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Water Supply Project

Eastern and Midlands Region

Preliminary Options Appraisal Report

Volume 5

Appendix G
Desalination MCA

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Water Supply Project
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Appendix G: Desalination MCA

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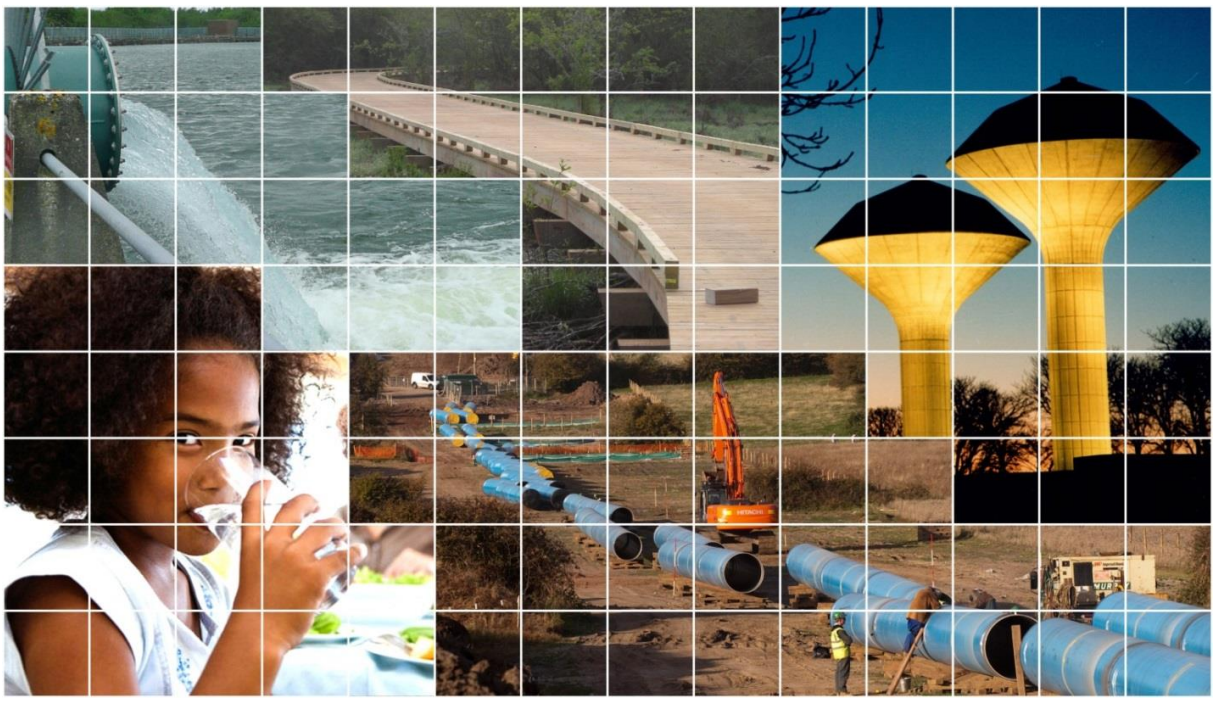


Contents

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 H (Desalination)**.

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 G - 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 G - 1 Appraisal Criteria

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

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 G - 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 G13) and mapping of known constraints (refer to appendix G2).

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 G3 – Ecology (Terrestrial)

Appendix G4 – Ecology (Aquatic) & Fisheries

Appendix G5 – Surface Water Environment

Appendix G6 – Air

Appendix G7 – Noise

Appendix G8 – Cultural Heritage

Appendix G9 – Landscape and Visual

Appendix G10 – Agronomy

Appendix G11 – Soils, Geology and Hydrogeology

Appendix G12 – Planning

Appendix G13 – Engineering and Design

Appendix G14 – 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 H (Desalination).

