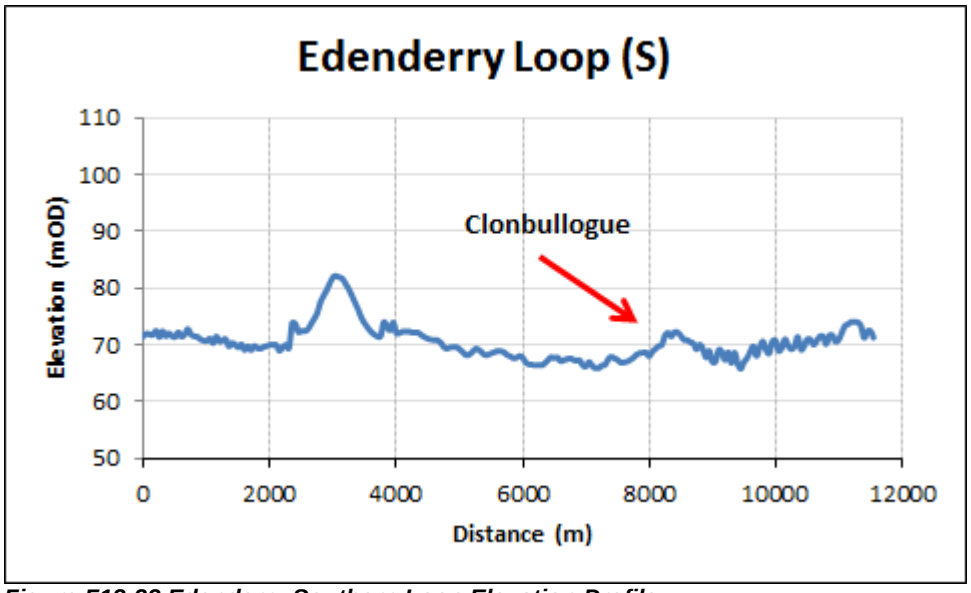


Figure F13-23 Edenderry Southern Loop Elevation Profile

4.4.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-13.

Table F13-13 Breakdown of Flood Types (Edenderry 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	5	7

The Northern Loop has the most potential to avoid predicted flood zones.

4.4.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Northern Loop** of Edenderry is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
2. The corridor has the least number of major obstructions which can impact on construction programme and cost;
3. Most potential to avoid flood zones.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

4.5 The Yellow River 'Loop'

4.5.1 Overview of 'Loop' Options

The loops originate to the south of Castlejordan near the Yellow River and joins up to the north at Kinnegad; see Figure F13-24.

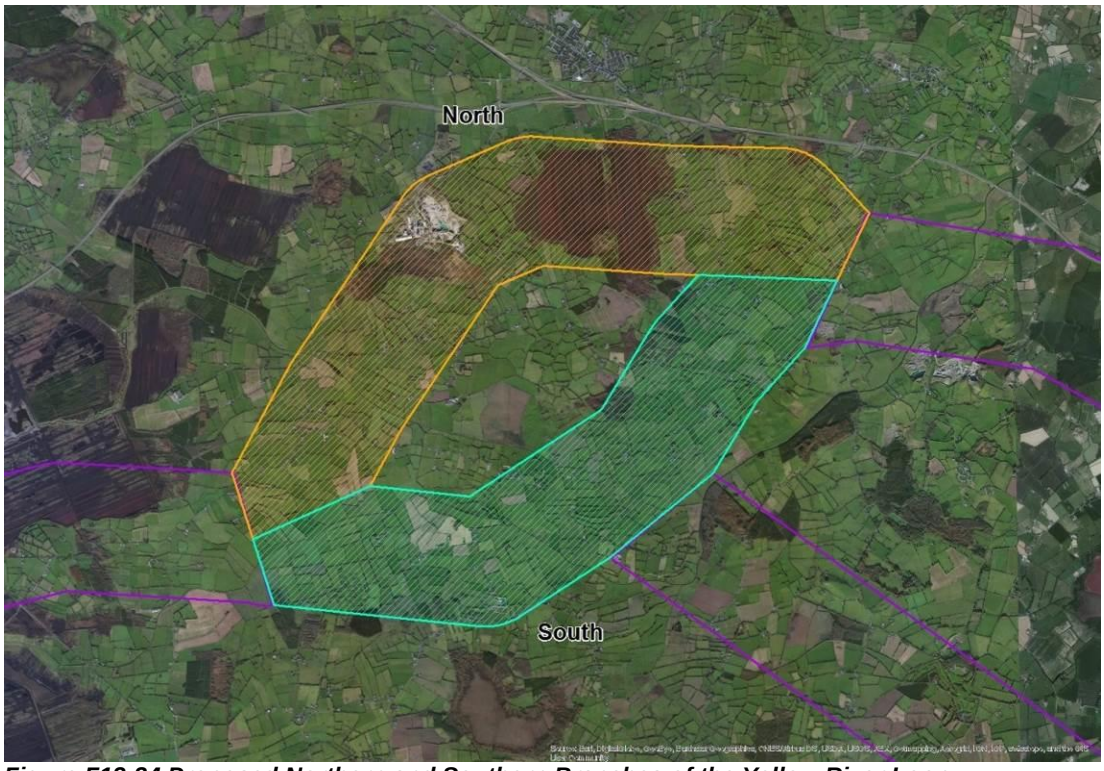


Figure F13-24 Proposed Northern and Southern Branches of the Yellow River Loop

4.5.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-14 below.

Table F13-14 Obstructions (Crossings – Yellow River Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	1 (R401)	1 (R401)
Local Roads	4	5
Major Rivers* (Stream Order)	-	-
Minor Rivers/Streams*	4	7
Railways	-	-
Total (Major Crossings**)	-	-
Total (Minor Crossings)	9	13

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Northern Loop has the least number of minor crossings. All routes have the same number of major crossings.

4.5.3 Ground Conditions

4.5.3.1 Karst

No features were noted along any of the routes; see Figure F13-25.

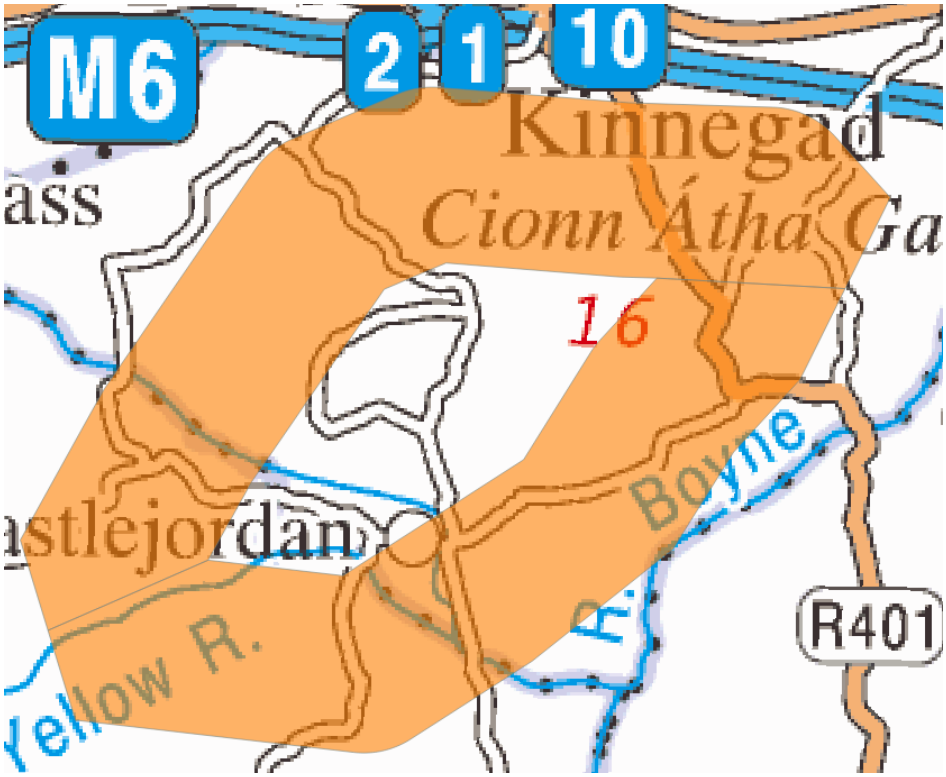


Figure F13-25 Karst Features (Yellow River Loop)

4.5.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 26. The soil present along all routes is primarily Limestone till ("light blue" colour in Figure F13-26), with significant quantities of cutover peat ("pink" colour in Figure F13-26) encountered along the Northern Loop. Higher quantities of glaciofluvial sands and gravels ("purple" colour in Figure F13-26) and alluvium ("yellow" colour in Figure F13-26) will be encountered along the Southern Loop.

It is noted on the Southern Loop that of the 3.3% of "Other Soil Types", Lake sediments comprises 3.0%. The latter contain large quantities of silt with a low shear strength. Removal of this soil type can have major cost and environmental considerations.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-15 below:

Table F13-15 Breakdown of Subsoils Encountered (Yellow River Loop)

Subsoil Type	Colour[5]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	47.6	60.8
Cutover Peat	Pink	42.3	8.0

[5] Refer to Figure F13-26

Glaciofluvial sands and gravels	Purple	5.5	14.0
Alluvium	Yellow	4.3	13.9
Other Soil Types	-	0.3	3.3
Total		100	100

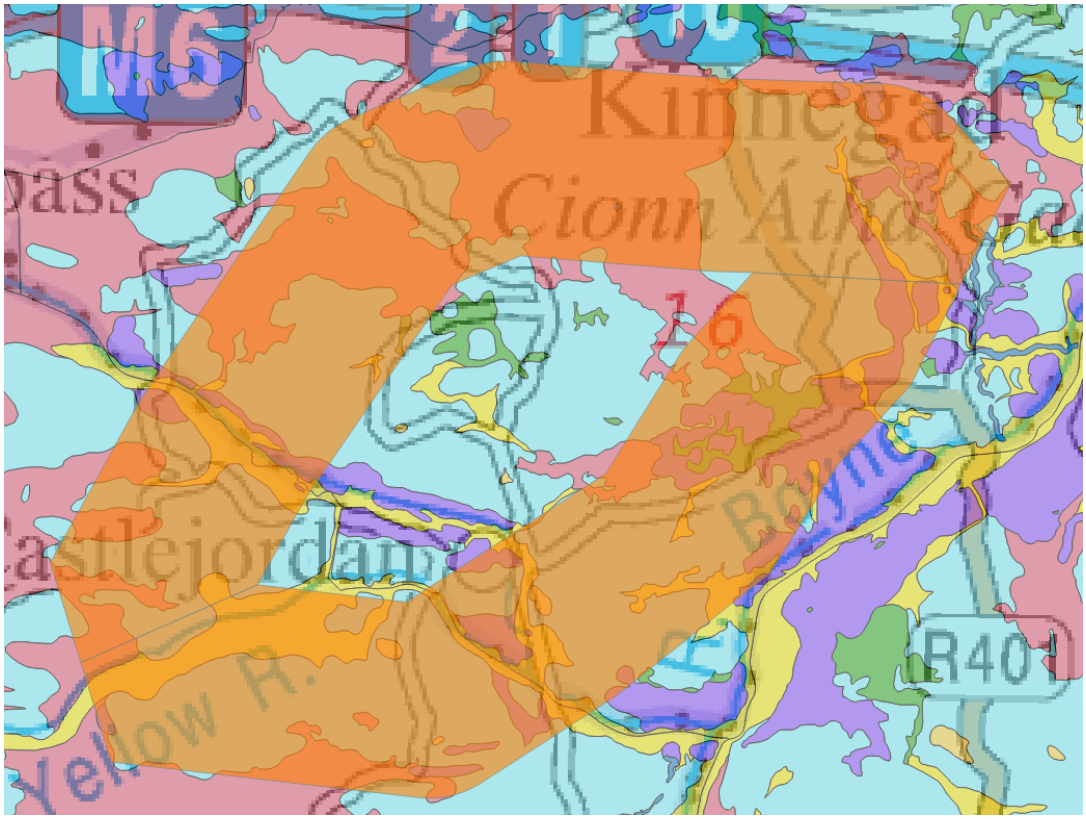


Figure F13-26 Subsoils Map (Yellow River Loop)

4.5.4 Accessibility

Transport of materials can be facilitated primarily through the use of local and regional roads (refer to Figure F13 – 24).

The Northern Loop can be accessed via the R401. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the R401. Some supplementary upgrade works may be required to utilise local roads in the area.

Both routes will result in similar challenges with access along the proposed corridor.

4.5.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-27 and F13-28.

An assessment was completed of the elevation profiles of the branches. The Southern Loop has a less constrained profile as it has an elevation rise between 2 and 4km (approximately 18m) while the Northern Loop has a sharp 23m fall (approximate) at 5km.

The Southern Loop has a preferable profile for a more efficient hydraulic performance.

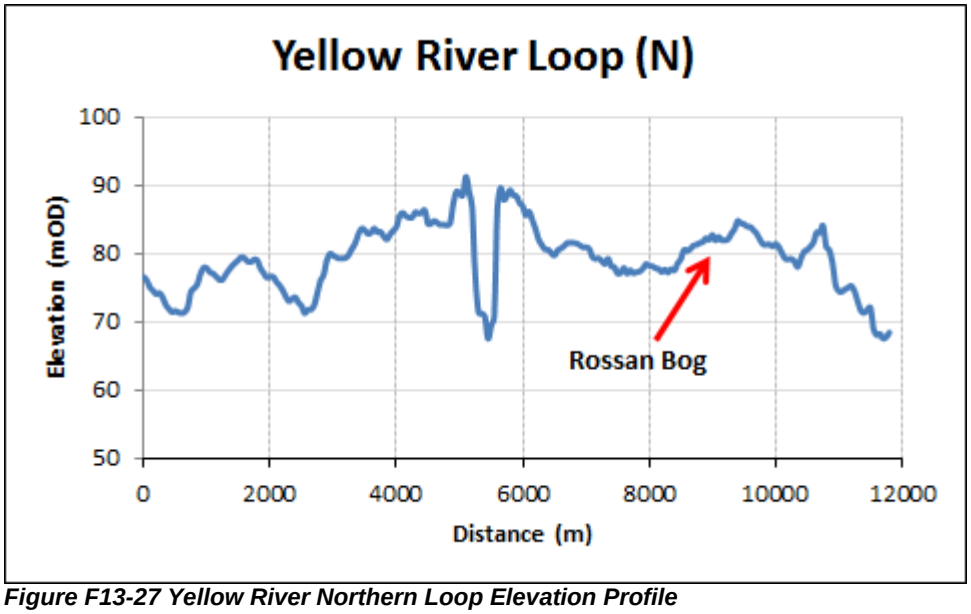


Figure F13-27 Yellow River Northern Loop Elevation Profile

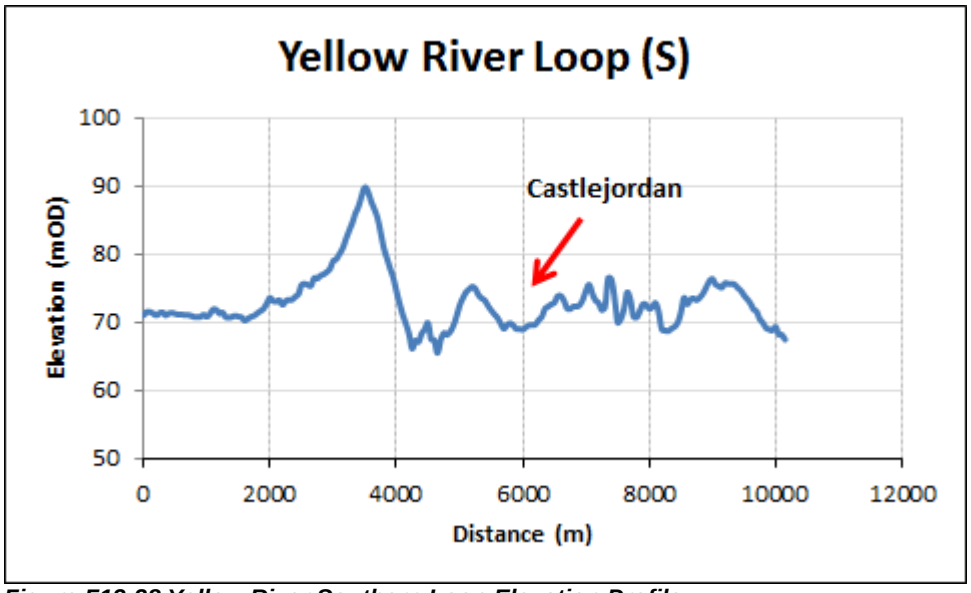


Figure F13-28 Yellow River Southern Loop Elevation Profile

4.5.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-16.

Table F13-16 Breakdown of Flood Types (Yellow River 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	4	6

The Northern Loop has the most potential to avoid predicted flood zones.

4.5.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Southern Loop** of Edenderry is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
2. The corridor has an acceptable elevation profile.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

4.6 The Killinagh Loop

4.6.1 Overview of Killinagh Loop Options

The loops originate near the village of Clonbullogue in County Offaly and cross the Grand Canal before re-joining near Derrinturn in County Kildare; see Figure F13-29.

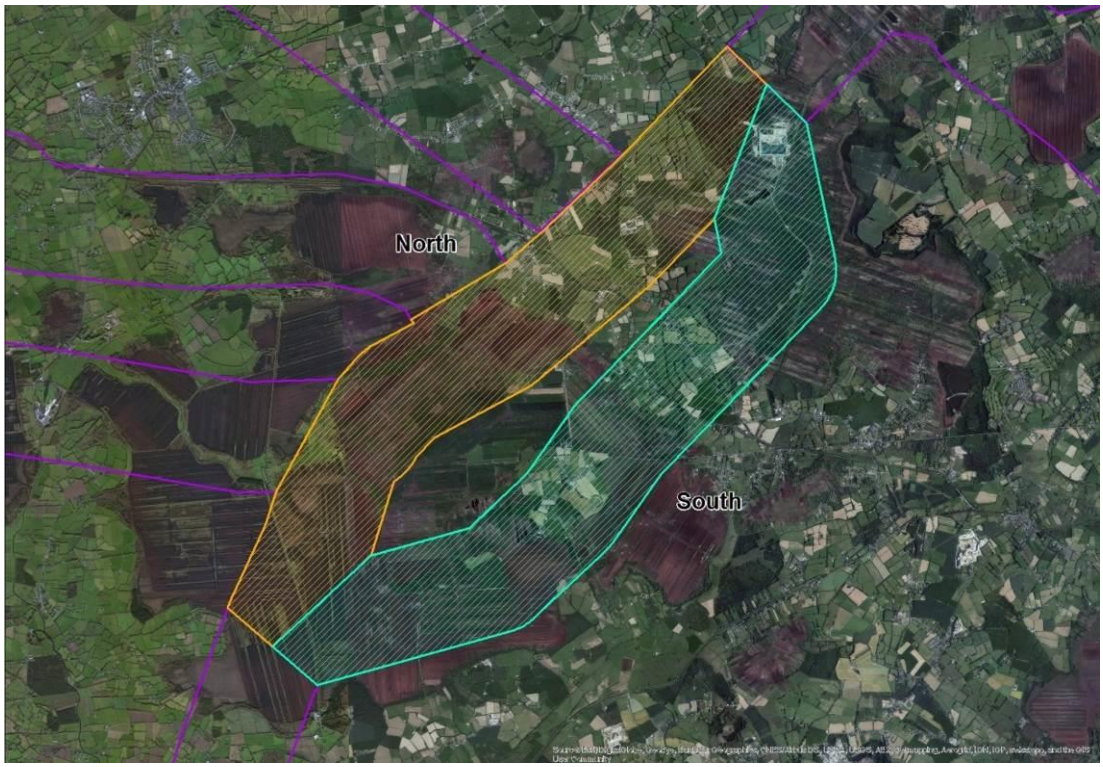


Figure F13-29 Proposed Northern and Southern Branches of the Killinagh Loop

4.6.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-17.

Table F13-17 Obstructions (Crossings – Killinagh Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	1 (R403)	3 (R414x2, R403)
Local Roads	4	4
Major Rivers* (Stream Order)	Grand Canal	Grand Canal
Minor Rivers/Streams*	6	1
Railways	-	-
Total (Major Crossings**)	1	1
Total (Minor Crossings)	11	8

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Southern Loop has the least number of minor crossings. All routes have the same number of major crossings.

4.6.3 Ground Conditions

4.6.3.1 Karst

No features were noted along any of the routes; see Figure F13-30.

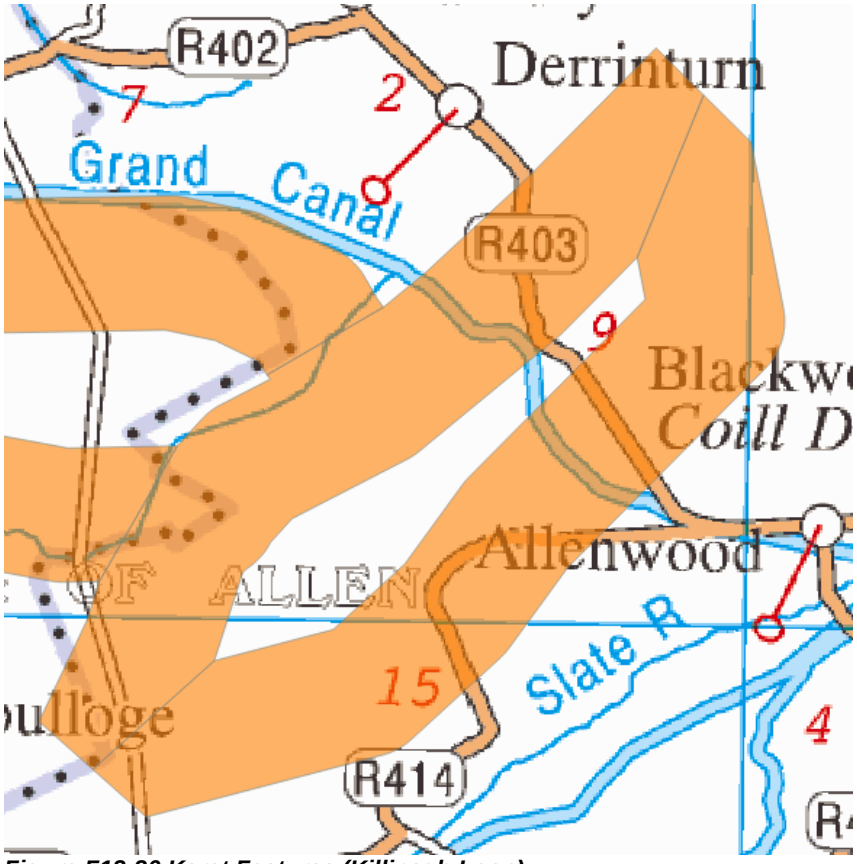


Figure F13-30 Karst Features (Killinagh Loop)

4.6.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 31. The soil present along all routes is primarily Cutover peat ("pink" colour in Figure F13-31) and Limestone till ("light blue" colour in Figure F13-31). More significant quantities of peat will be encountered along the Southern Loop.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-18 below:

Table F13-18 Breakdown of Subsoils Encountered (Killinagh Loop)

Subsoil Type	Colour[6]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	25.8	13.1
Cutover Peat	Pink	71.0	86.8
Glaciofluvial sands and gravels	Purple	0.8	-
Alluvium	Yellow	1.3	-
Other Soil Types	-	1.1	0.1
Total		100	100

[6] Refer to Figure F13-31.