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

Ref.	Criteria	Corridor D1	Corridor D2
1.0	**Environmental**		
1.1	**Biodiversity, Flora & Fauna**	**Low:** This option does not cross any European site. It is within the drainage catchment of European sites and hence linked.	**Moderate:** This option does not cross any European site. It is within the drainage catchment of European sites and hence linked.
1.1.1	Potential to impact on Natura 2000 Sites	**Very Low:** Natural Heritage Areas and proposed Natural Heritage areas are well removed from this option.	**Low:** Natural Heritage areas are removed from this option. Bog of the Ring pNHA (within 1.5km) and Knock Lake pNHA (0.5km) are relatively close to this corridor.
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Low:** Designated Annex I listed habitats are directly avoided however they are located downstream.	**Low:** Designated Annex I listed habitats are avoided however they are located downstream.
1.1.3	Potential impact Annex I listed habitats (designated)	**Low:** The managed landscape crossed means risks of impacting non-designated Annex I habitats are low	**Low:** The managed landscape crossed means risks of impacting non-designated Annex I habitats are low
1.1.4	Potential impact Annex I listed habitats (non-designated)	**Moderate:** The route crosses approximately 30.8km of farmland with numerous field boundaries (hedgerows and treelines) which would be directly impacted.	**Moderate:** The route crosses approximately 35.3km of farmland with numerous field boundaries (hedgerows and treelines) which would be directly impacted.
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	**Low:** The managed farmland nature of the landscape means the risk of encountering protected flora is low.	**Low:** The managed farmland nature of the landscape means the risk of encountering protected flora is low.
1.1.6	Potential to impact on protected Flora - Flora Protection Order	**Low:** Otter are the most likely species to be encountered along this route at rivers and smaller streams.	**Low:** Otter are the most likely species to be encountered along this route at rivers and smaller streams.
1.1.7	Potential to impact on Annex II species	**Moderate:** Bat species will potentially roost in more mature treelines which may be directly impacted.	**Moderate:** Bat species will potentially roost in more mature treelines which may be directly impacted.
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	**Low:** The route corridor avoids identified winter bird sites and SPA's. Kingfisher (Annex I listed) may use rivers crossed.	**Low:** The route corridor avoids identified winter bird sites and SPA's. Kingfisher (Annex I listed) may use rivers crossed.
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Moderate:** Badger and breeding bird species will likely use hedgerows and mature treelines which will be directly impacted.	**Moderate:** Badger and breeding bird species will likely use hedgerows and mature treelines which will be directly impacted.
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
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)	**Low:** The route corridor avoids SPA's and as the corridor will be underground, loss/disturbance to habitat used by coastal species will be minimised.	**Very Low:** The route corridor avoids SPA's and as the corridor will be underground, loss/disturbance to habitat used by coastal species will be minimised.
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** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206).	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206
1.2.3	Potential impact Annex I listed habitats (designated)	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206

Ref.	Criteria	Corridor D1	Corridor D2
1.2.4	Potential impact Annex I listed habitats (non-designated)	**Very low impact.** No non-designated Annex I aquatic habitats recorded for these water bodies.	**Very low impact.** No non-designated Annex I aquatic habitats recorded for these water bodies.
1.2.5	Potential to impact high ecological value habitats (semi natural habitats)	**Very low impact.** No high ecological aquatic habitats recorded for these waterbodies.	**Very low impact.** No high ecological aquatic habitats recorded for these waterbodies.
1.2.6	Potential to impact on protected Flora - Flora Protection Order	**Very low impact.** No protected aquatic flora or fauna recorded for these water courses.	**Very low impact.** No protected aquatic flora or fauna recorded for these water courses.
1.2.7	Potential to impact on Annex II species	**Very low impact.** No Annex II species recorded for these water courses.	**Very low impact.** No Annex II species recorded for these water courses.
1.2.8	Potential to Impact on Annex IV species (wherever they occur)	**Very low impact.** No Annex IV species recorded for these water courses.	**Very Low impact.** No Annex IV species recorded for these water courses.
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	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Reg	**Very low Impact** There are no known Freshwater Pearl Mussels in these water courses.	**Very low Impact** There are no known Freshwater Pearl Mussels in these water courses.
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.
1.2.14	Potential to impact on coastal zone habitats (intertidal)	**Very Low:** The corridors do not extend into coastal intertidal habitats	**Very Low:** The corridors do not extend into coastal intertidal habitats
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	**Very Low:** The corridors do not extend into subtidal habitats.	**Very Low:** The corridors do not extend into subtidal habitats
1.2.16	Potential to impact marine/coastal birds	*See terrestrial section*	*See terrestrial section*
1.2.17	Potential to impact marine mammals	*See terrestrial section*	*See terrestrial section*
1.3	**Fisheries**		
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	**Very Low:** The corridors do not extend into inshore fishing grounds.	**Very Low:** The corridors do not extend into inshore fishing grounds.
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 impact.**	**Moderate**
1.4.2	Significance of Impact – Watercourse Crossings	**Moderate**	**Low impact.**
1.5	**Air/Climatic Factors**		
	Air		
1.5.1	Potential for Construction phase Air Quality impact at Sensitive receptors	The area is predominantly suburban with mixed density residential development. Low impacts during construction phase	The area is predominantly rural/suburban with low density residential development. Very low impacts during construction phase, less predicted impacts in this corridor
1.5.2	Potential for Operational phase Air Quality impact at Sensitive receptors	Low impacts during operational phase, only operational impacts would be due to traffic generated from staff	Very low impacts during operational phase, only operational impacts would be due to traffic generated from staff
1.5.3	Proximity to EPA Waste Licensed facility	No facilities present in study area	No facilities present in study area