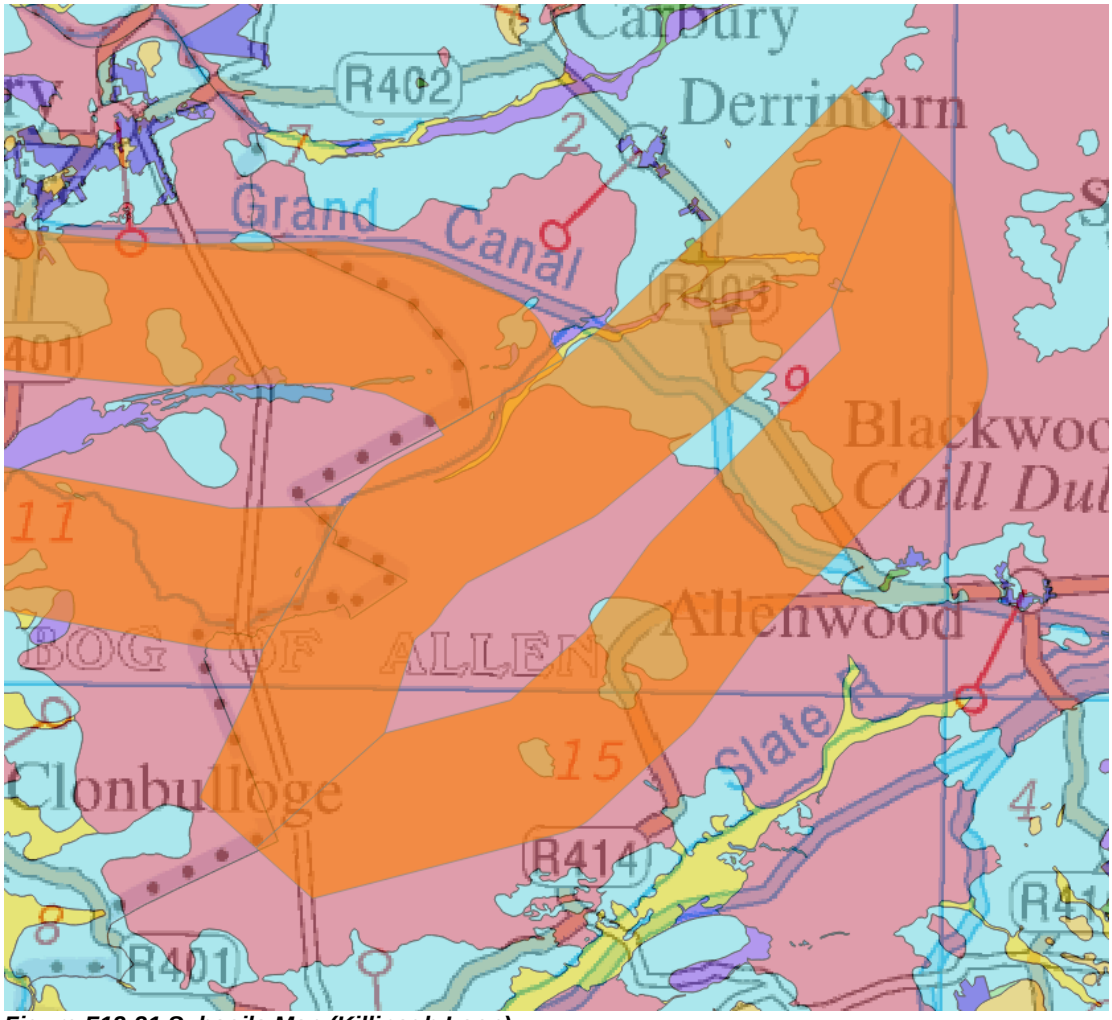


Figure F13-31 Subsoils Map (Killinagh Loop)

4.6.4 Accessibility

Transport of materials can be facilitated primarily through the use of local and regional roads (refer to Figure F13 – 29).

The Northern Loop can be accessed via the R403. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the R403 and R414. Some supplementary upgrade works may be required to utilise local roads in the area.

4.6.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-32 and F13-33.

Both branches have acceptable elevation profiles, with the Northern Loop being slightly less constrained.

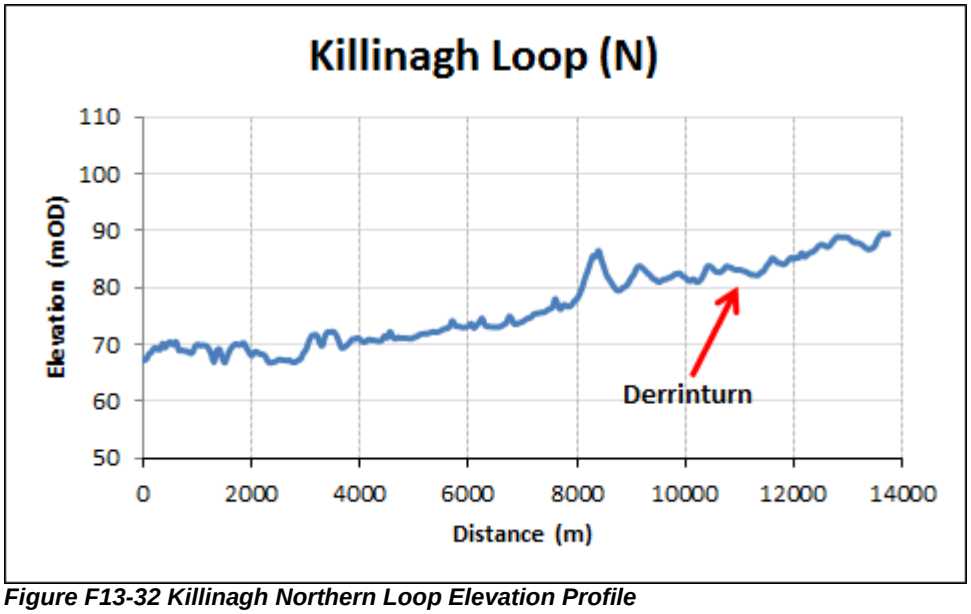


Figure F13-32 Killinagh Northern Loop Elevation Profile

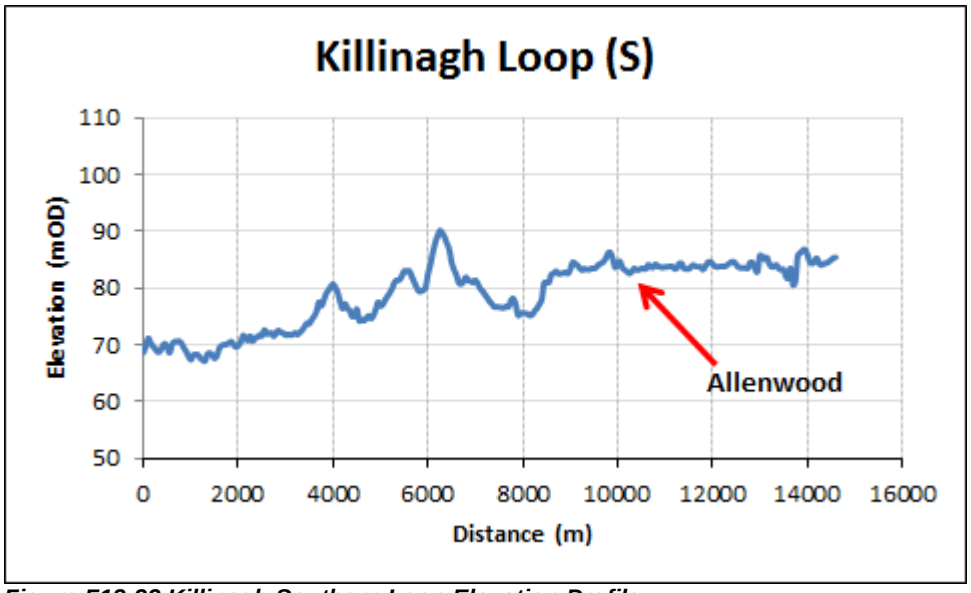


Figure F13-33 Killinagh Southern Loop Elevation Profile

4.6.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-19.

Table F13-19 Breakdown of Flood Types (Killinagh 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	11	1

The Southern Loop has the most potential to avoid predicted flood zones.

4.6.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Northern Loop** of Killinagh is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
2. The corridor has an acceptable elevation profile.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

4.7 The Barreen 'Loop'

4.7.1 Overview of Barreen 'Loop' Options

The loops originate to the west of Rathcoffey in Kildare and travels east between Celbridge and Straffan before crossing the River Liffey; see Figure F13-34.

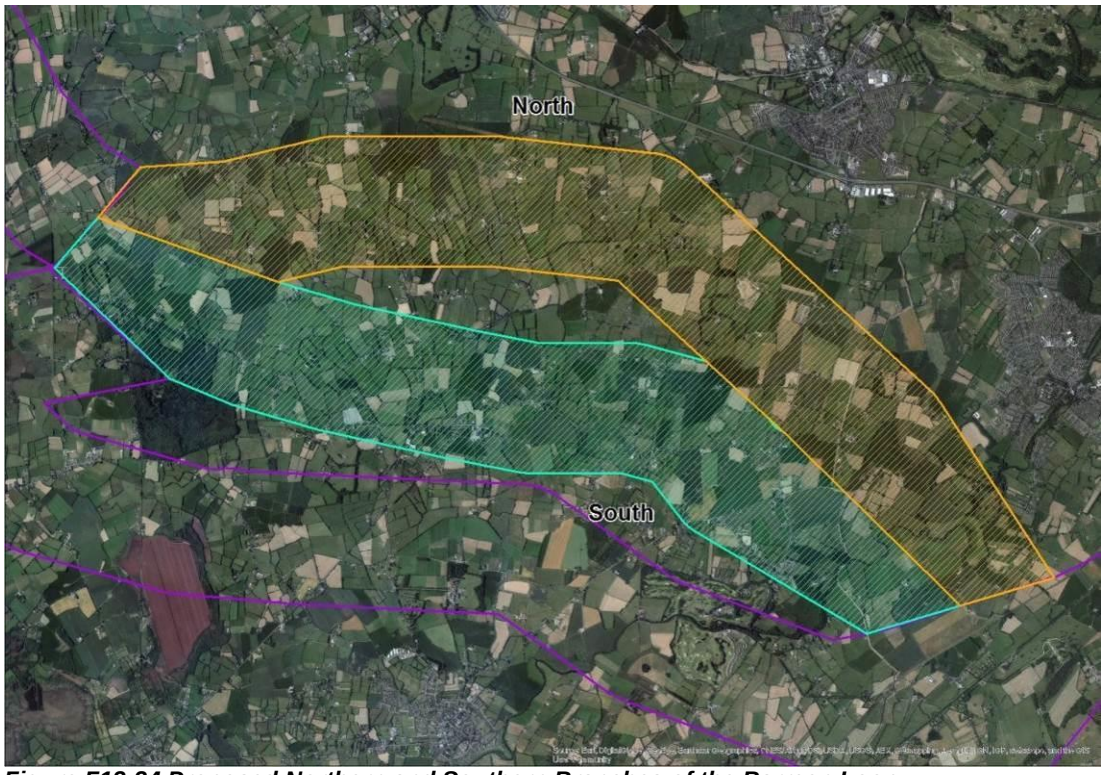


Figure F13-34 Proposed Northern and Southern Branches of the Barreen Loop

4.7.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-20.

Table F13-20 - Obstructions (Crossings – Barreen Loop)

Amenity	Northern Loop	Southern Loop
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	4 (R407, R408, R406, R403)	4 (R407, R408, R406, R403)
Local Roads	9	10
Major Rivers* (Stream Order)	1 (Liffey[6])	1 (Liffey[6])
Minor Rivers/Streams*	6	8
Railways	-	-
Total (Major Crossings**)	1	1
Total (Minor Crossings)	19	22

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

The Northern Loop has the least number of minor crossings. All routes have the same number of major crossings.

4.7.3 Ground Conditions

4.7.3.1 Karst

No features were noted along any of the routes; see Figure F13-35.

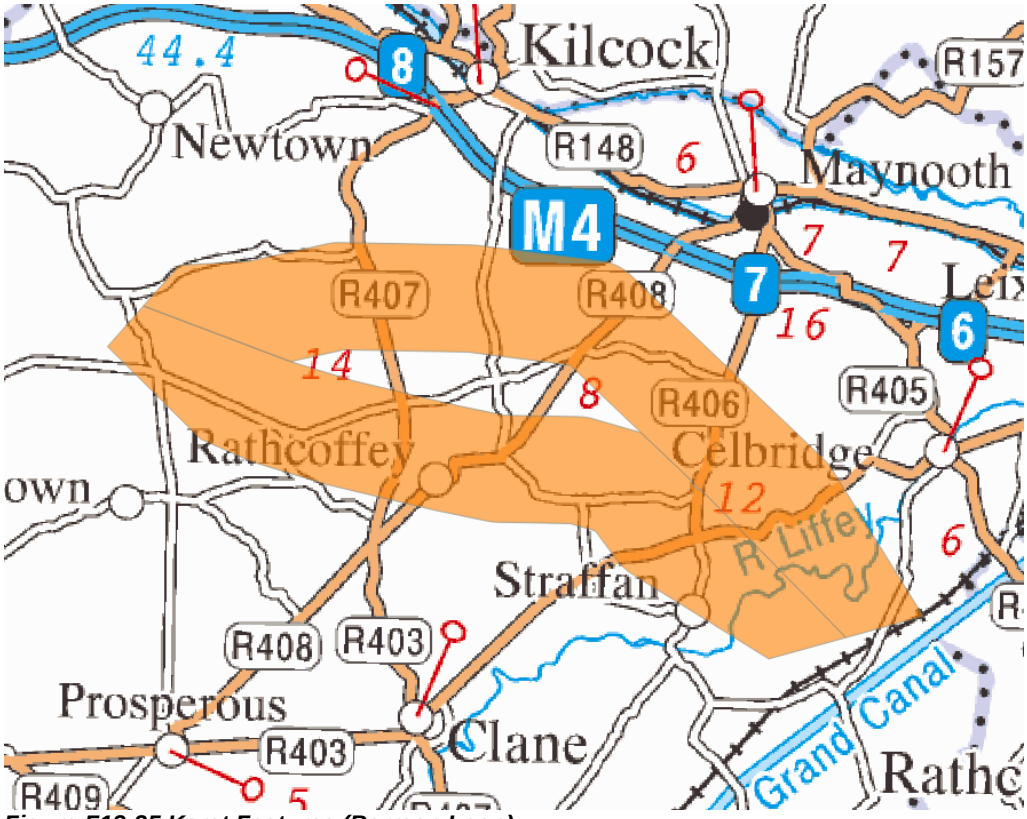


Figure F13-35 Karst Features (Barreen Loop)

4.7.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13-36. The soil present along all routes is primarily Limestone till ("light blue" colour in Figure F13-36). The Northern Loop is less contrained due to lower quantities of peat, glaciofluvial sand & gravels and alluvium.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-21 below:

Table F13-21 Breakdown of Subsoils Encountered (Barreen Loop)

Subsoil Type	Colour[7]	Northern Loop (%)	Southern Loop (%)
Limestone till	Light blue	88.9	78.5
Cutover Peat	Pink	-	2.0
Glaciofluvial sands and gravels	Purple	5.1	12.0
Alluvium	Yellow	4.3	4.9
Other Soil Types	-	1.7	2.6
Total		100	100

[7] Refer to Figure F13-36

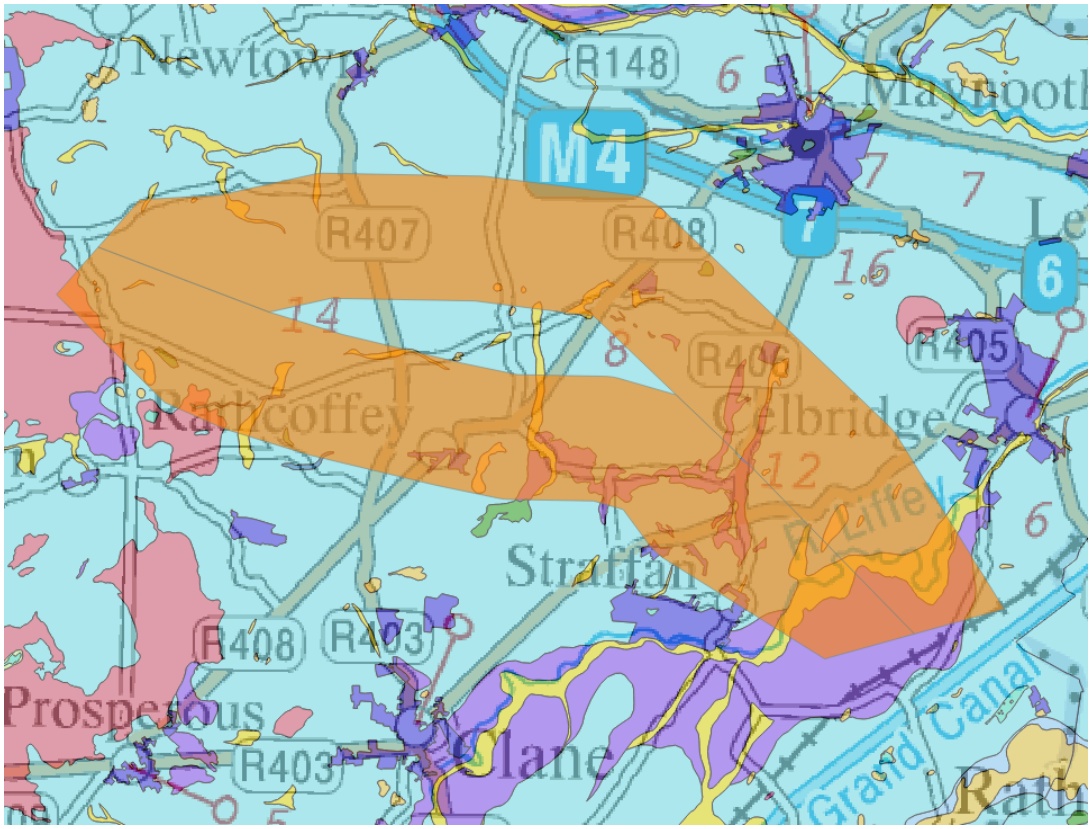


Figure F13-36 Subsoils Map (Barreen Loop)

4.7.4 Accessibility

Transport of materials can be facilitated primarily through the use of local and regional roads (refer to Figure F13 – 34).

The Northern Loop can be accessed via the R403, R406, R407 and R408. Some supplementary upgrade works may be required to utilise local roads in the area.

The Southern Loop can be accessed via the R403, R406, R407 and R408. Some supplementary upgrade works may be required to utilise local roads in the area.

Both routes will result in similar challenges with access along the proposed corridor.

4.7.5 Elevation Profiles

Elevation profiles of the branches were prepared; see Figures F13-37 and F13-38.

The Southern Loop has a less constrained profile. The Northern Loop has a sharp rise at approximately 12km near Straffan.

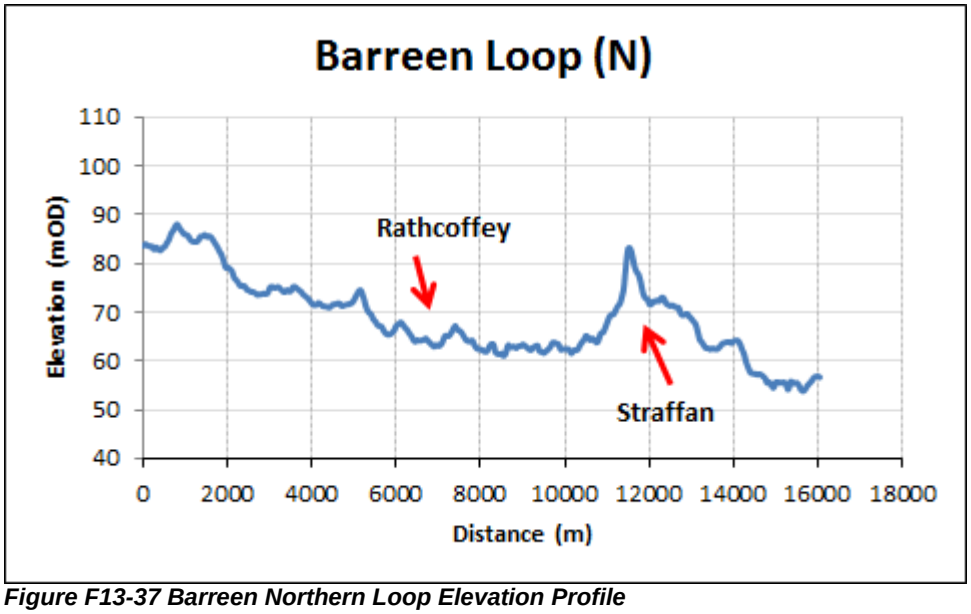


Figure F13-37 Barreen Northern Loop Elevation Profile

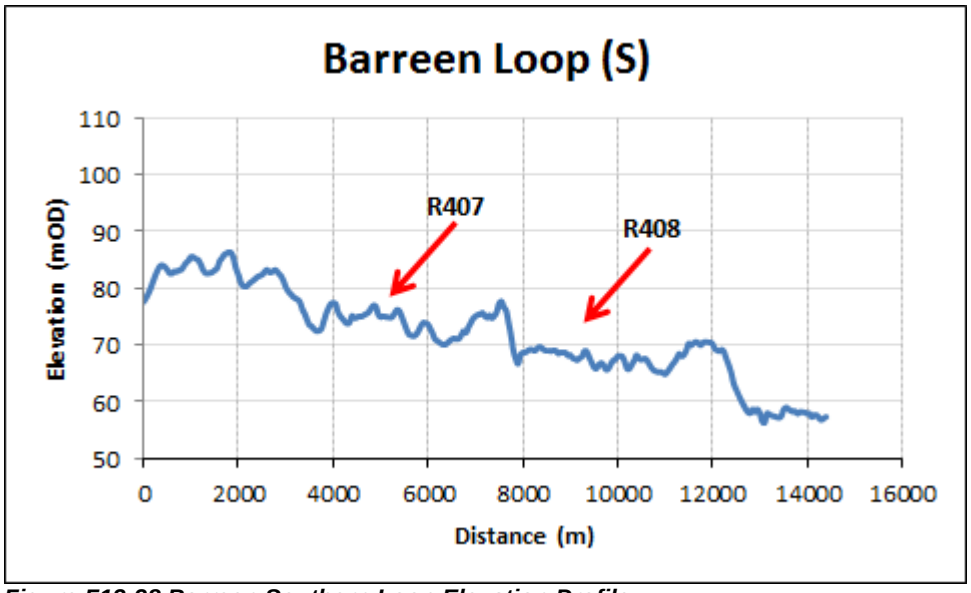


Figure F13-38 Barreen Southern Loop Elevation Profile

4.7.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-22.

Table F13-22 Breakdown of Flood Types (Barreen 'Loops')

Flood Type	Northern Loop (%)	Southern Loop (%)
Fluvial	15	10

The Southern Loop has the most potential to avoid predicted flood zones.

4.7.7 Conclusion

The 'Engineering and Design' assessment has concluded that the **Southern Loop** of Barreen is the least constrained on the basis of the following:

1. The corridor has an acceptable elevation profile;
2. Most potential to avoid flood zones.

The corridor will likely encounter poorer ground conditions but through careful design, planning an appropriate route can be developed to ensure exposure to poorer ground is minimised.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

5 Preliminary Route Corridor AB

5.1 Route Options for Corridor AB

5.1.1 Overview of Route Options for Corridor AB

This section considers a number of options (variations) for routing a transmission pipeline from Parteen Basin Reservoir and Birr, i.e. Corridor AB.

These options are routed through counties Tipperary and Offaly. Corridor A1 passes near the towns of Ballycommon, Cloghjordan, Ballingarry and Shinrone while Corridors A2 and A3 pass near the towns of Cooleen, Nenagh and Barna; see Figure F13-39.

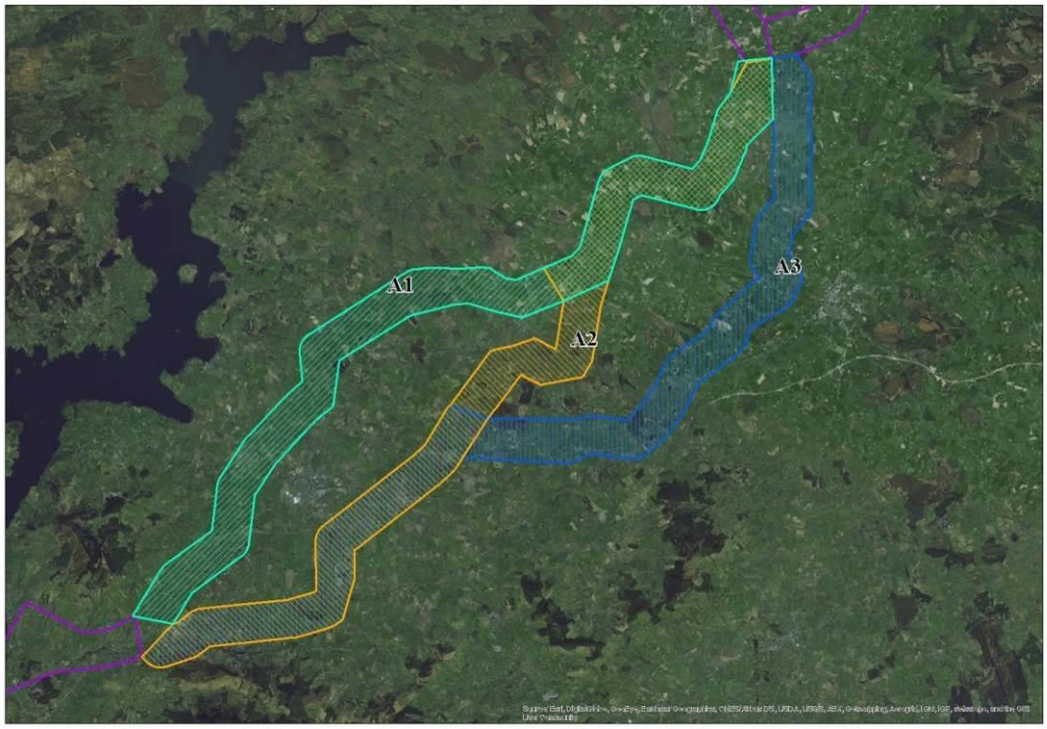


Figure F13-39 Proposed route for Corridors A1, A2 and A3

5.1.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-23.

Table F13-23 Obstructions (Crossings –Corridor AB Options)

Amenity	Corridor A1	Corridor A2	Corridor A3
National Primary (motorway and non-motorway)	2 (M7, N7)	2 (M7, N7)	2 (M7, N7)
National Secondary Roads	2 (N52, N62)	1 (N62)	1 (N62)
Regional Roads	7 (R494, R495, R493, R490, R491x2, R492)	9 (R499, R500, R497, R498, R494, R490, R491x2, R492)	7 (R499, R500, R497, R498, R494, R490, R491)
Local Roads	31	29	38
Major Rivers* (Stream Order)	2 (Nenagh[5], Little Brosna[4])	3 (Nenagh[4], Little Brosna[4], Ollatrim[4])	3 (Ollatrim[4], Nenagh[4], Little Brosna[4])
Minor Rivers/Streams*	21	29	33
Railways	1	1	1
Total (Major Crossings**)	7	7	7
Total (Minor Crossings)	59	67	78

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

Corridor A1 has the least number of minor crossings based on this assessment. All routes have the same number of major crossings.

5.1.3 Ground Conditions

5.1.3.1 Karst

A number of karst features have been noted along the route of Corridor A1 to the south of Borrisokane; see Figure F13-40. No features were noted along the route of Corridor A2 or A3.

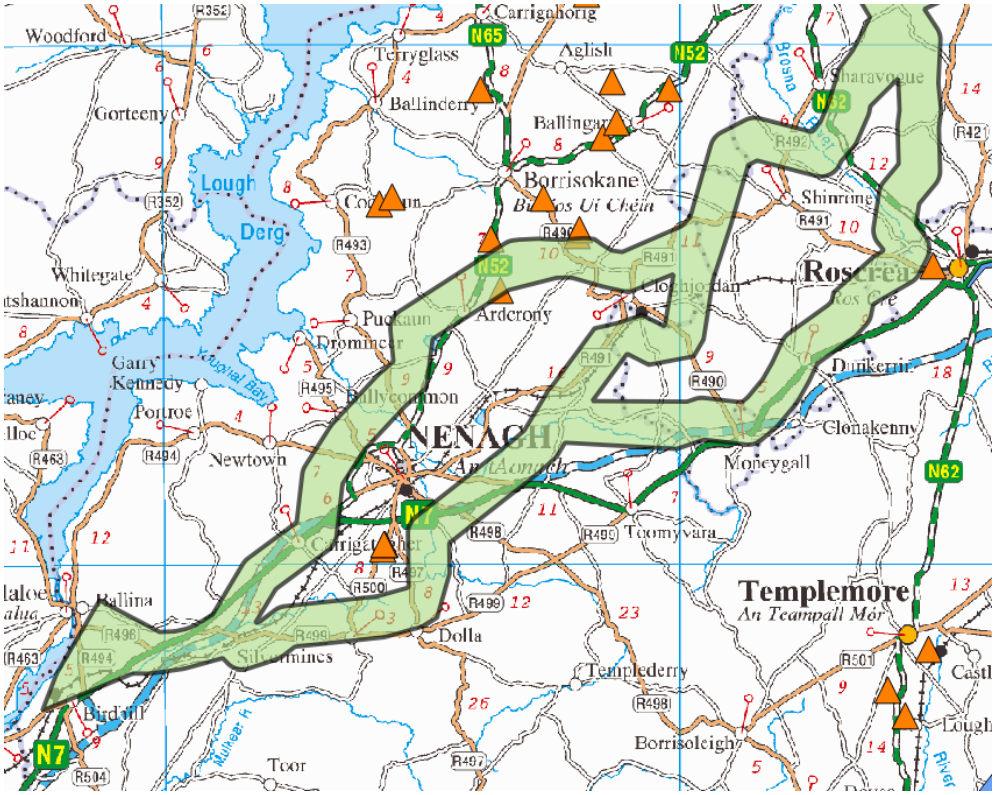


Figure F13-40 Karst Features (Route Corridor AB)

5.1.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 41. The soil present along all routes is primarily Limestone till (“light blue” colour in Figure F13-41). In several areas peat (“pink” colour in Figure F13-41) is noted along the routes.

Around the town of Nenagh aluvium soils (“yellow” colour in Figure F13-41) are present along the route of the Nenagh River, which passes through the town in a north-south orientation before discharging into Dromineer Bay to the north west. All corridors will be required to cross this river, however Corridor A3 will have the highest potential to encounter these soils.

It is also noted that Corridor A3 has a high potential for encountering soils with glaciofluvial deposits (“purple” colour in Figure F13-41) e.g. sands and gravels.

A significant quantity of made ground has been noted in Nenagh Town (“blue” colour in Figure F13-41), however all corridors appear to avoid this.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-24 below:

Table F13-24 Breakdown of Subsoils Encountered (Route Corridor AB)

Subsoil Type	Colour[8]	Corridor A1 (%)	Corridor A2 (%)	Corridor A3 (%)
Limestone till	Light blue	64.3	64.2	59.1
Cutover Peat	Pink	10.1	15.0	8.3
Glaciofluvial sands and gravels	Purple	1.2	2.3	11.2
Alluvium	Yellow	4.3	6.3	7.9
Sandstone till (Devonian)	Red	10.1	7.9	7.7
Other subsoil types	-	10	4.3	5.8
Total		100	100	100

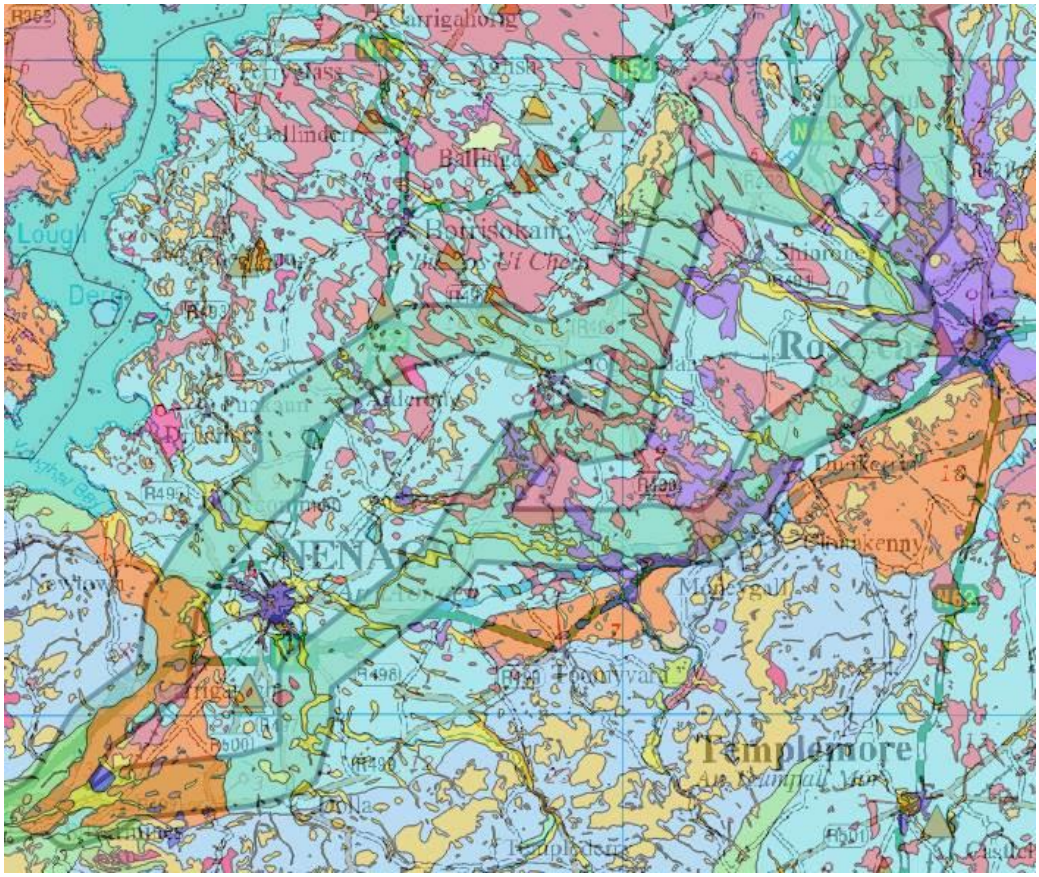


Figure F13-41 Subsoils (Route Corridor AB)

5.1.4 Accessibility

Transport of materials can be facilitated primarily via a combination of primary and secondary national roads along the majority of the routes, with some use of local and regional roads; see Figure F13-42.

Corridor A1 can be accessed via the M7/N7, N52, N62 and the R491. Some supplementary upgrade works may be required to utilise local roads in the area.

Corridor A2 can be accessed via the R499, M7/N7 and the R491. Supplementary upgrade works may be required to utilise local roads in the area.

Corridor A3 can be accessed via the R499, R497 and the M7/N7. Some supplementary upgrade works may be required to utilise local roads in the area.

[8] Refer to Figure F13-39

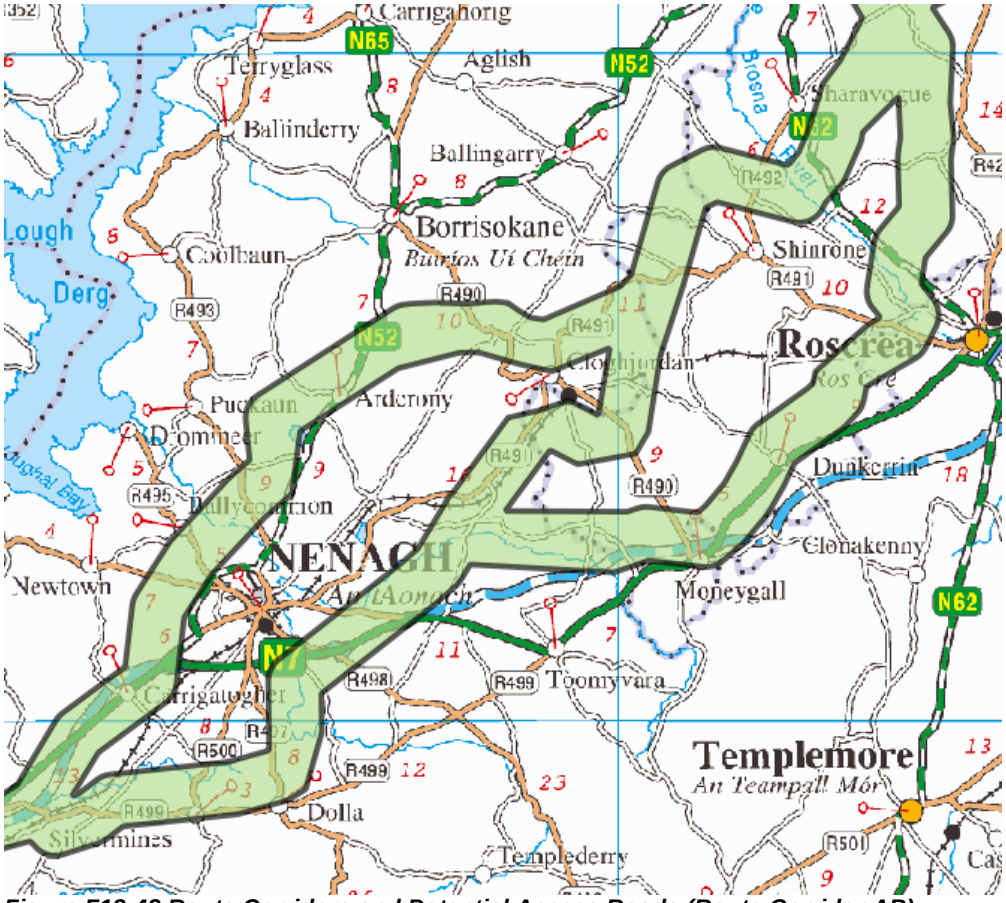


Figure F13-42 Route Corridors and Potential Access Roads (Route Corridor AB)

Corridors A1 and A3 have the best access available to the national primary and secondary road networks. The existing road network for Corridor A2 appears to be adequate, however this route will likely require more upgrade works to existing infrastructure than the other two corridors.

5.1.5 Elevation Profile

Elevation profiles of the branches were prepared; see Figures F13-43, F13-44 and F13-45.

The assessment generally noted a consistent profile for all corridors, with a significant rise occurring around at approximately 25-30km and a sharp fall occurring at approximately 40-45km.

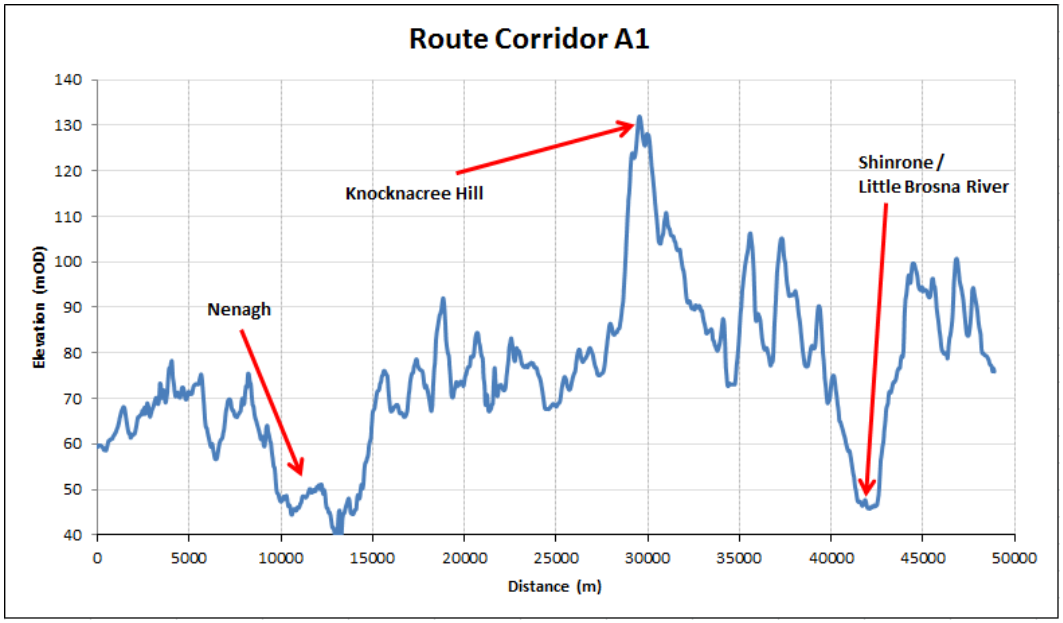


Figure F13-43 Corridor A1 Elevation Profile

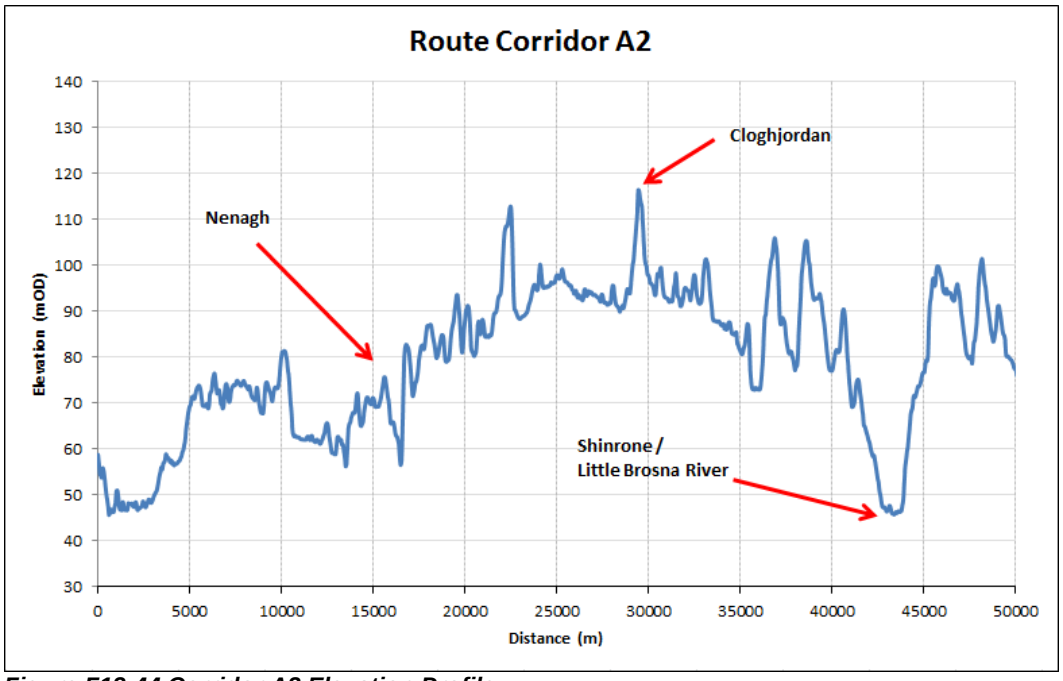


Figure F13-44 Corridor A2 Elevation Profile

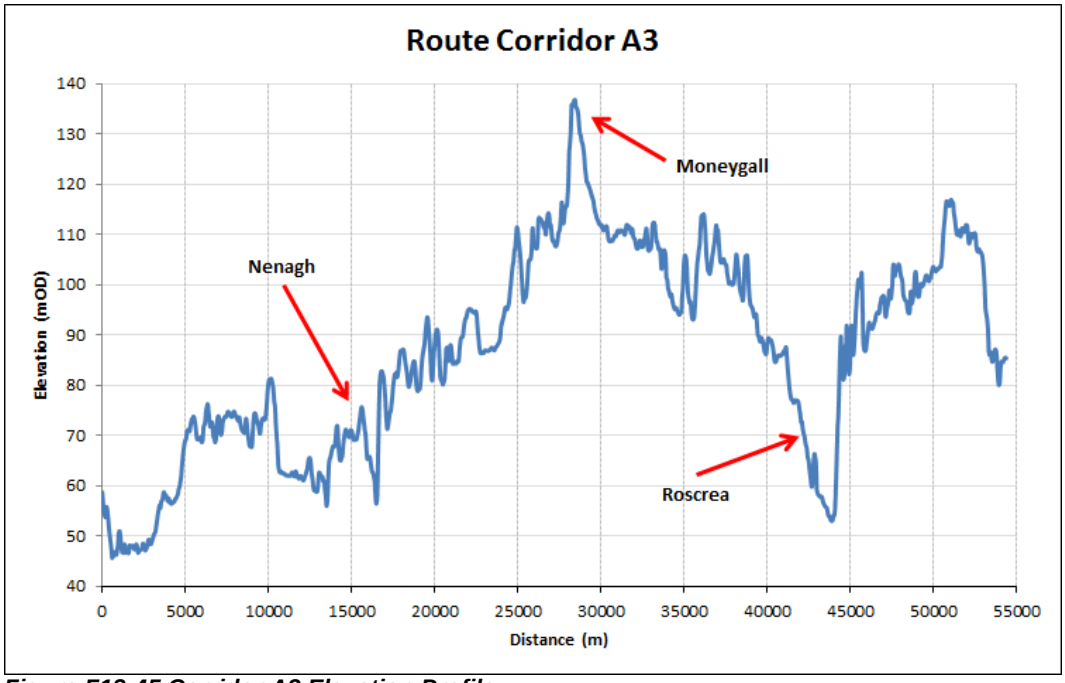


Figure F13-45 Corridor A3 Elevation Profile

The elevations show significant variation but all are within the acceptable constraints (i.e. reaching a point greater than 130 mOD) to allow gravity flow to the termination point.

5.1.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-25.

Table F13-25 Breakdown of Flood Types (Route Corridor AB)

Flood Type	Corridor A1 (%)	Corridor A2 (%)	Corridor A3 (%)
Fluvial	6.87	11.69	12.34

Corridor A1 has the most potential to avoid predicted flood zones.

5.2 Conclusion

The 'Engineering and Design' assessment has concluded that for **Route Corridor AB, Option A1** is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridors;
2. The corridor has favourable access from primary and secondary roads along its route;
3. The corridor has an acceptable elevation profile;
4. The corridor has the least number of major and minor obstructions which can impact on construction programme and cost;
5. Most potential to avoid flood zones.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

6 Preliminary Route Corridor BC

6.1 Route Options for Corridor BC

6.1.1 Overview of Route Options for Corridor BC

This section considers a number of options (variations) for routing a transmission pipeline from Birr to Mountbolus, i.e. Corridor BC.

These options are routed through the county of Offaly; see Figure F13-46. Corridor B1 passes north near the town of Birr and follows the N52 in an north-easterly direction passing through Kilcormac and terminating at Mountbolus. Corridor B2 passes near the village of Clareen and travels in a north-easterly direction along a more rural route to Mountbolus.

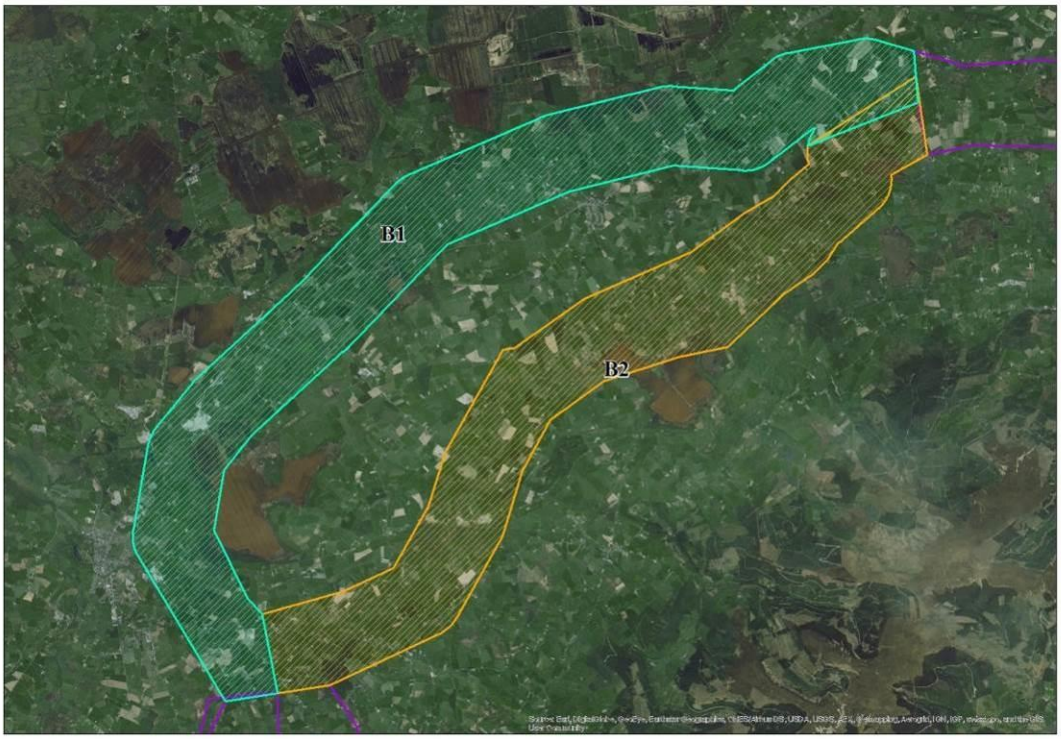


Figure F13-46 Proposed route for Corridors B1 and B2

6.1.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-26.

Table F13-26 Obstructions (Crossings – Route Corridor BC)

Amenity	Corridor B1	Corridor B2
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	2 (N52x2)	-
Regional Roads	2 (R440, R437)	1 (R440)
Local Roads	20	18
Major Rivers*	2 (Camcor [4], Silver [4])	1 (Silver [4])
Minor Rivers/Streams*	9	10
Railways	-	-

Total (Major Crossings**)	4	1
Total (Minor Crossings)	31	29

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

Corridor B2 has the least number of major and minor crossings based on this assessment.

6.1.3 Ground Conditions

6.1.3.1 Karst

A small number of karst features have been mapped along the route of Corridor B1 and are shown in Figure F13 – 47. No features were noted along the route of Corridor B2.