Ref.	Criteria	Corridor D1	Corridor D2
1.5.4	Proximity to EPA IPPC Licensed Intensive Agriculture facility	There are no EPA IPPC licenced facilities for intensive agriculture present in study area	There are no EPA IPPC licenced facilities for intensive agriculture present in study area
1.5.5	EPA Air Quality Zone Classification	Zone A and zone D	Zone A, with majority within zone D
1.5.6	Wind Rose Assessment	Dublin Airport Windrose (2010-2014) identifies west-south prevailing wind	Dublin Airport Windrose (2010-2014) identifies west-south prevailing wind
1.5.7	Construction Phase Impact rating	Low impact from construction dust emissions	Low impact from construction dust emissions
1.5.8	Operational Phase Impact rating	Low impact due to additional traffic (likely to be minimal) generated by development	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 suburban with mixed density residential development. 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 this proposed corridor. This route corridor passes slightly higher density residential receptors at Swords, Lusk, Skerries and Balbriggan south. As such a slightly higher rating by comparison to corridor DS2 has been applied	The area is predominantly rural/suburban with low density residential development. 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 this proposed corridor. This route corridor passes slightly lower density residential receptors and as such a slightly lower rating by comparison to corridor DS1 has been applied
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.	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 across the majority of the route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. Both routes pass the M2 and M1 motorways and therefore there will be sections along the route where ambient noise levels will be increased.	Existing ambient noise climate likely to be reasonably low across the majority of the route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. Both routes pass the M2 and M1 motorways and therefore there will be sections along the route where ambient noise levels will be increased.
1.5.12	Construction Phase Impact rating	Low noise impact expected during construction phase	Very low noise impact expected during construction phase
1.5.13	Operational Phase Impact rating	Low noise impact expected during operational phase	Very low noise impact expected during 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)	Low as only five are recorded within the corridor, which covers a large area	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 (183) are recorded within the corridor although the area itself is large	Mid-range as a large amount of sites (106) are recorded within the corridor although the area itself is large
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	Mid-range as a large amount of sites (84) are recorded within the corridor although the area itself is large	Low as only 40 are recorded within the corridor, which covers a large area
1.7.4	Potential to impact (direct/indirect) on NIAH	Low as only 34 are recorded within the corridor, which covers a large area	Low as only 25 are recorded within the corridor, which covers a large area
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	Mid-range as 18 landscapes are recorded within the corridor although the area itself is large	Mid-range as 19 landscapes are recorded within the corridor although the area itself is large
1.7.6	Potential to impact on ACA	Very low as only 2 are recorded within the corridor, which	Low as 4 are recorded within the corridor, which covers a large