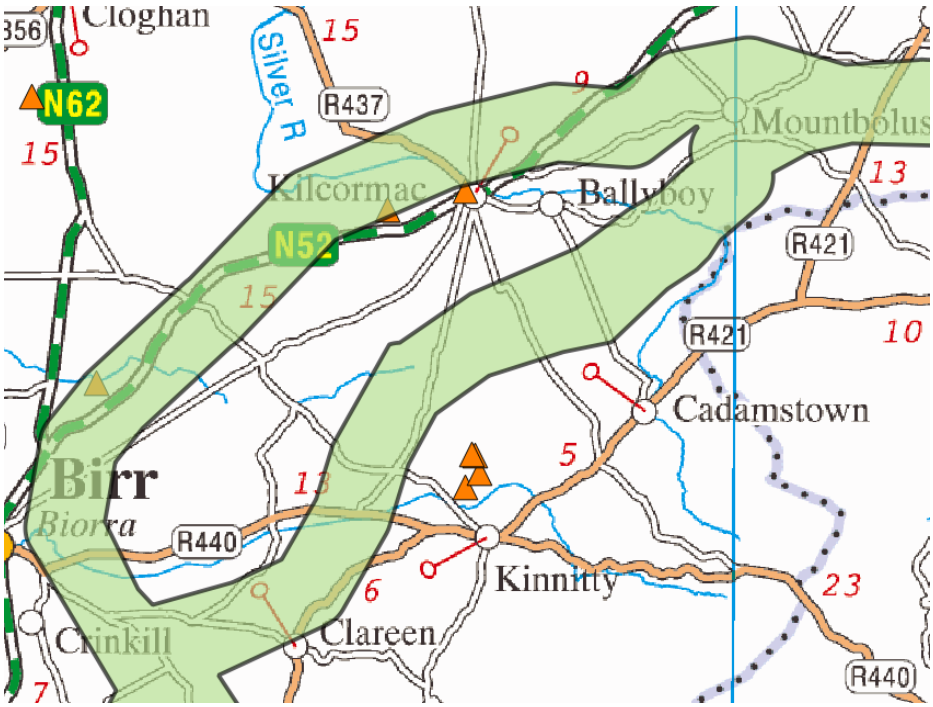


Figure F13-47 Karst Features (Route Corridor BC)

6.1.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure 13-48. The soil present along all routes is primarily Limestone till (“light blue” colour in Figure F13-48). Significant areas of peat (“pink” colour in Figure F13-48) and aluvium soils (“yellow” colour in Figure F13-48) are noted along both corridors, particularly to the north and east of Birr.

Glaciofluvial sand and gravels (“purple” colour in Figure F13-48) have been mapped in large quantities along corridor B1.

A breakdown of the primary subsoils to be encountered along each corridor are listed in Table F13-27 below:

Table F13-27 Breakdown of Subsoils Encountered (Route Corridor BC)

Subsoil Type	Colour[9]	Corridor B1 (%)	Corridor B2 (%)
Limestone till	Light blue	35.0	66.8
Cutover Peat	Pink	18.3	16.6
Glaciofluvial sands and gravels	Purple	34.2	7.1
Alluvium	Yellow	8.8	6.6
Other Soil Types	-	3.7	2.9
Total		100	100

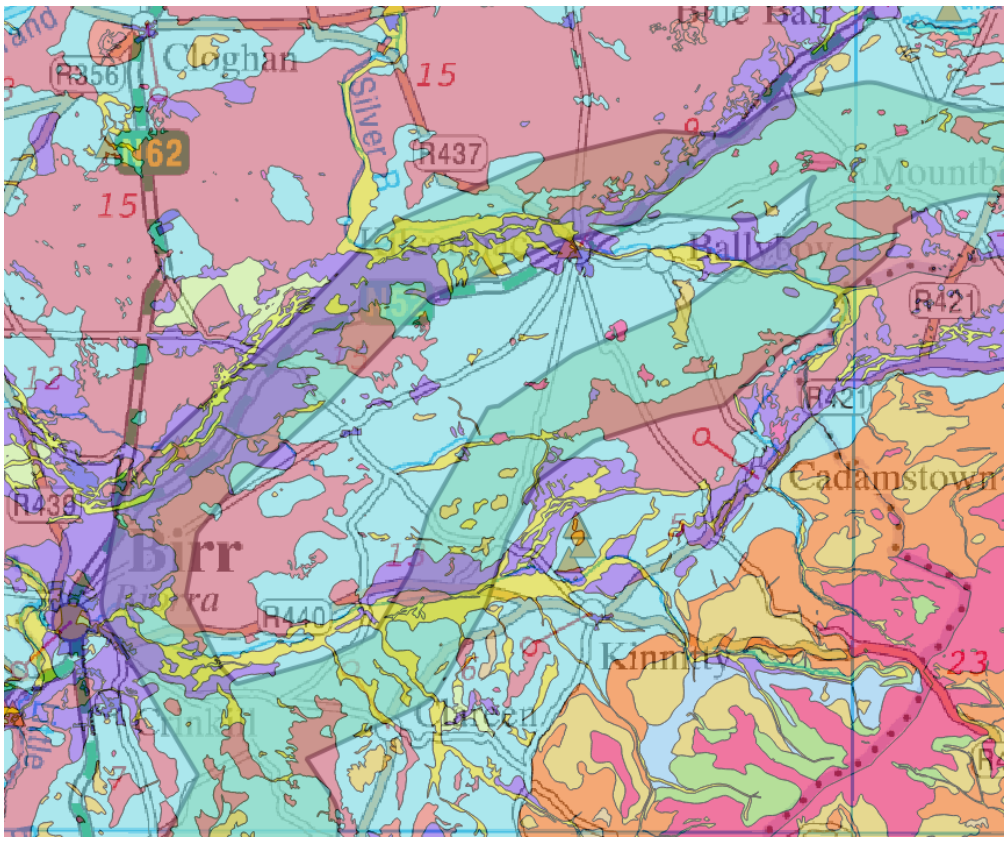


Figure F13-48 Subsoils (Route Corridor BC)

6.1.4 Accessibility

Transport of materials can be facilitated primarily via a combination of primary and secondary national roads along the majority of the routes, with some use of local and regional roads; see Figure F13-47.

Corridor B1 can be accessed via the N52, R440 and R437. Supplementary upgrade works may be required to utilise local roads in the area.

Corridor B2 can be accessed via the R440 and R421. Supplementary upgrade works may be required to utilise local roads in the area.

[9] Refer to Figure F13-48

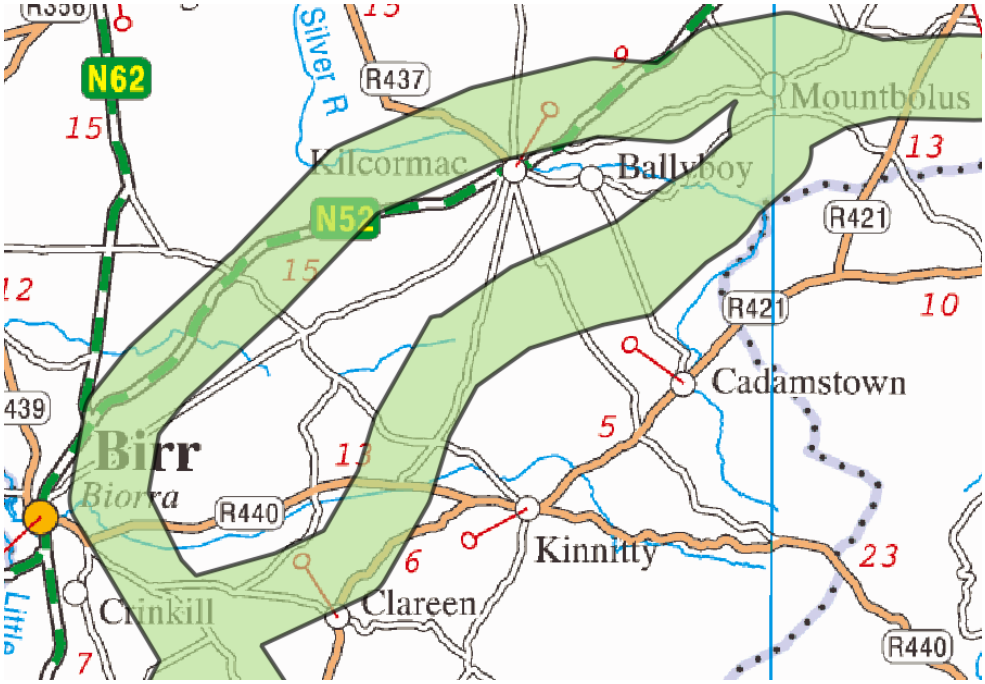


Figure F13-49 Route Corridors and Potential Access Roads (Route Corridor BC)

Corridor B1 has the best access available to the national primary and secondary road networks. The existing road network for Corridor B2 appears to be adequate, however this route will likely require more upgrade works to existing infrastructure than the other corridor.

6.1.5 Elevation Profile

Elevation profiles of the branches were prepared; see Figures F13-50 and F13-51.

An assessment was completed of the elevation profiles of the branches. The assessment produced a consistent rise along the route for corridor B1, with fluctuations in levels occurring along Corridor B2.

The profile along Corridor B2 could result in potential hydraulic issues during the operation stage due to the significant variation in elevations along the route.

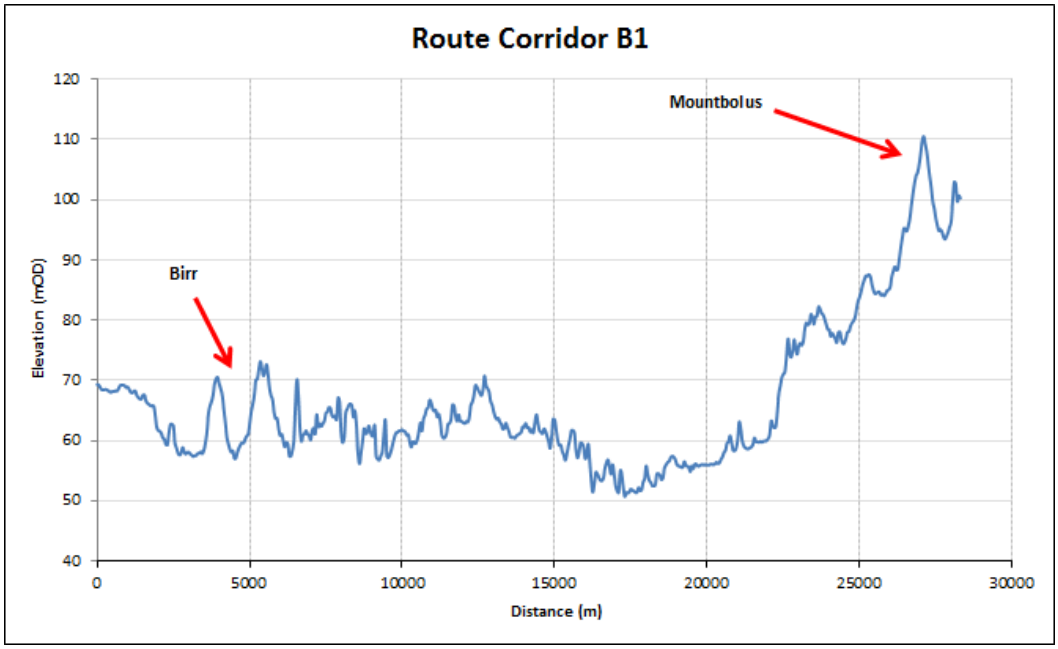


Figure F13-50 Corridor B1 Elevation Profile

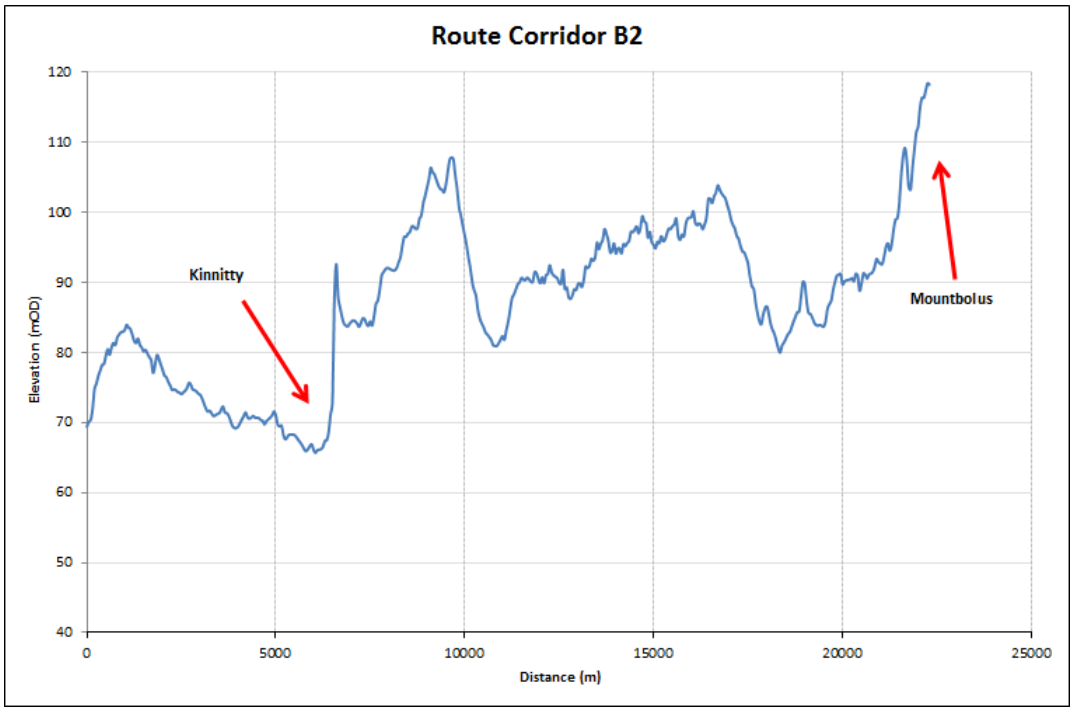


Figure F13-51 Corridor B2 Elevation Profile

6.1.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-28.

Table F13-28 Breakdown of Flood Types (Route Corridor BC)

Flood Type	Corridor B1 (%)	Corridor B2 (%)
Fluvial	3.93	4.49

Corridor B1 has the most potential to avoid predicted flood zones.

6.2 Conclusion

The 'Engineering and Design' assessment has concluded that for **Route Corridor BC, Option B2** is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
2. The corridor has an acceptable elevation profile;
3. No karst features have been mapped along the route;
4. The corridor has the least number of crossings of major obstructions.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

7 Preliminary Route Corridor CD

7.1 Route Options for Corridor CD

7.1.1 Overview of Route Options for Corridor CD

This section considers a number of options (variations) for routing a transmission pipeline from Mountbolus to a location south west of Kilcock, i.e. Corridor CD.

All corridors originate in County Offaly to the south of Tullamore; see Figure F13 – 52. C1 passes near Tyrellspass (Westmeath) and Clonard (Meath) before terminating to the south west of Kilcock (Kildare). C2 follows a similar route but takes a more southerly route towards Derrinturn (Kildare) near its separation from C1 at Clonard. C3 follows a primarily easterly route through Offaly before also terminating near Derrinturn. C4 takes a more southerly route, weaving through counties Offaly and Laois, passing near Portarlington and Bracknagh before taking a north easterly route towards Derrinturn.

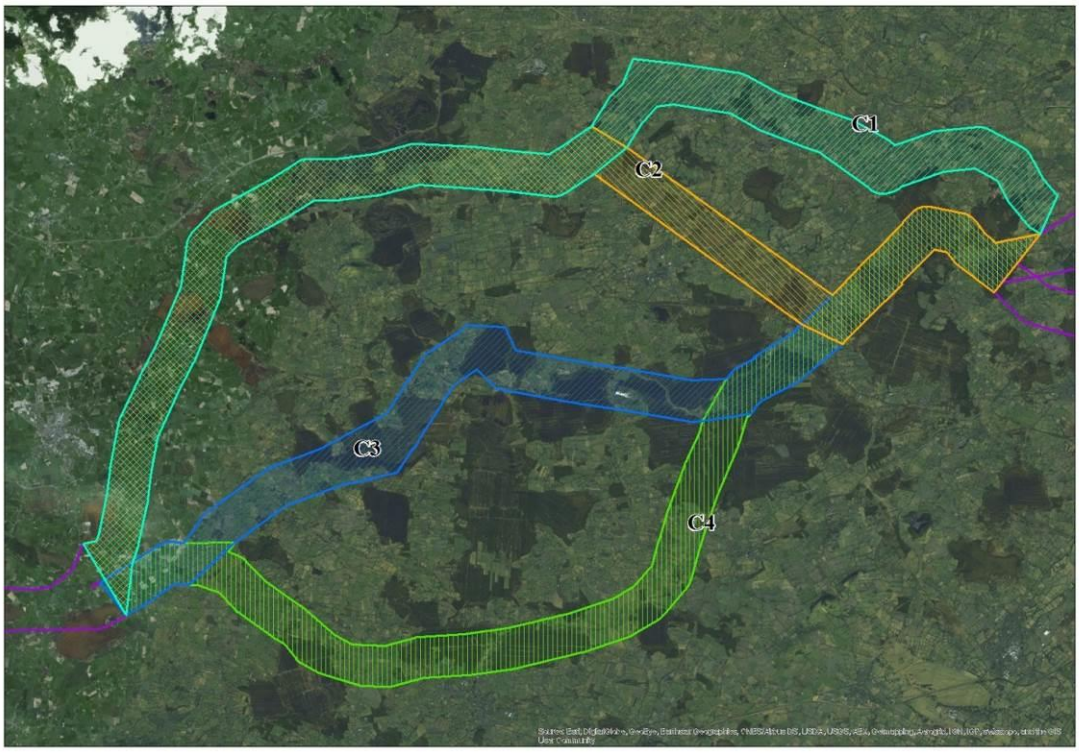


Figure F13-52 Proposed route for Corridors C1, C2, C3 and C4

7.1.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13–29.

Table F13-29 Obstructions (Crossings – Route Corridor CD)

Amenity	Corridor C1	Corridor C2	Corridor C3	Corridor C4
National Primary (motorway and non-motorway)	-	-	-	-
National Secondary Roads	-	-	-	-
Regional Roads	4 (R420, R400, R401, R402)	5 (R420, R400, R401, R402, R403)	5 (R420, R400, R402, R401 R403)	5 (R420, R419x2, R401, R403)
Local Roads	33	28	13	20
Major Rivers* (Stream Order)	1 (Boyne 4)	1 (Boyne 4)	1 (Figile 4)	1 (Figile 4)
Minor Rivers/Streams*	27	17	17	14
Railways	1	1	1	1
Total (Major Crossings**)	2	2	2	2
Total (Minor Crossings)	64	50	35	39

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

Corridor C3 has the least number of major and minor crossings based on this assessment.

7.1.3 Ground Conditions

7.1.3.1 Karst

No features were noted along any of the routes; see Figure F13-53.

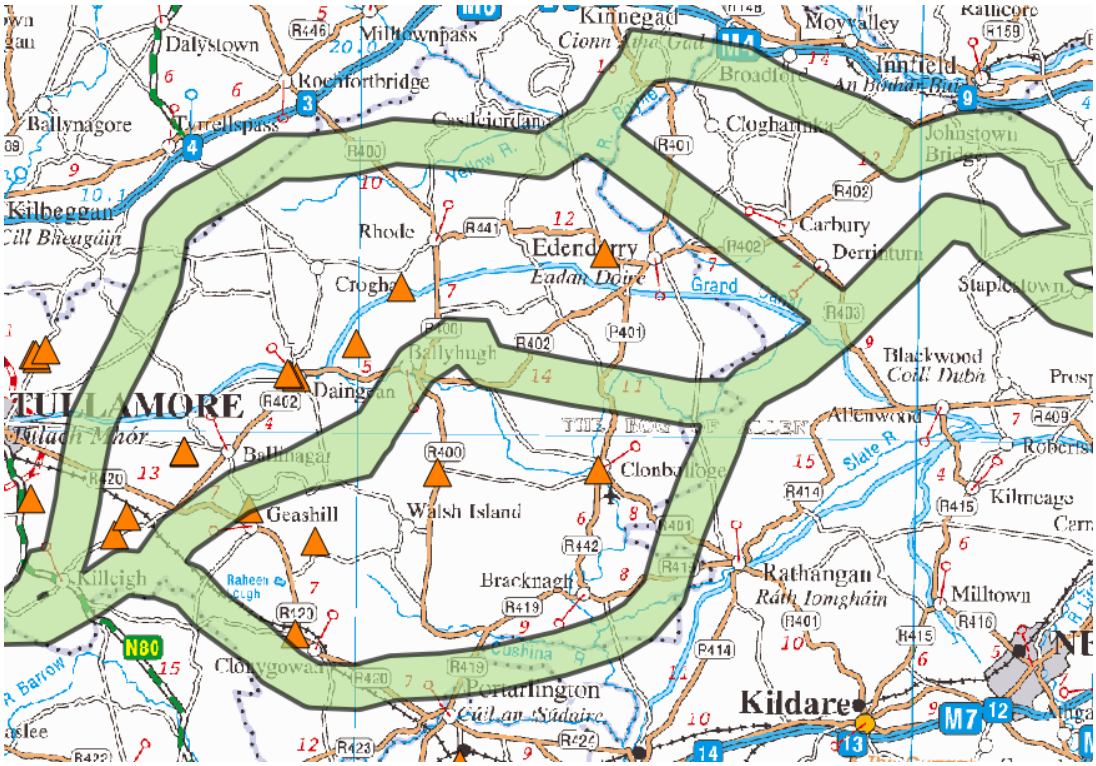


Figure F13-53 Karst Features (Route Corridor CD)

7.1.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 54. The soil present along all routes is primarily Limestone till (“light blue” colour in Figure F13-54) and significant areas of peat (“pink” colour in Figure F13-54), particularly C3 and

C4. Glaciofluvial sand and gravels ("purple" colour in Figure F13 - 54) and aluvium soils ("yellow" colour in Figure F13-54) are noted in higher quantities along Corridor C1 and C2.

Table F13-30 Breakdown of Subsoils Encountered (Route Corridor CD)

Subsoil Type	Colour[10]	Corridor C1 (%)	Corridor C2 (%)	Corridor C3 (%)	Corridor C4 (%)
Limestone till	Light blue	43.5	40.5	30.1	31.9
Cutover Peat	Pink	32.8	44.4	64.7	58.6
Glaciofluvial sands and gravels	Purple	13.3	7.2	2.6	0.9
Alluvium	Yellow	6.2	4.4	1.2	2.0
Other Soil Types	-	4.2	3.5	1.4	6.6
Total		100	100	100	100

It is noted that Corridor C4 is 6.6% of "Other Soil Types", of which 5.9% is comprised of "Lake sediments". The issues with this soil type have been discussed previously in Section 1.2.

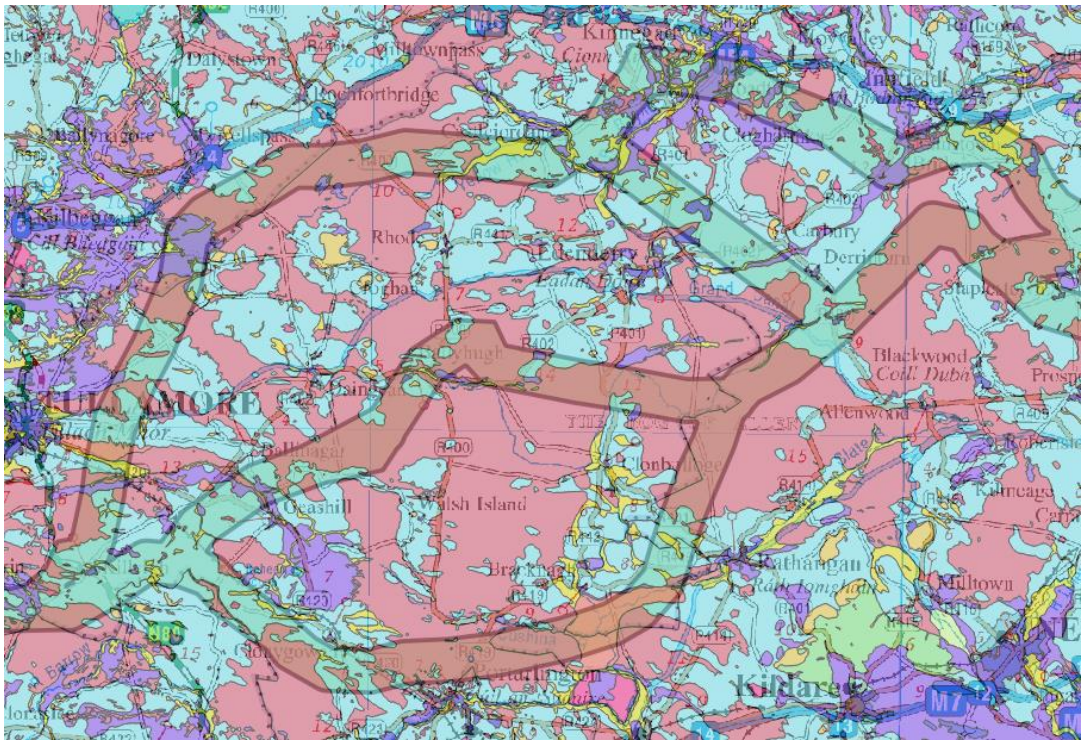


Figure F13-54 Subsoils (Route Corridor CD)

The large presence of peat along corridor C3 (64.7%) and C4 (58.6%), coupled with the location of lake sediments along Corridor C4 make these routes less favourable options due to the potential construction challenges which will be faced.

7.1.4 Accessibility

Transport of materials can be facilitated primarily via a combination of primary and secondary national roads along the majority of the routes, with some use of local and regional roads; see Figure F13-52.

[10] Refer to Figure F13 - 54

Corridor C1 and C2 can be accessed via the N52, N80, M4/M6, R420, R400, R401 and R402. Supplementary upgrade works may be required to utilise local roads in the area.

Corridor C3 can be accessed via the N80, R420, R400, R402, R401 and R403. Supplementary upgrade works may be required to utilise local roads in the area.

Corridor C4 can be accessed via the N80, R420, R419 and R403. Supplementary upgrade works may be required to utilise local roads in the area.

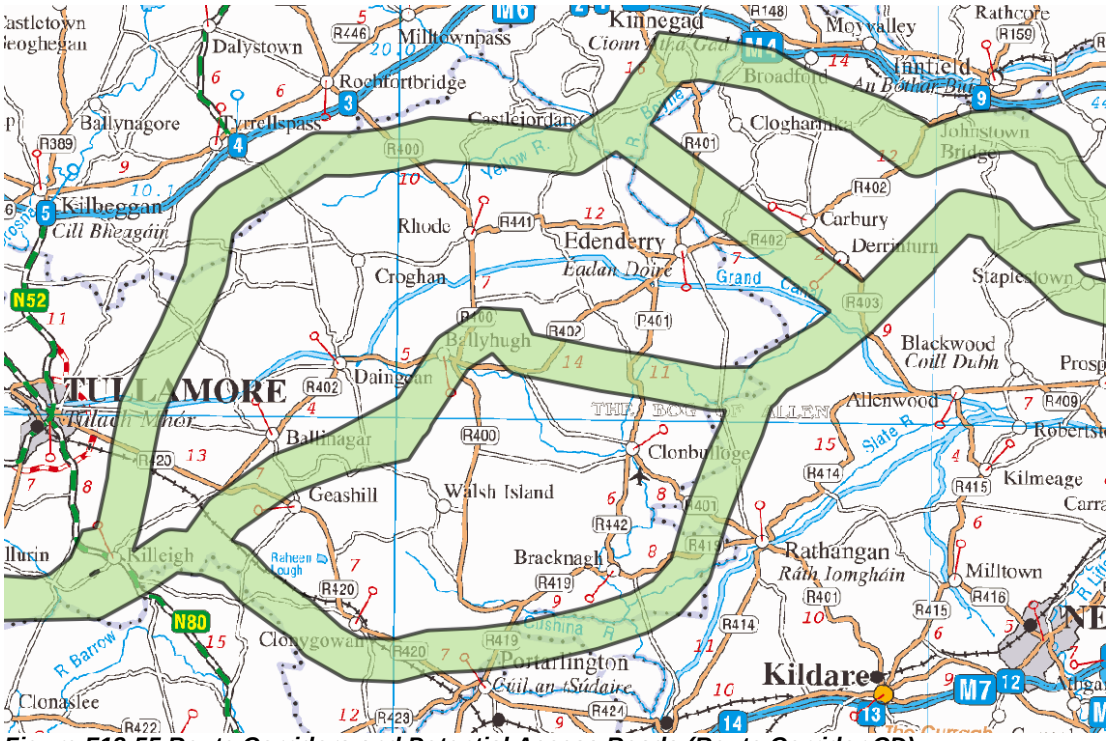


Figure F13-55 Route Corridors and Potential Access Roads (Route Corridor CD)

All routes have good access from the existing road infrastructure. Corridor C1 and C2 have the least potential to require upgrade works to allow construction of the pipeline due to the location of existing national primary and secondary roads.

7.1.5 Elevation Profile

Elevation profiles of the branches were prepared; see Figures F13-56, F13-57, F13-58 and F13-59.

An assessment was completed of the elevation profiles of the branches. The assessment noted a general fall from 95mOD to 80mOD across the profiles. Both C1 and C2 experience a drop below 60mOD around Tullamore before rising to 100mOD to the south of Tyrellspass at the border of Offaly and Westmeath. Several other gradual variations in elevations occur along all routes.

The significant fall and rise in elevation at the beginning of Corridor C1 and C2 could potentially result in hydraulic issues during the operation of the pipeline.

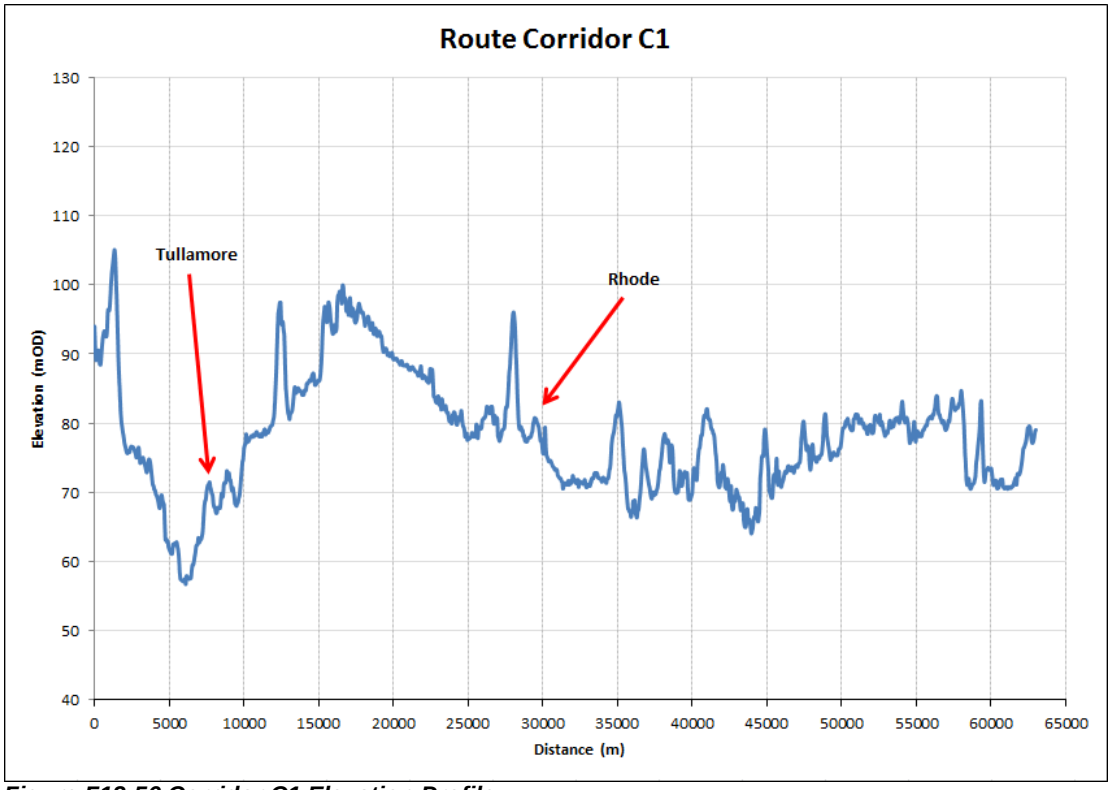


Figure F13-56 Corridor C1 Elevation Profile

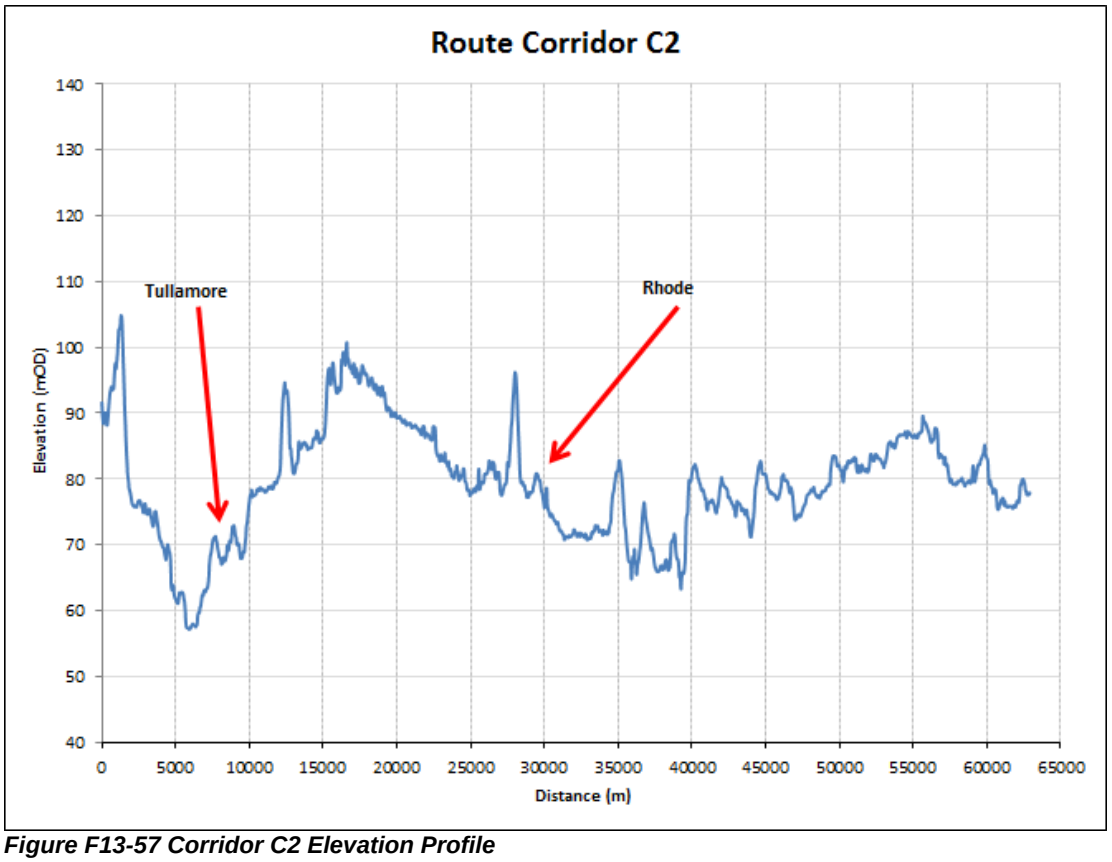


Figure F13-57 Corridor C2 Elevation Profile

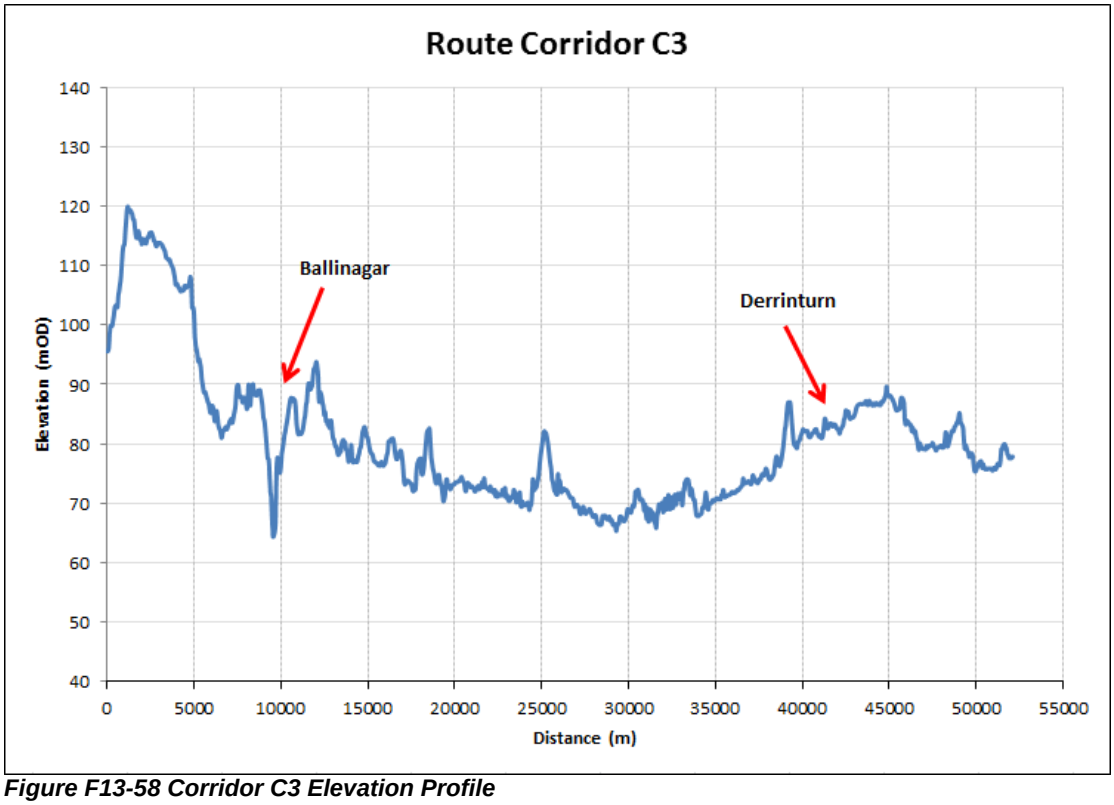


Figure F13-58 Corridor C3 Elevation Profile

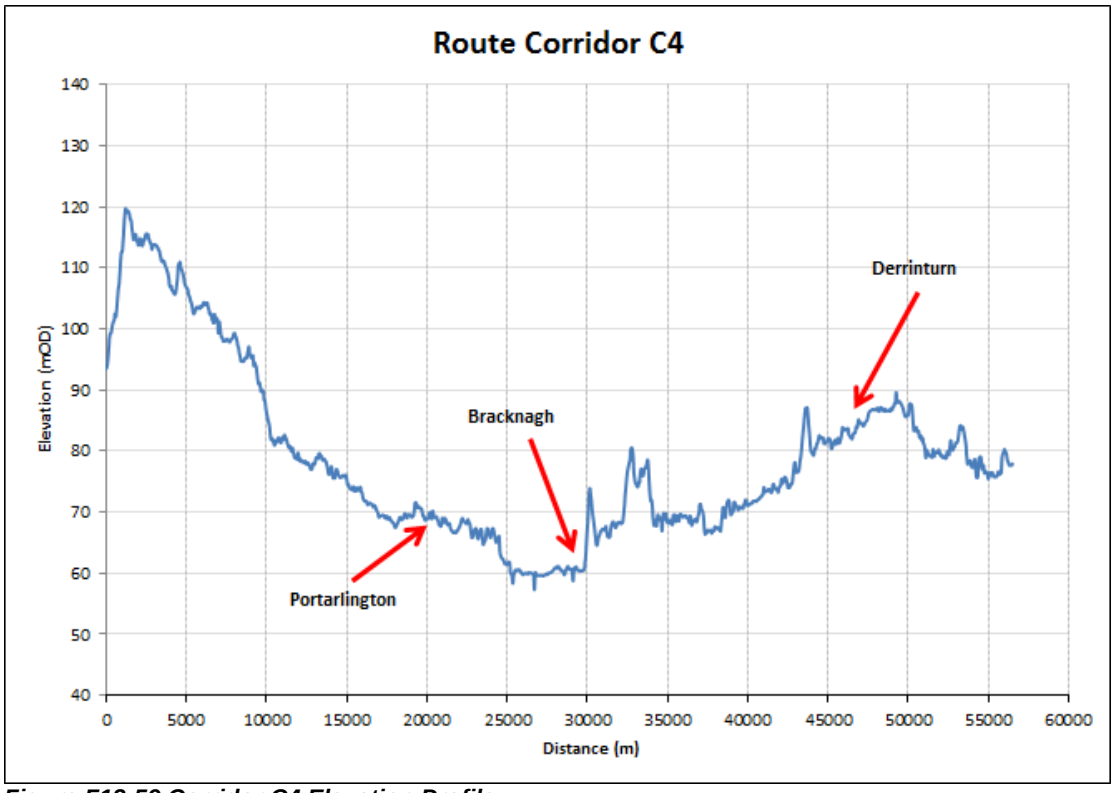


Figure F13-59 Corridor C4 Elevation Profile

7.1.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-31.

Table F13-31 Breakdown of Flood Types (Route Corridor CD)

Flood Type	Corridor C1 (%)	Corridor C2 (%)	Corridor C3 (%)	Corridor C4 (%)
Fluvial	9.61	9.99	7.22	9.65

Corridor C3 has the most potential to avoid predicted flood zones.

7.2 Conclusion

The 'Engineering and Design' assessment has concluded that for **Route Corridor CD, Option C1** is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with other corridors;
2. The corridor has favourable access from primary and secondary roads along its route;
3. The corridor has an acceptable elevation profile, however a sudden rise and fall at approximately 5km could introduce potential hydraulic issues;

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

8 Preliminary Route Corridor DE

8.1 Route Options for Corridor DE

8.1.1 Overview of Route Options for Corridor DE

This section considers a number of options (variations) for routing a transmission pipeline from south west of Kilcock to a location near Ardclough, i.e. Corridor DE.

All corridors are routed through the county of Kildare; see Figure F13-60. Corridor D1 passes north along the M4 near Maynooth and Straffan before terminating near Ardclough. Corridor D2 passes north of Robertstown, Prosperous and Clane before terminating near Ardclough.

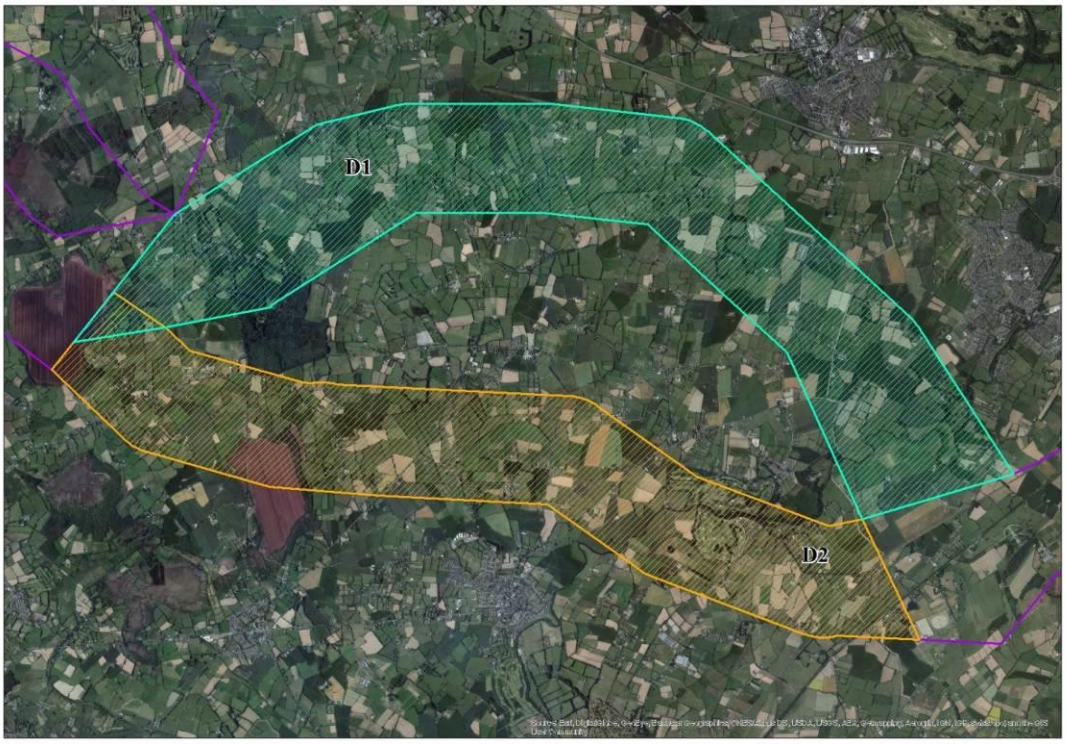


Figure F13-60 Proposed route for Corridors D1 and D2

8.1.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor; see Table F13-32.

Table F13-32 Obstructions (Crossings – Route Corridor DE)

Amenity	Corridor D1	Corridor D2
National Primary (motorway and non-motorway)	-	-
National Secondary Roads	-	-
Regional Roads	4 (R407, R408, R406, R403)	3 (R407, R408, R403)
Local Roads	8	7
Major Rivers*	1 (Liffey [6])	2 (Morell [5], Liffey [6])
Minor Rivers/Streams*	8	7
Railways	1	1
Total (Major Crossings**)	2	3
Total (Minor Crossings)	20	17

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

Both routes have a similar amount of major and minor crossings, with Corridor D2 resulting in 1no. additional major crossing of the River Morrell.

8.1.3 Ground Conditions

8.1.3.1 Karst

No features were noted along either route; see Figure F13-61.

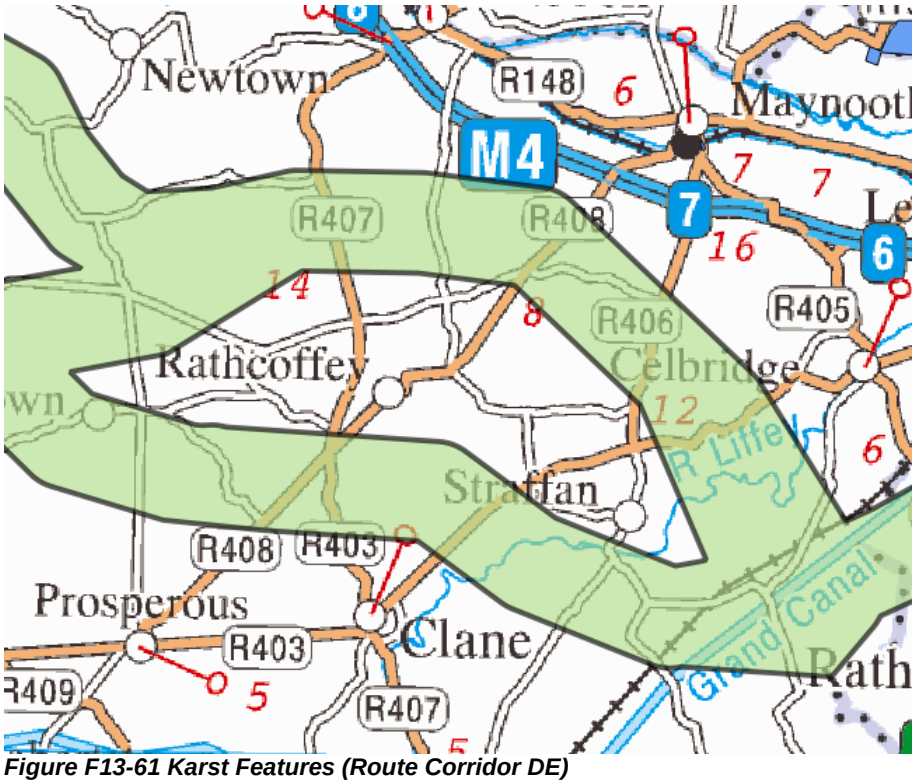


Figure F13-61 Karst Features (Route Corridor DE)

8.1.3.2 Subsoils

Sub-soils encountered along the corridors are shown in Figure F13 – 62. The soil present along all routes is primarily Limestone till (“light blue” colour in Figure F13-62) with high levels of glaciofluvial sand and gravels (“purple” colour in Figure F13 - 62) mapped along the route of Corridor D2.

It is noted on Corridor D2 that of the 5.6% of "Other Soil Types", 4.6% is comprised on Made Ground, located to the south of Straffan. These soils can be very unpredictable and can result in additional temporary works measures at construction stage due to unforeseen ground conditions.

Table F13-33 Breakdown of Subsoils Encountered (Route Corridor DE)

Subsoil Type	Colour[11]	Corridor D1 (%)	Corridor D2 (%)
Limestone till	Light blue	79.9	63.9
Cutover Peat	Pink	6.7	9.4
Glaciofluvial sands and gravels	Purple	7.1	16.7
Alluvium	Yellow	4.5	4.4
Other Soil Types	-	1.8	5.6
Total		100	100

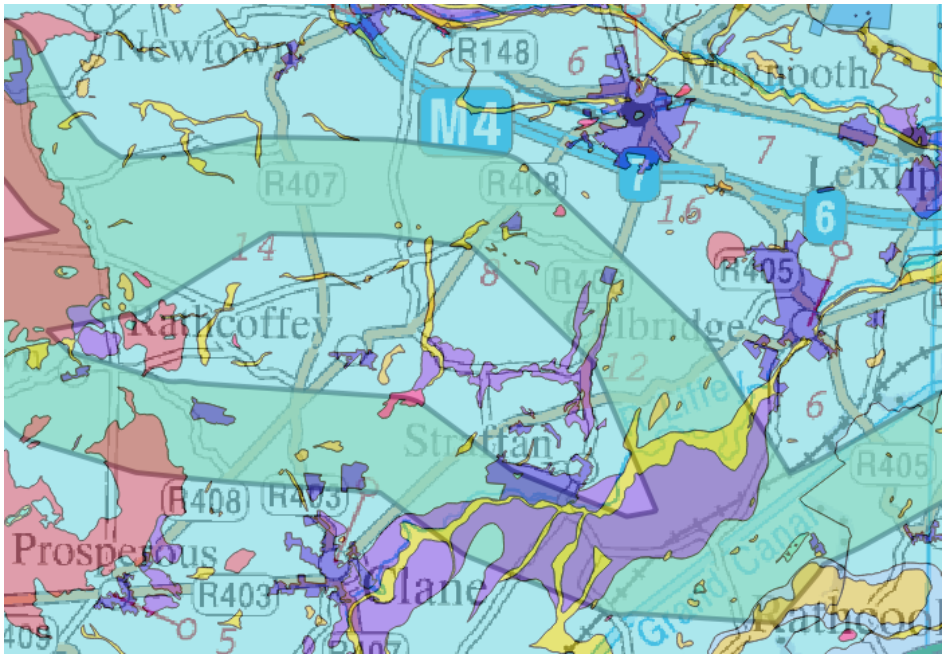


Figure F13-62 Subsoils (Route Corridor DE)

8.1.4 Accessibility

Transport of materials can be facilitated primarily via a combination of primary and secondary national roads along the majority of the routes, with some use of local and regional roads; see Figure F13 – 60.

Corridor D1 can be accessed via the M4, R407, R408 and R405. Supplementary upgrade works may be required to utilise local roads in the area.

Corridor D2 can be accessed via the R407, R408 and R403. These regional roads can be accessed from the N7. Supplementary upgrade works may be required to utilise local roads in the area.

[11] Refer to Figure F13-62

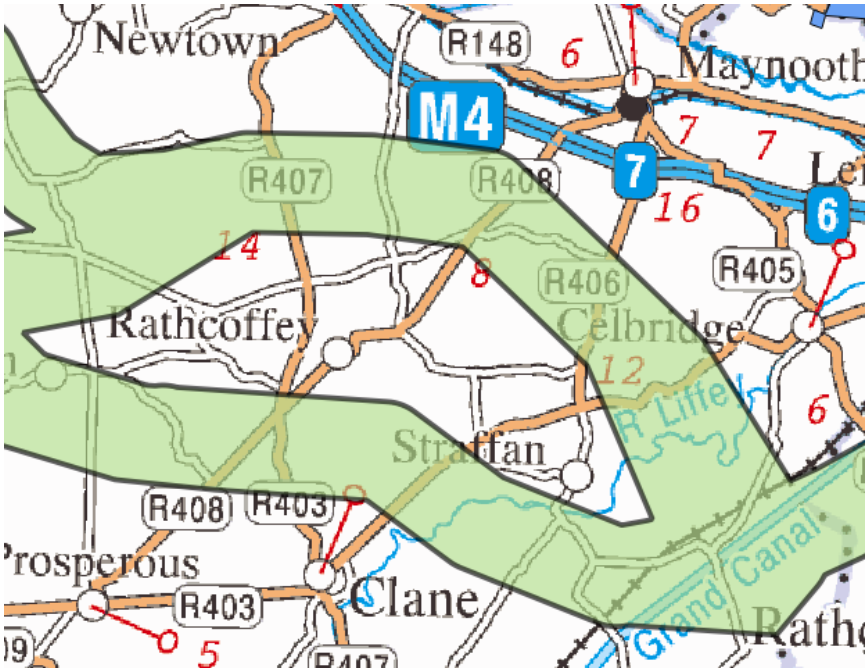


Figure F13-63 Route Corridors and Potential Access Roads (Route Corridor DE)

Neither route has an overall advantage in terms of accessibility to the route. Both routes will require the use of local and regional roads which may be subject to upgrade works as determined by the local authority.

8.1.5 Elevation Profile

Elevation profiles of the branches were prepared; see Figures F13-64, and F13-65.

The assessment generally produced a consistent profile for all corridors, with a gradual fall towards the termination point from approximately 80mOD to below 60mOD.

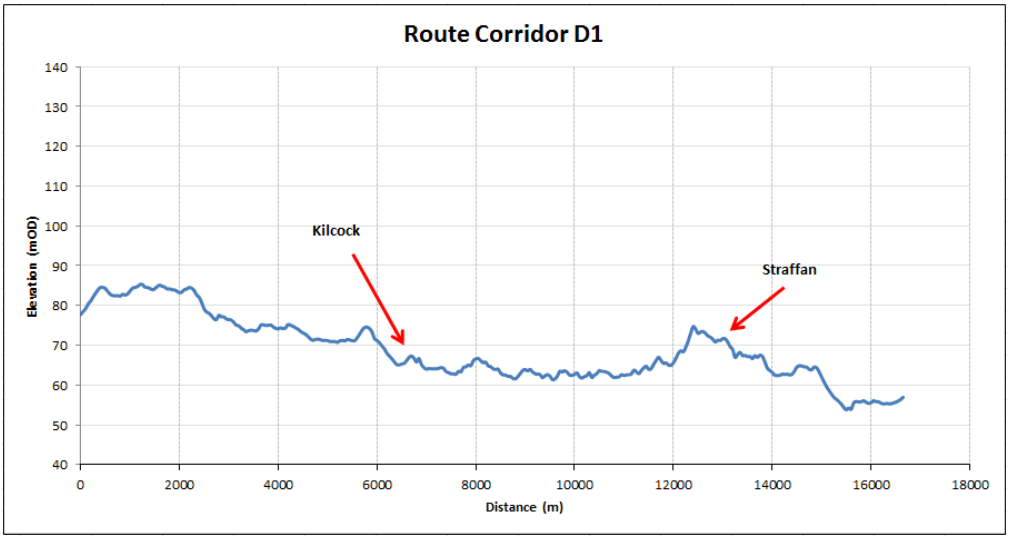


Figure F13-64 Corridor D1 Elevation Profile

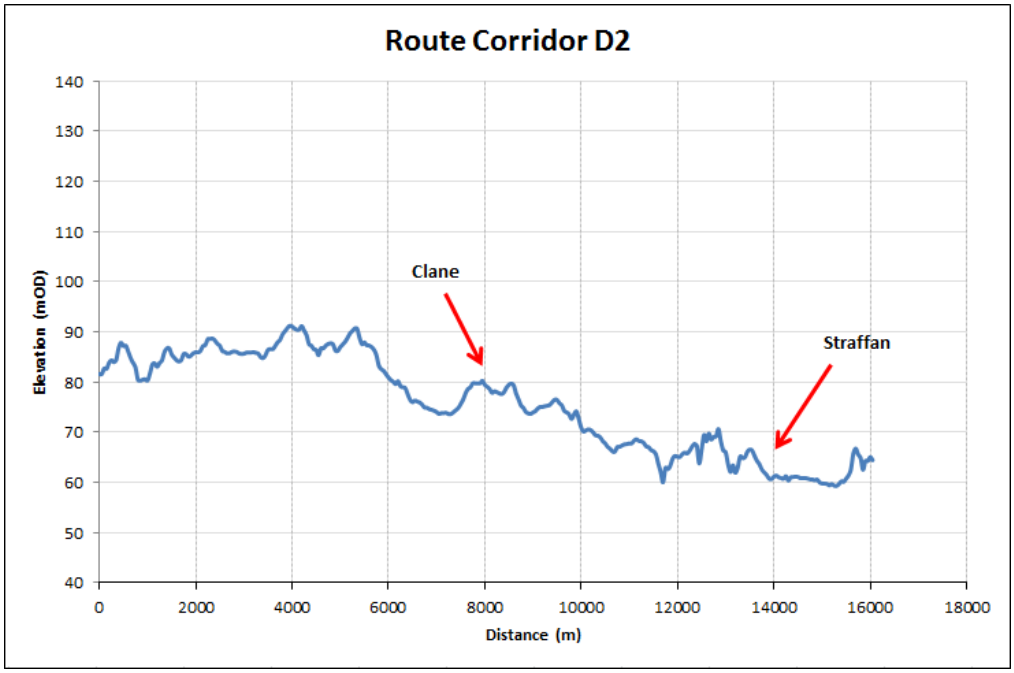


Figure F13-65 Corridor D2 Elevation Profile

8.1.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table F13-34.

Table F13-34 Breakdown of Flood Types (Route Corridor DE)

Flood Type	Corridor D1 (%)	Corridor D2 (%)
Fluvial	6.21	3.22

Corridor D2 has the most potential to avoid predicted flood zones.

8.2 Conclusion

The 'Engineering and Design' assessment has concluded that for **Route Corridor DE, Option D1** is the least constrained on the basis of the following:

1. The corridor has the least potential for encountering poor ground when zones of peat as well as alluvial and glaciofluvial deposits are compared with the other corridor;
2. The corridor has favourable access from primary and secondary roads along its route;
3. The corridor has an acceptable elevation profile;
4. The corridor has the least number of major obstructions which can impact on construction programme and cost.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

9 Matrix of Multi Criteria Analysis

9.1 Loops

Pipeline Loop 1 - "The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Very low	**Low:** Poorer access and ground conditions	**Very low**	**Mid-range:** Significant elevation challenges	**Low:** Poorer ground conditions and elevation profile	**Very low**	**Low:** Elevation challenges	**Mid-range:** Poorer ground conditions	**Low:** Poorer ground conditions	**Very low**	**Very low**	**Low:** Poorer ground conditions	**Low:** Elevation challenges	**Very low**

9.2 Route Corridors

9.2.1 Preliminary Route Corridor AB

Criteria	Corridor A1	Corridor A2	Corridor A3
Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	6.87 km^2	11.69 km^2	12.34 km^2
Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N52, N62, River Nenagh, Little Brosna River, Railway)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N62, River Nenagh, Little Brosna River, River Ollatrim, Railway)	**Mid-range** - this route requires 7no. Crossings (M7, N7, N62, River Nenagh, Little Brosna River, River Ollatrim, Railway)
Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**High-** this route requires 66no. Crossings	**High -** this route requires 74no. Crossings, including 9no. Crossings of regional roads	**High** - this route requires 85no. Crossings
Karst	**Mid-range** - GSI database has noted a number of karst features along this route	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
Subsoils	**Mid-range** - this route contains 10% peat	**High -** this route contains 15% peat and 6% alluvium	**High** - this route contains 11% glaciofluvial sand and gravels, 8% peat and 8% alluvium
Accessibility	**Mid-range** - this corridor is served by the N7/N52 for part of the route while the second half is dependent on regional/secondary roads for transport of goods	**High** - this corridor his the greatest deviation away from national primary and secondary roads, which increases the risk of upgrading local roads or building new access road to complete the works	**Low -** the route is served for a large part of the M7/N7 roads
Elevation Profile	**Mid-range** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km	**Low** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km. This route has a less significant elevation rise	**Mid-range** - the profile associated with this corridor is similar to all corridors, with a significant elevation rise at 25km followed by a significant fall at 40km. It is noted that this profile deviates from the centreline near 50km due to the location of a large obstruction (hill)

9.2.2 Preliminary Route Corridor BC

Criteria	Corridor B1	Corridor B2
Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	3.93 km^2	4.49 km^2
Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route requires 4no. Crossings (N52 x2, River Camcor, River Silver)	**Low** - this route 1no. Crossing (River Silver)
Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**Mid-range** - this route requires 31no. Crossings	**High** - this route requires 29no. Crossings
Karst	**Mid-range** - GSI database has noted a number of karst features along this route	**Low** - GSI database notes no karst features along here
Subsoils	**Very High** - this route contains 18% peat, 34% glaciofluvial sands and gravels, 9% alluvium	**High** - this route contains 17% peat, 7% glaciofluvial deposits and 7% alluvium
Accessibility	**Low** - the route is served for a large part by the N52 road	**High** - this route his relatively poor access to main roads and will likely require significant upgrade works to existing road infrastructure to complete works
Elevation Profile	**Mid-range** - this route has a relatively consistent rise to its termination	**High** - the proposed profile will result in hydraulic issues which will impact on the design due to the large number of rises/falls

9.2.3 Preliminary Route Corridor CD

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	9.61 km^2	9.99 km^2	7.22 km^2	9.65 km^2
Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Low** - this route 2no. Crossing (River Boyne, Railway)	**Low** - this route 2no. Crossing (River Boyne, Railway)	**Low** - this route 2no. Crossing (River Figile, Railway)	**Low** - this route 2no. Crossing (River Figile, Railway)
Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**Mid-range** - 64no. Crossings	**Low** - 50no. Crossings	**Low** - 35no. Crossings	**Low** - 39no. Crossings
Karst	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
Subsoils	**High** - this route contains 33% peat, 13% glaciofluvial deposits, 6% alluvium	**High** - this route contains 44% peat, 7% glaciofluvial deposits, 5% alluvium	**Very High** - this route contains 65% peat	**Very High** - this route contains 59% peat
Accessibility	**Low** - the route is served for a large part by the N52, N80, M4/M6 and several regional roads	**Low** - the route is served for a large part by the N52, N80, M4/M6 and several regional roads	Mid-range - this route is served by the N80 and several regional roads. There is a greater likelihood of upgrade works to roads being required	**Mid-range** - this route is served by the N80 and several regional roads. There is a greater likelihood of upgrade works to roads being required
Elevation Profile	**High** - this route has a large fall and rise at 5km	**High** - this route has a large fall and rise at 5km	**Low** - the route has a consistent fall to its termination	**Low** - the route has a consistent fall to its termination

9.2.4 Preliminary Route Corridor DE

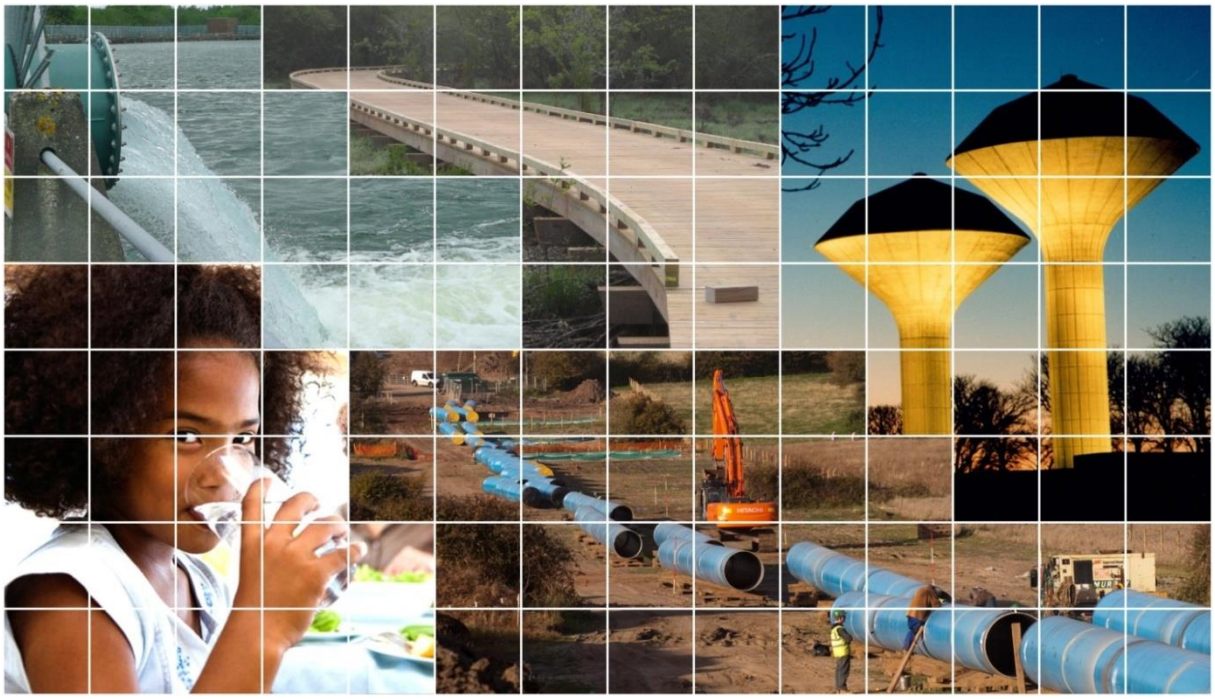
Criteria	Corridor D1	Corridor D2
Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	6.21 km^2	3.22 km2
Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	**Mid-range** - this route has 2no. Crossings (River Liffey, Railway)	**Mid-range -** this route has 3no. Crossings (River Morell, River Liffey, Railway)
Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	**High -** this route requires 20no. Crossings	**Mid-range** - this route requires 17no. Crossings
Karst	**Low** - GSI database notes no karst features along here	**Low** - GSI database notes no karst features along here
Subsoils	**Mid-range** - this route contains 7% peat, 7% glaciofluvial deposits and 5% alluvium	**High** - this route contains 10% peat, 17% glaciofluvial deposits, 6% made ground
Accessibility	**Low** - the route is served by the M4 and several regional roads	**Low** - the route is served by the N7 and several regional roads
Elevation Profile	**Low** - the route has a consistent fall to its termination	**Low** - the route has a consistent fall to its termination

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix F: Parteen Basin Reservoir MCA

Appendix F14: Roads & Traffic

October 2015 **F02**



Contents

1 Introduction

1.1 Introduction

Two options capable of sustainably meeting the potable water requirements of the Eastern and Midlands region have been identified from previous studies; refer to the Preliminary Options Appraisal Report. These are:

- Option C (Parteen Basin Reservoir Direct)
- Option H (Desalination)

The next stage was to determine how the ancillary components of a water supply system impact on their environment; and support comparative assessment of the two remaining options. These components can be broadly defined as:

- The Terminal Point Reservoir, and
- The Transmission Pipeline.

This report describes the decision making process used to appraise the least constrained terminal reservoir location and transmission pipeline route corridor associated with **Option C (Parteen Basin Reservoir Direct)**.

To undertake the appraisal a range of specialists were engaged, in their areas of expertise, to conduct a comparative assessment. The following disciplines were employed:

i. **Ecology** – the consideration of impact on animals, plants and their environment.
ii. **Water** – the consideration of impacts on the surface water environment.
iii. **Air and Noise** - the consideration of air and noise pollution
iv. **Cultural Heritage** - the consideration of existing archaeological and built heritage
v. **Soils, Geology and Hydrogeology** – the consideration of impact on soils, geology and hydrogeology.
vi. **Landscape and visual** – the consideration of landscape and visual impact.
vii. **Agronomy** – the consideration of impact on land based enterprise.
viii. **People** – the consideration of impacts on people
ix. **Planning** – the consideration of planning and land use policy in relation to proposed works
x. **Engineering** - the consideration of technical challenges associated with proposed works.
xi. **Traffic** - the consideration of impact on traffic and road network

The specialists independently assessed each component, relative to defined criteria, but within their areas of expertise. This approach is referred to as Multi-Criteria

Analysis and explicitly considers multiple criteria (see Table F14 - 1), within a decision-making environment.

Environmental Criteria	Technical Criteria	Risk Criteria
Biodiversity, Flora and Fauna	Safety	Technical Risk relating to the Source
Fisheries	Planning Policy	Technical Risk relating to Infrastructure and Operations
Water	Engineering and Design	Environmental and Planning Risk
Air/Climatic Factors	Capital and Operational Costs	Financial Risk
Material Assets (Energy)	Sustainability	Socio-economic risk
Cultural Heritage (including Architecture & Archaeology)		
Landscape & Visual		
Material Assets (Land use)		
Tourism		
Population		
Human Health		
Soils, Geology and Hydrogeology		

Table F14 - 1 Appraisal Criteria

The assessments are presented as individual statements within this Appendix F.

This Appendix F14 is a statement on Roads and Traffic and describes the decision making process used in identifying the least constrained termination point and route corridor associated with Option C (Parteen Basin Reservoir Direct).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained location and route corridor. This report should be read in conjunction with the *Site Selection Methodology*.

1.2 Methodology

This appendix applies both 'Non-linear Site Methodology – Step 1' and 'Linear Site Methodology – Step 2' as described in the *Site Selection Methodology.*

To effectively determine the least constrained components for Option C (Parteen Basin Reservoir Direct), they were assessed under seven Roads and Traffic sub-criteria.

- Number of crossings required for access road
- Number of crossings of Motorways
- Number of crossings of National Roads
- Number of crossings of Regional Roads
- Number of crossings of Local Roads – Primary
- Number of crossings of Local Roads - Secondary / Tertiary
- Number of Railway Crossings

1.2.1 Desk Top Study

A desk top study exercise of the infrastructure elements was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.*

The hierarchy of the assessment considered the following:

- Avoidance
  - avoid railway crossings were feasible; and
  - avoid motorway crossings were feasible.
- Balance the physical impact of constructing a road crossing with that of access to the pipeline route:
  - Good National Road access but road crossing could have significant disruption to traffic;
  - Good Regional Road access, but road crossing could have some disruption to traffic & access;
  - Local Primary Roads may have potential for good access, but road crossing could have some disruption to traffic & may require a short term road closure;
  - Local Secondary & Local Tertiary Roads, most likely not suitable for construction access. Road crossing will likely require a short term road closure.

The assessment did not consider traffic volumes or road accident / collision data on each road as this information was not available.

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” component is based upon a subjective assessment by each Specialist in their discipline of expertise. This judgement is presented as a weighted impact; colour coded for ready identification.

Very high	**Dark blue**
High	**Blue**
Mid-range	**Green**
Low	**Light Green**
Very low	**Cream**

2 Termination Point Reservoir

2.1 Terminal Locations

An assessment of the potential termination point locations was carried out on the Peamount location only; refer to Preliminary Options Appraisal Report, Section 8.

2.2 Methodology

This is 'Non-linear Site Methodology – Step 1' as described in the *Site Selection Methodology.*

2.2.1 Peamount

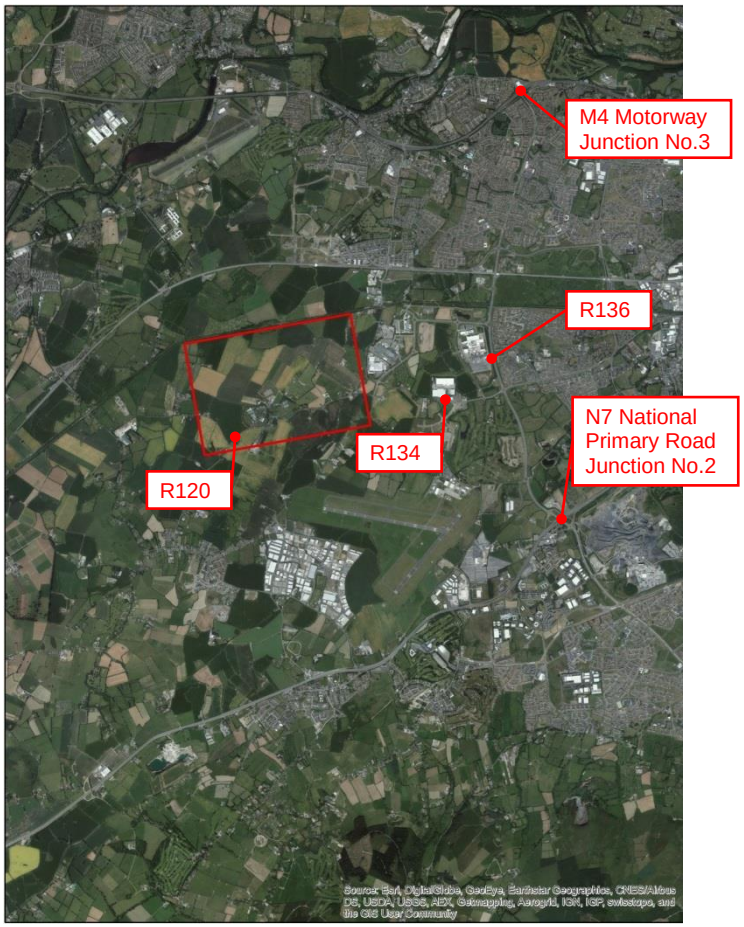


Figure F14 – 1 Peamount

Road access to the Peamount Terminal Location is restricted to the north of the area by the Grand Canal and the Dublin to Carlow Railway Line running in an east westerly direction.

To the south of the site area runs the R120 regional road between Clutterland and Newcastle and provides the only road access to Peamount Hospital. The length of access road required from the R120 is anticipated to be in the region of 700m, assuming the reservoir is positioned to the centre of the location shown on Figure G14-1. There is potential to pass close to Peamount Hospital.

Nearby motorway access is available to the North via junction no. 3 of the M4/N4and to the south via the N7 junction no. 2 and along the R136 dual carriageway.

The R134 and R120 link the R136 to the Peamount site. Sections of both the R136 and the R120 are proposed to be improved by South Dublin City Council:

- Adamstown Road (R120) Improvement Scheme; and
- Nagar Road.

2.3 Matrix of Multi Criteria Analysis

Criteria	Location 1 - Peamount
Number of crossings required for access road	Assuming access is available from the R120, there will be no road crossings.
Number of crossings of Motorways	None
Number of crossings of National Roads	None
Number of crossings of Regional Roads	Assuming the Peamount Terminal Reservoir site is to the north of the R120, no regional road crossings will be required for the terminal.
Number of crossings of Local Roads	None
Number of Railway Crossings	None

Table F14 - 2 Summary of the MCA for Peamount

2.4 Comparative Discussion

There should be direct access to a reservoir in the Peamount Location directly from the R120. There will therefore be no crossing of existing roads by a new permanent access road to the reservoir. Disruption to traffic at this site would be restricted to that caused by construction traffic; there would be no long term traffic impact. Nonetheless care will need to be taken to ensure that there is no impact on the nearby Peamount Hospital during construction.

The construction of a new permanent access road (approximately 700m long) has the potential to impact on local landowners; the extent of this disruption can only be determined once the reservoir site and access road route is determined at detailed design stage.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option C (Parteen Basin Reservoir Direct).

3.2 Methodology

This is 'Linear Corridor Methodology – Step 2' as described in the Site Selection Methodology.

The route between a potential abstraction location, based on a Shannon source water body, and the proposed termination point covers a very large distance, almost the width of the State. Consequently, this generates a large number of options (variations), and sub-options, for routing a transmission pipeline between two fixed points.

For ease of reference the principle options are defined as the 'Preliminary Route Corridors' whereas the sub-options, which are variations to the 'Preliminary Route Corridors', have been labelled 'loops'; as shown on Figure F14 – 2.

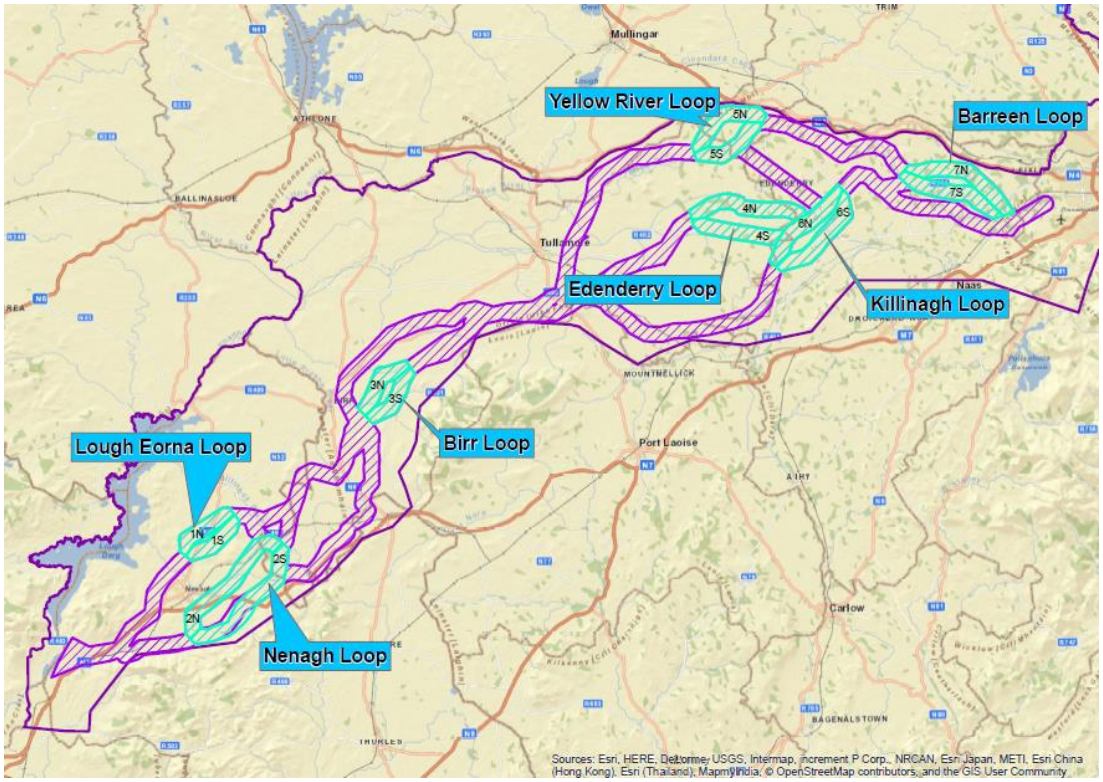


Figure F14-2 Preliminary Route Corridors and Loops

The general direction of these 'Preliminary Route Corridors' is from west to east. These 'loops' can be further distinguished as being a 'north loop' and a 'south loop', effectively representing divergence and convergence of a particular 'Preliminary Route Corridor'.

The aim of this Step 2 is to first identify and then appraise “Preliminary Route Corridors” (approximately 2 km wide), from which a “Least Constrained Route Corridor” is confirmed.

Given the large number of options (variations), and sub-options, available, and to allow for ready comparison an assessment of ‘loops’ to identify the sub-option which was the least constrained was initially conducted.

Figure F14-2 shows the location of the Loop Options:

- 1N & 1S: The Lough Eorna Loop (Northern and Southern Branches/Options)
- 2N & 2S: The Nenagh Loop (Northern and Southern Branches/Options)
- 3N & 3S: The Birr Loop (Northern and Southern Branches/Options)
- 4N & 4S: The Edenderry Loop (Northern and Southern Branches/Options)
- 5N & 5S: The Yellow River Loop (Northern and Southern Branches/Options)
- 6N & 6S: The Killinagh Loop (Northern and Southern Branches/Options)
- 7N & 7S: The Barreen Loop (Northern and Southern Branches/Options).

4 Corridor Sub - Options or "Loops"

4.1 The Lough Eorna Loop (Loop 1)

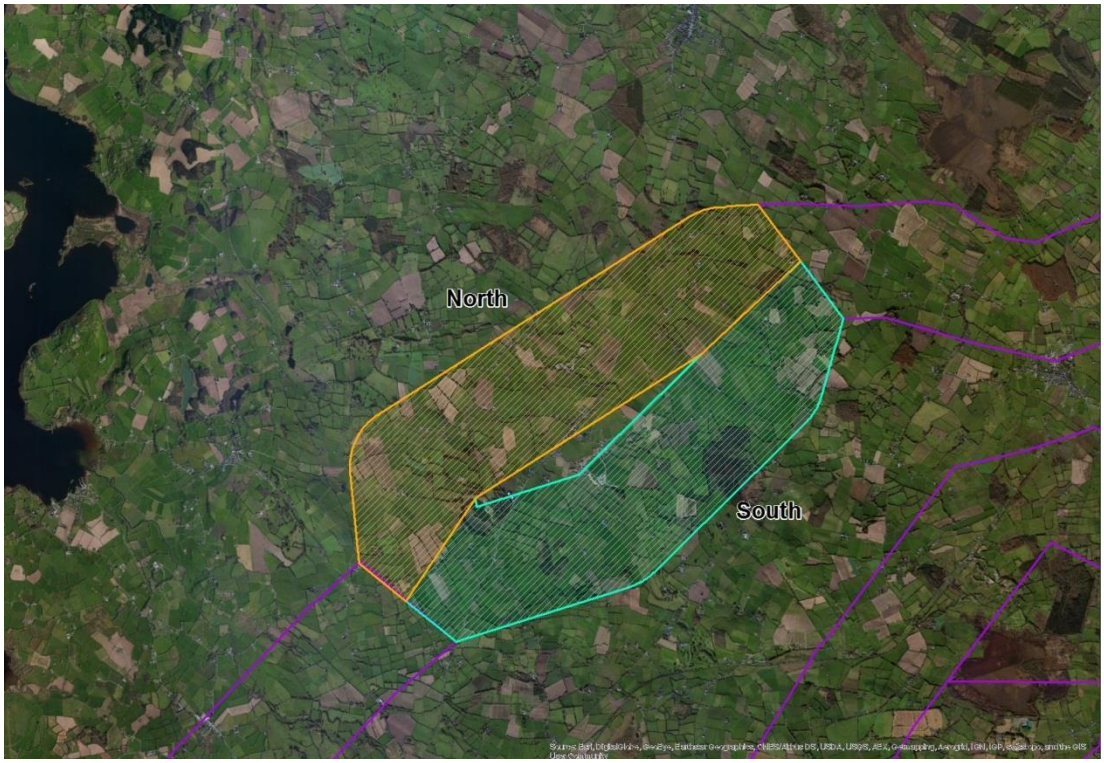


Figure F14 – 4 The Lough Eorna Loop

4.1.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses N52 National Secondary Road;
- Crosses up to 7 local roads.

These interfaces are considered to be of a low impact.

4.1.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses N52 National Secondary Road
- Crosses 4 local Roads

These interfaces are considered to be of a low impact.

4.1.3 Conclusion

As both branches cross the N52, there will be similar traffic disruption during construction of the road crossing. Access to the pipeline route via the N52 will also be alike.

Assuming the local roads will not be suitable for construction access and as the northern route crosses 7 local roads, this may lead to slightly more local disruption to local traffic during construction of each road crossing.

The southern branch is considered to be least constrained, given the lower number of local road crossings along this branch.

4.2 The Nenagh Loop (Loop 2)

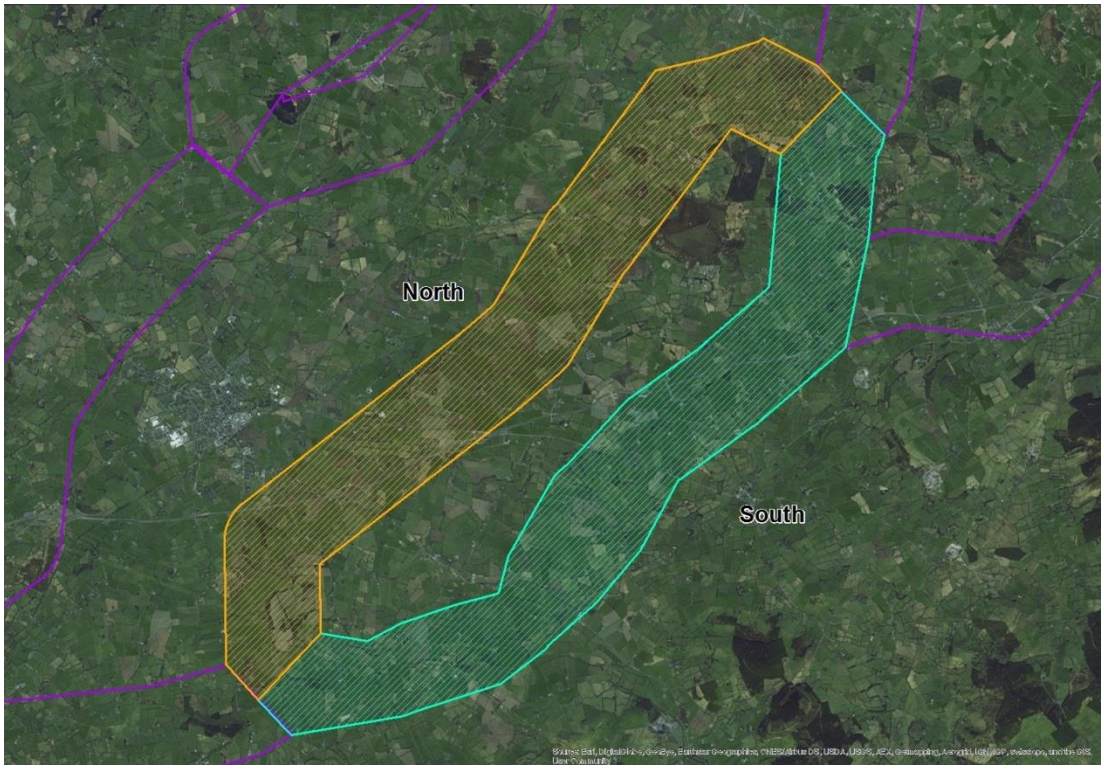


Figure F14 – 5 The Nenagh Loop

4.2.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses M7 Motorway - more potential to cross under motorway via existing bridge underpasses.
- Potential to Cross Limerick-Dublin Railway Line
- Crosses up to 3 Regional Roads
- Crosses up to 14 Local Roads

As there is a motorway and potential railway crossing along this branch, the interfaces are considered to be of a mid-range impact.

4.2.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses M7 Motorway
- Crosses up to 3 Regional Roads
- Crosses up to 14 Local Roads

Although this branch does not cross a railway line, it does incorporate a motorway crossing, with little potential for using existing underpasses; the interfaces are therefore considered to be of a mid-range impact.

4.2.3 Conclusion

Although both branches crossed the M7 motorway, the Northern Branch had more potential to cross under existing bridges, However the Northern Branch has the potential to cross the Limerick-Dublin Railway Line.

With the number of regional and local road crossings being equal, the southern branch is considered to be less constrained as it would avoid a railway crossing.

4.3 The Birr Loop (Loop 3)

Figure F14 – 6 The Birr Loop

4.3.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses 1 Regional Road
- Crosses up to 8 Local Roads

These interfaces are considered to be of a low impact.

4.3.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses up to 3 Regional Roads
- Crosses up to 5 Local Roads

These interfaces are considered to be of a low impact.

4.3.3 Conclusion

Assuming the local roads will not be suitable for construction access and with the southern branch having fewer local roads to cross and with potentially better construction access via the regional road network, the southern branch is considered to be the least constrained.

4.4 The Edenderry Loop (Loop 4)

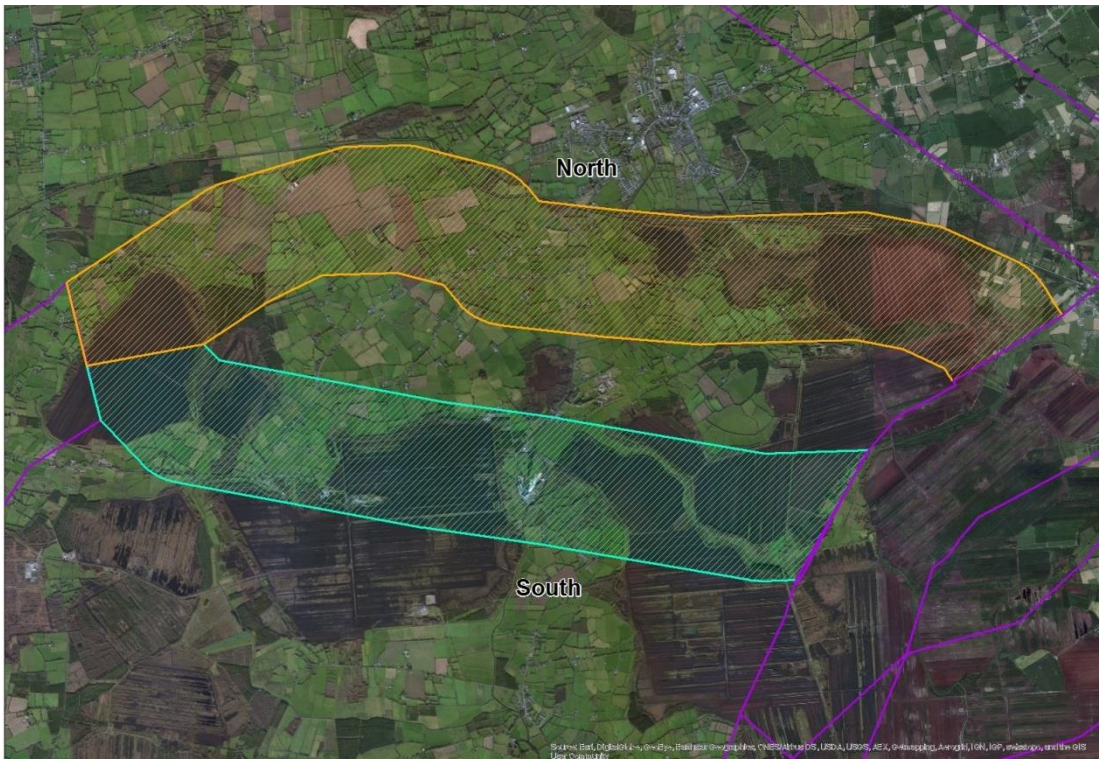


Figure F14 – 7 The Edenderry Loop

4.4.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses 2 Regional Road
- Crosses up to 9 Local Roads

These interfaces are considered to be of a low impact.

4.4.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses 2 Regional Road
- Crosses up to 4 Local Roads

These interfaces are considered to be of a low impact.

4.4.3 Conclusion

Assuming the local roads will not be suitable for construction access and with the southern branch having fewer local roads to cross, the southern branch is considered to be least constrained.

4.5 The Yellow River Loop (Loop 5)

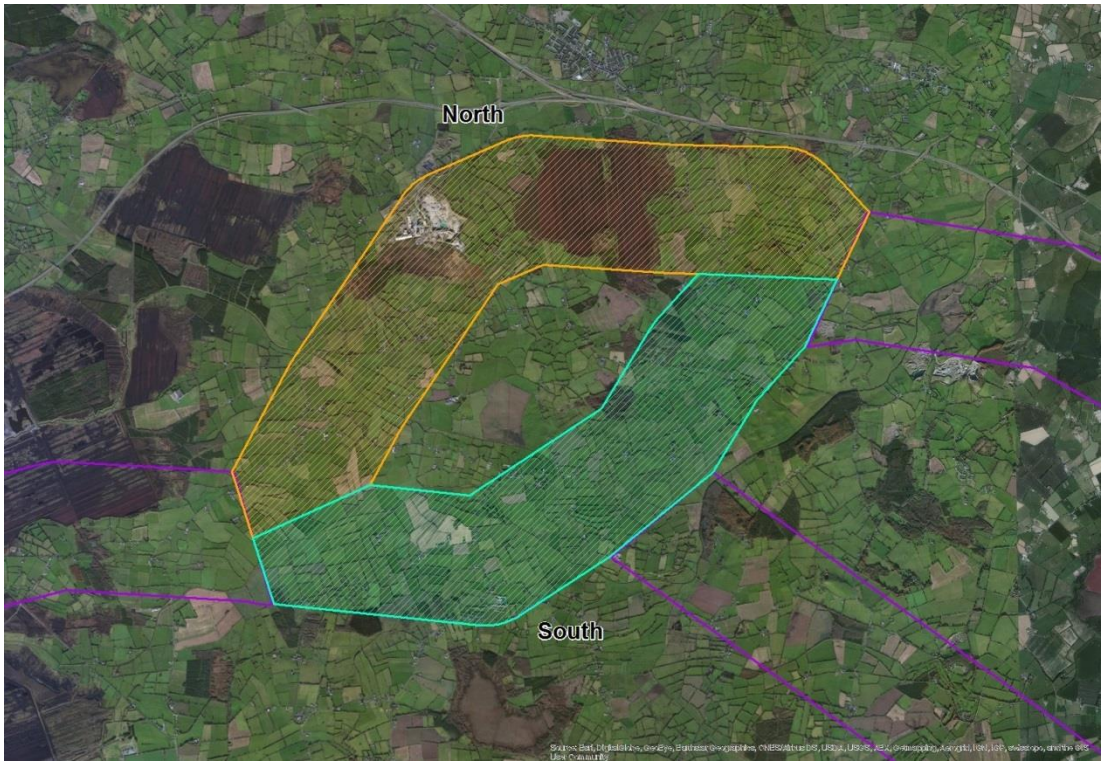


Figure F14 – 8 The Yellow River Loop

The northern branch intersects with the following transport corridors:

- Crosses 1 Regional Road
- Crosses up to 7 Local Roads

These interfaces are considered to be of a low impact.

4.5.1 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses 1 Regional Road
- Crosses up to 7 Local Roads

These interfaces are considered to be of a low impact.

4.5.2 Conclusion

There is no difference in the impact the two branch options would have on the interface with the regional and local road network on the Yellow River Loop. From and roads and traffic point of view, neither branch is preferred over the other.

4.6 The Killinagh Loop (Loop 6)

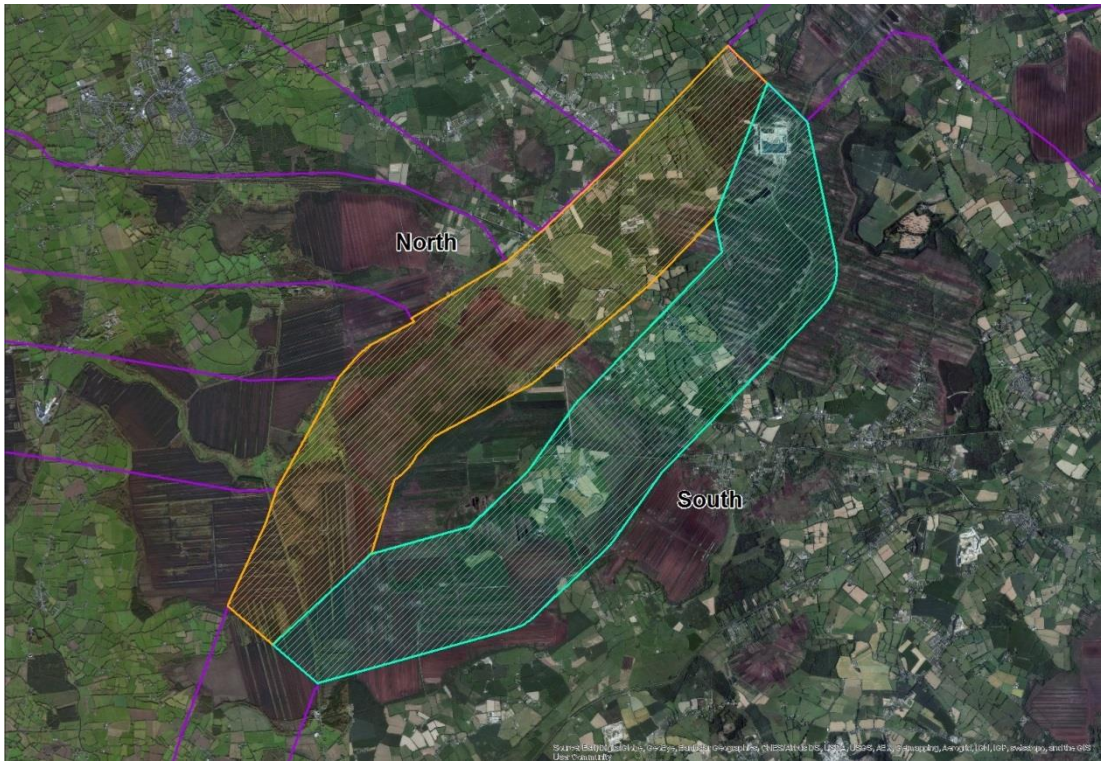


Figure F14 – 9 The Killinagh Loop

4.6.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses 1 Regional Road
- Crosses up to 4 Local Roads

These interfaces are considered to be of a low impact.

4.6.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses up to 3 Regional Roads
- Crosses up to 2 Local Roads

These interfaces are considered to be of a low impact.

4.6.3 Conclusion

The southern branch has fewer local roads to cross and with potentially better construction access via the regional road network. The southern branch is therefore considered to be marginally less constrained than the northern branch on the Killinagh Loop.

4.7 The Barreen Loop (Loop 7)

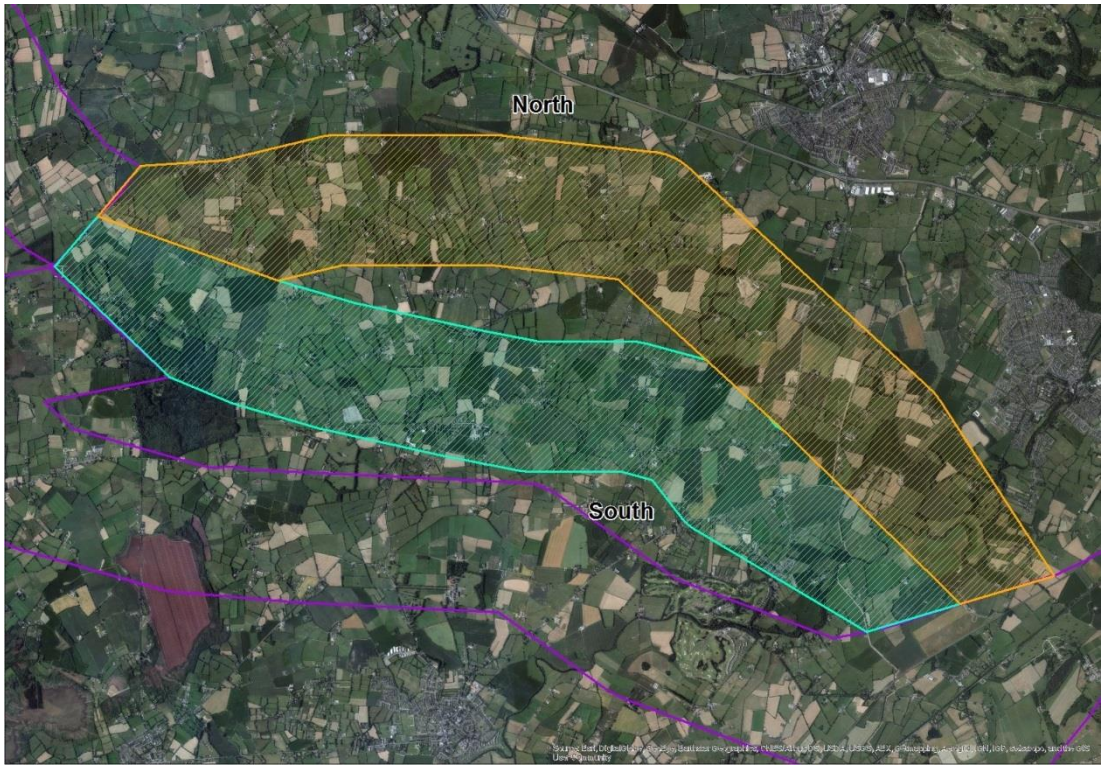


Figure F14 –10 The Barreen Loop

4.7.1 Northern Branch

The northern branch intersects with the following transport corridors:

- Crosses up to 4 Regional Roads
- Crosses up to 9 Local Roads

These interfaces are considered to be of a low impact.

4.7.2 Southern Branch

The southern branch intersects with the following transport corridors:

- Crosses up to 4 Regional Roads
- Crosses up to 10 Local Roads

These interfaces are considered to be of a low impact.

4.7.3 Conclusion

There is no significant difference in the impact the branch options on the Barreen Loop have on the interface with the regional and local road network. From a roads and traffic point of view, there is no preference for one branch over the other.

The Matrix of Multi Criteria analysis below summarises the assessment of all loop/branch options.

4.8 Matrix of Multi Criteria Analysis

Pipeline Loop 1 - " The Lough Eorna Loop"		Pipeline Loop 2 - "The Nenagh Loop"		Pipeline Loop 3 - "The Birr Loop"		Pipeline Loop 4 - "The Edenderry Loop"		Pipeline Loop 5 - "The Yellow River Loop"		Pipeline Loop 6 - "The Killinagh Loop"		Pipeline Loop 7 - "The Barreen Loop"	
North	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Low Impact: Crosses N52 Crosses up to 7 local roads	**Low Impact:** Crosses N52 Crosses 4 local Roads	**Mid-range Impact:** Crosses M7 - more potential to cross under motorway via existing bridge underpasses. Potential to Cross Limerick-Dublink Railway Line Crosses up to 3 Regional Roads Crosses up to 14 Local Roads	**Mid-range Impact:** Crosses M7 Crosses up to 3 Regional Roads Crosses up to 14 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 8 Local Roads	**Low Impact:** Crosses up to 3 Regional Roads Crosses up to 5 Local Roads	**Low Impact:** Crosses 2 Regional Road Crosses up to 9 Local Roads	**Low Impact:** Crosses up to 2 Regional Road Crosses up to 4 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 7 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 7 Local Roads	**Low Impact:** Crosses 1 Regional Road Crosses up to 4 Local Roads	**Low Impact:** Crosses up to 3 Regional Roads Crosses up to 2 Local Roads	**Low Impact:** Crosses up to 4 Regional Roads Crosses up to 9 Local Roads	**Low Impact:** Crosses up to 4 Regional Roads Crosses up to 10 Local Roads

Table F14 - 3 Summary of the MCA for Corridor sub-options or "Loops"

5 Preliminary Route Corridor A

5.1 Introduction

There are three route corridor options A1, A2 and A3 between the potential water source location near Ballina Co Tipperary and the start of the B corridor options at a location east of Birr Co Offaly, refer to Figure F14 – 11 below.

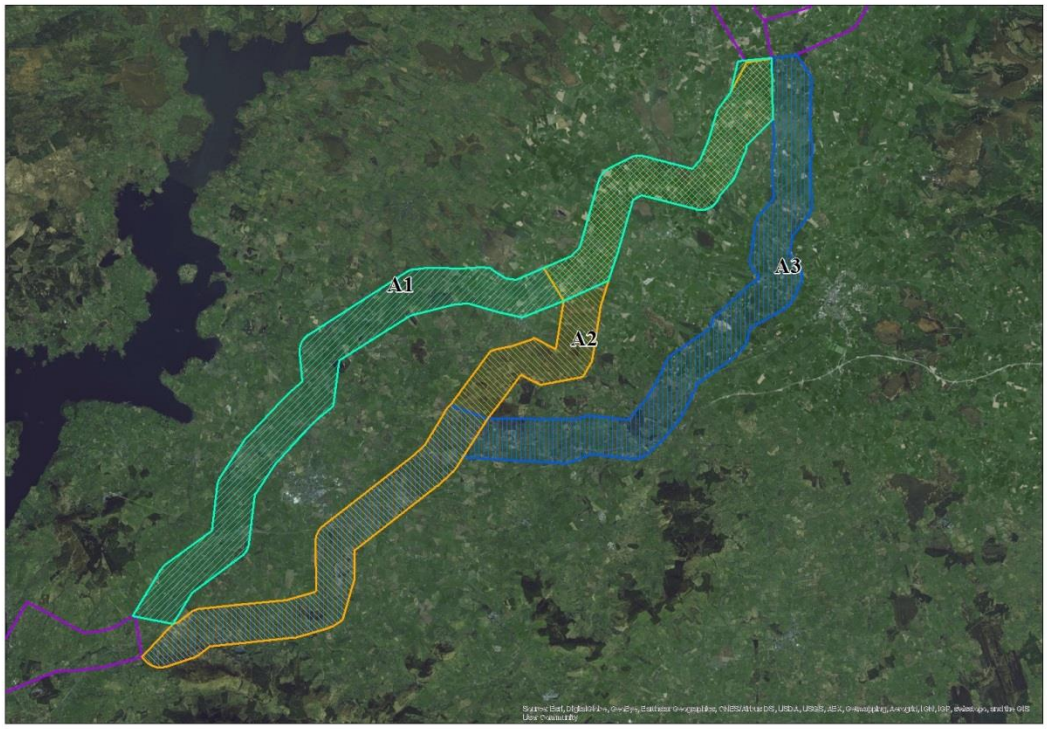


Figure F14 – 11 Preliminary Route Corridors and Loops

5.2 Route Corridor A1

Corridor A1 intersects with the following transport corridors:

- There are no crossings of the Railway network;
- There is significant potential for 2 crossings of the M7 motorway;;
- There are 2 crossings of National Roads;
- There are up to 8 crossings of Regional Roads;
- There are up to 19 crossings of Local Primary Roads;
- There are up to 20 crossings of Local Secondary and Tertiary Roads.

5.3 Route Corridor A2

Corridor A2 intersects with the following transport corridors:

- Up to 4 crossings of the Limerick - Dublin Railway line;
- Definite crossing of the M7 Motorway ;
- 1 National Road;

- Up to 10 Regional Roads;
- Up to 14 Local Primary Roads;
- Up to 18 Local Secondary and Tertiary Roads.

5.4 Route Corridor A3

Corridor A3 has the following potential impacts on the transport corridors it crosses:

- 1 crossing of the Limerick - Dublin Railway line ;
- Low potential for 2 crossings of the M7 motorway ;
- 1 crossing of a National Road;
- Up to 9 crossings of Regional Roads;
- Up to 11 crossings of Local Primary Roads and
- Up to 26 crossings of Local Secondary and Tertiary Roads.

5.5 Matrix of Multi Criteria Analysis

Criteria	Corridor A1	Corridor A2	Corridor A3
Number of crossings required for access road	Not applicable	Not applicable	Not applicable
Number of crossings of Motorways	**Mid-range Impact:** Significant potential to Cross M7 Motorway	**High Impact:** Definite Crossing of M7 Motorway Required	**Low Impact:** Low potential to Cross M7 Motorway
Number of crossings of National Roads	**Mid-range Impact:** 2 crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing
Number of crossings of Regional Roads	**Low Impact:** Up to 8 Crossings	**Low Impact:** Up to10 Crossings	**Low Impact:** Up to 9 Crossings
Number of crossings of Local Roads – Primary	**Mid-range Impact:** Up to 19 crossings	**Low Impact:** Up to 14 crossings	**Low Impact:** Up to 11 crossings
Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** Up to 20 crossings	**Low Impact:** Up to 18 crossings	**Mid-range Impact:** Up to 26 crossings
Number of Railway Crossings	**Very Low Impact:** No Railway Crossing	**High Impact:** Up to 4 no Crossings of Limerick - Dublin Railway Required	**Mid-range Impact:** 1 No Crossing of Limerick to Dublin Railway Required

Table F14 - 4 Summary of the MCA for Route Corridors A

5.6 Comparative Discussion

Overall, Corridor A2 is considered to have the greatest impact on major transport infrastructure with a high impact on the railway (4 crossings of the Limerick – Dublin line) and motorway networks (crossing of the M7).

With corridor A1 having fewer local secondary and tertiary roads to cross than either Corridor A2 or A3, and with potentially better construction access via the national, regional road and local primary road network, corridor A1 is considered to be least constrained.

6 Preliminary Route Corridor B

6.1 Introduction

There are two route corridor options B1 and B2 on the BC route corridor, refer to Figure F14 – 12 below.

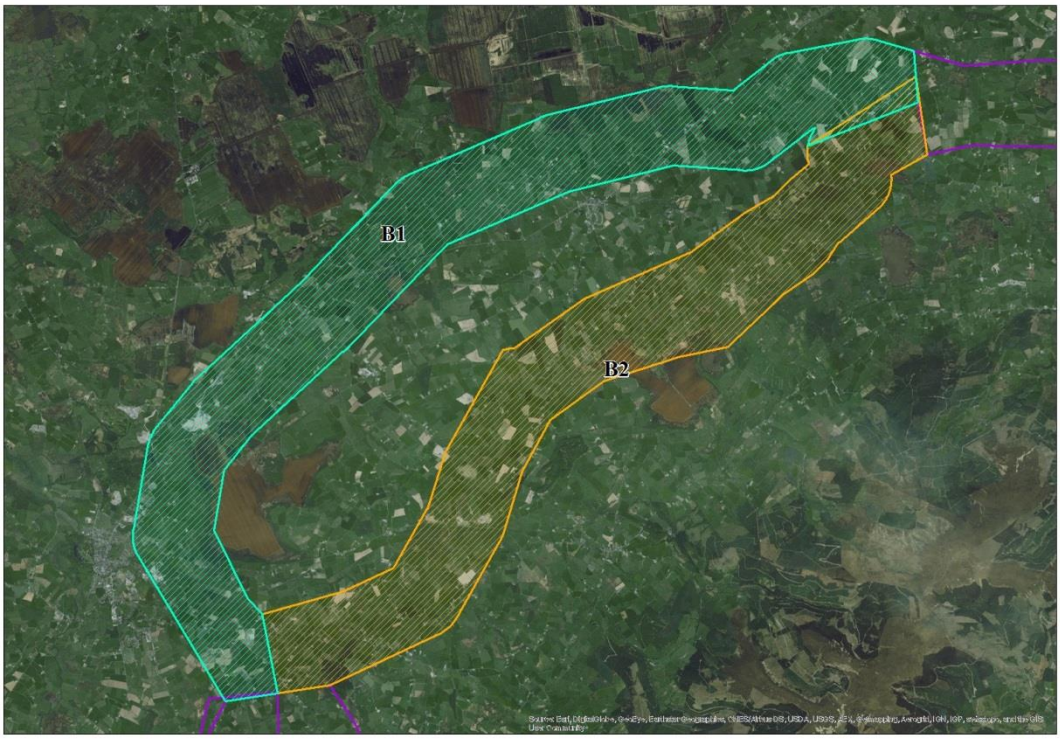


Figure F14 – 12 Preliminary Route Corridors and Loops

6.2 Route Corridor B1

Route Corridor B1 intersects with the following transport corridors:

- Crosses up to 3 National Roads;
- Crosses 2 Regional Roads;
- Crosses up to 4 Local Primary Roads;
- Crosses up to 16 Local Secondary and Tertiary Roads.

This Corridor does not cross the railway or the motorway networks.

6.3 Route Corridor B2

Route Corridor B1 does not contain any intersections with the railway, motorway of National roads networks. It does however contain the following intersections with Regional and Local roads:

- Crosses up to 3 Regional Roads;
- Crosses 3 Local Primary Roads;
- Crosses up to 16 Local Secondary and Tertiary Roads.

6.4 Matrix of Multi Criteria Analysis

Criteria	Corridor B1	Corridor B2
Number of crossings required for access road	Not Applicable	Not Applicable
Number of crossings of Motorways	None	None
Number of crossings of National Roads	**Mid-range Impact:** Up to 3 crossings	None
Number of crossings of Regional Roads	**Low Impact:** 2 crossings	**Low Impact:** 1 definite and 2 unlikely crossings
Number of crossings of Local Roads - Primary	**Low Impact:** Up to 4 crossings	**Low Impact:** 3 crossings
Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** up to 16 crossings	**Low Impact:** up to 16 crossings
Number of Railway Crossings	None	None

Table F14 - 5 Summary of the MCA for C Route Corridors B

6.5 Comparative Discussion

Although Corridor B2 may have fewer total road crossings than B1, and no crossings of National roads and therefore less traffic disruption during construction, it is considered that there is potentially better construction access via the national, regional road and local primary road network to Corridor B1. Therefore corridor B1 is considered to be least constrained from a roads and traffic perspective.

7 Preliminary Route Corridor C

7.1 Introduction

There are four route corridor options C1, C2, C3 and C4 on the CD route corridor, refer to Figure F14 – 13 below.

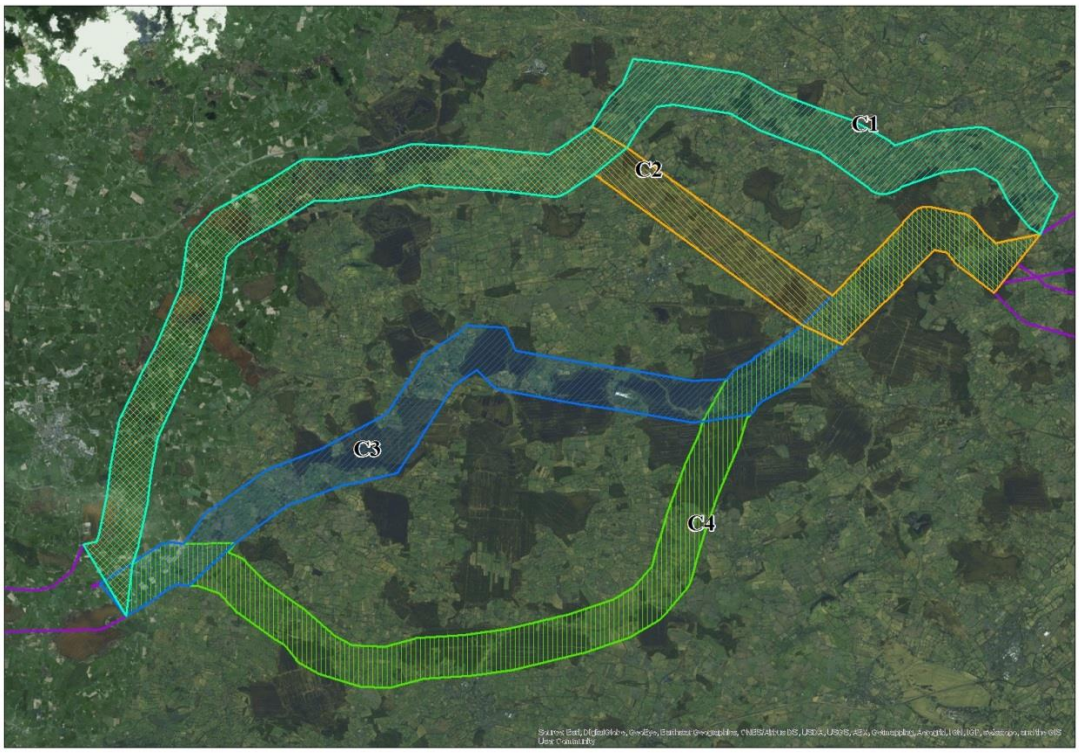


Figure F14 – 13 Preliminary Route Corridors and Loops

7.2 Route Corridor C1

Corridor C1 does not contain any crossings of the motorway network. It does however intersect with the following transport corridors:

- 1 crossing of the Athlone to Portarlington Railway line;
- 1 crossing of a National Road;
- 4 crossings of Regional Roads;
- 3 crossings Local Primary Roads and
- Up to 29 Local Secondary and Tertiary Roads crossings.

7.3 Route Corridor C2

As with Corridor C1, Corridor C2 does not cross the motorway network, but intersects with the following transport corridors:

- 1 crossing of the Athlone to Portarlington Railway line;
- 1 crossing of a National Road;
- Crosses 5 crossings of Regional Roads;
- Crosses 4 crossings of Local Primary Roads and

- Up to 28 Local Secondary and Tertiary Roads.

7.4 Route Corridor C3

Corridor C3 contains the following intersections with the roads and rail networks:

- 1 crossing of the Athlone to Portarlington Railway line;
- 1 National Road crossing;
- 6 Regional Roads crossings;
- Up to 4 Local Primary Roads crossings;
- Up to 14 Local Secondary and Tertiary Roads.

This corridor does not cross the motorway network.

7.5 Route Corridor C4

Corridor C4 does not cross any motorways but intersects with the following transport corridors:

- 1 crossing of the Athlone to Portarlington Railway line;
- 1 crossing of a National Road;
- 5 crossings of Regional Roads;
- Up to 6 Local Primary Roads crossings and
- Up to 16 Local Secondary and Tertiary Roads crossings.

7.6 Matrix of Multi Criteria Analysis

Criteria	Corridor C1	Corridor C2	Corridor C3	Corridor C4
Number of crossings required for access road	Not applicable	Not Applicable	Not Applicable	Not Applicable
Number of crossings of Motorways	**None**	**None**	**None**	**None**
Number of crossings of National Roads	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing	**Very Low Impact:** 1 crossing
Number of crossings of Regional Roads	**Low Impact:** 4 crossings	**Low Impact:** 5 crossings	**Low Impact:** 6 crossings	**Low Impact:** 5 crossings
Number of crossings of Local Roads - Primary	**Low Impact:** 3 crossings	**Low Impact:** 4 crossings	**Low Impact:** up to 4 crossings	**Low Impact**: up to 6 crossings
Criteria	**Corridor C1**	**Corridor C2**	**Corridor C3**	**Corridor C4**
Number of crossings of Local Roads - Secondary / Tertiary	**Mid-range** Impact: up to 29 crossings	**Mid-range** Impact: up to 28 crossings	**Low Impact:** up to 14 crossings	**Low Impact:** up to 16 crossings
Number of Railway Crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing

Table F14 - 6 Summary of the MCA for C Route Corridors B

7.7 Comparative Discussion

There is little to separate the roads and traffic impacts of the four Corridors under consideration from the number of crossings on National, Regional and Local Primary Road network. Corridors C3 and C4 are considered to have the least impact on the local secondary and tertiary road network.

Given that Corridor C3 has slightly fewer local secondary and tertiary road crossings and that there is potentially better construction access via the regional road network to Corridor C3 than to Corridor C4, Corridor C3 is considered to be least constrained by a slight margin.

8 Preliminary Route Corridor D

8.1 Introduction

There are two route corridor options D1 and D2 on the DE route corridor, refer to Figure F14 – 14 below.

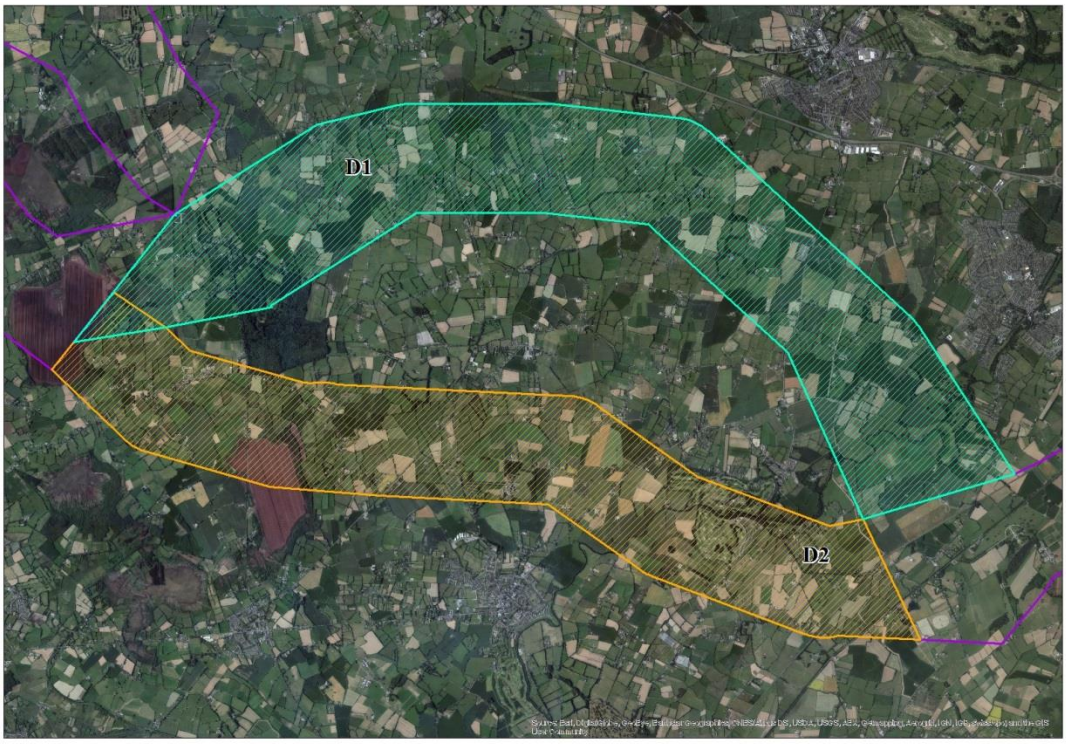


Figure F14 – 14 Preliminary Route Corridors and Loops

8.2 Route Corridor D1

There are no crossings of the motorway or National roads networks along Corridor D1. The Corridor does intersect with the following transport corridors:

- 1 crossing of the Portarlington to Dublin Railway line;
- ;
- 4 Regional Roads crossings;
- Up to 2 Local Primary Roads crossings and
- Up to 12 Local Secondary and Tertiary Roads crossings.

8.3 Route Corridor D2

D2 does not cross the motorway or National roads networks but does incorporate crossing with the following transport corridors:

- 1 crossing of the Portarlington to Dublin Railway line;
- 4 Regional Roads crossings;
- Up to 2 Local Primary Roads crossings and
- Up to 9 Local Secondary and Tertiary Roads crossings.

8.4 Matrix of Multi Criteria Analysis

Criteria	Corridor D1	Corridor D2
Number of crossings required for access road	Not Applicable	Not Applicable
Number of crossings of Motorways	None	None
Number of crossings of National Roads	None	None
Number of crossings of Regional Roads	**Low Impact:** 4 crossings	**Low Impact:** 4 crossings
Number of crossings of Local Roads - Primary	**Low Impact:** up to 2 crossings	**Low Impact:** up to 2 crossings
Criteria	**Corridor D1**	**Corridor D2**
Number of crossings of Local Roads - Secondary / Tertiary	**Mid-range Impact:** up to 12 crossings	**Low Impact:** up to 9 crossings
Number of Railway Crossings	**Low Impact:** 1 crossing	**Low Impact:** 1 crossing

Table F14 - 7 Summary of the MCA for Route Corridors D

8.5 Comparative Discussion

Assuming the local secondary and tertiary roads will not be suitable for construction access and with Corridor D2 having fewer local secondary and tertiary roads to cross, Corridor D2 is considered to be least constrained by a slight margin.

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