Ref.	Criteria	Corridor D1	Corridor D2
		covers a large area	area
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 – Passes through designated 'highly sensitive' coastal landscape area between Skerries and Rush	Mid range – Incorporates a sensitive landscape designation associated with Balscadden (FCC) and the 'Coastal Plains' and 'Ward Lowlands' LCAs of County Meath.
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	Low – skirts coastline between Balbriggan and Skerries but this can be avoided	Very Low – a modified and fairly typical rural landscape
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	Low – hedgerows and treelines throughout	Low – hedgerows and treelines throughout
1.8.4	Potential to impact on woodlands and significant tree groups	Mid range – Mature parkland/woodlands at Ardgillan Demesne and Milverton Demesne near Skerries	Very low – there would not appear to be any significant woodlands within the corridor
1.8.5	Potential to impact on historic designed landscapes	Mid range – Mature parkland/woodlands at Ardgillan Demesne and Milverton Demesne near Skerries	Low – Some small demesnes / demesne remnants (see cultural heritage appraisal), but these could be avoided through refinement
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 – passes through coastal area with numerous designated scenic views but will not result in a permanent intrusion	Low – encompasses numerous scenic views in the hilly landscape of north Fingal / southeast Meath, but no permanent visual intrusion
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	Low – Ardgillan Castle but will not result in a permanent intrusion	Low – does not appear to be any such features
1.8.9	Potential to impact on views from settlements	Low – runs in close proximity to Balbriggan, Skerries, Lusk and Swords	Very Low – tends to thread between notable settlements
1.8.10	Potential to impact on views from dwellings / local roads	Low - some relatively dense clusters of rural housing throughout this part of North County Dublin	Low – Some relatively dense clusters of rural development and small settlements such as Naul
1.8.11	Potential to impact on views from motorways	Low – crosses M1 and M2 motorways	Low – crosses M1 and M2 motorways
1.8.12	Potential to impact on views from other major roads (national or regional roads)	Low – crosses several regional roads	Low – crosses several regional roads
1.8.13	Potential to impact on views from rail lines	Low – encompasses a small section of Dublin-Belfast railway line northwest of Skerries	Very low – Dublin – Belfast railway line only crossed at common node with DS1
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	Very low – although it passes relatively close to Dublin airport it does not represent a noticeable permanent intrusion in the landscape	Very low – considerable distance from Dublin Airport
1.8.15	Potential to impact on views from national 'way marked' walking routes	Very Low – no national Way marked walks within the corridor	Very Low – no national Way marked walks within the corridor
1.8.16	Potential to impact on local walks	Low - Fingal 'Green Infrastructure' maps identify several coastal walking loops	Very low - No formalised walks apparent
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	Low – North County Dublin beaches	Very low - none apparent
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	Mid-range	Mid-range
1.13	**Soils, Geology and Hydrogeology**		
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	**Very Low Potential** Northern Section – Lm - Locally Important Aquifer, moderately	**Very Low Potential** Northern Section – Lm - Locally Important Aquifer, moderately

Ref.	Criteria	Corridor D1	Corridor D2
		productive. Narrow band of karstified aquifer across the corridor, west of Skerries. Southern Section – Majority of southern section classified as a Poor Aquifer (Pl) with areas of Ll -Locally Important Aquifer, moderately productive only in local zones. Low potential impact on the aquifer.	productive. Southern Section – Ll -Locally Important Aquifer, moderately productive only in local zones. Small areas classified as Poor Aquifers. Low potential impact on the aquifer.
1.13.2	Vulnerability Classification - potential for groundwater contamination	**Midrange:** 50% of the corridor –Low Groundwater Vulnerability with areas of Moderate-Extreme vulnerability in the northerly section of corridor and majority of southern section of the corridor (with some rock at surface)	**Midrange:** Majority of the corridor –Low Groundwater Vulnerability with areas of Moderate-Extreme vulnerability in the northern section and extreme south of corridor (with some rock at surface)
1.13.3	GSI Groundwater Protection Response matrix	**Midrange:** No data available for this area	**Midrange:** 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:** No features identified in this area	**Very Low:** 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:** The Bog of the Ring groundwater abstraction scheme is located between DS1 and DS2. The source protection area for this groundwater source is not impacted by the DS1 Corridor option.	**Midrange:** The Bog of the Ring groundwater abstraction scheme is located between DS1 and DS2. An area of the Outer Protection Zone (SO) encroaches on the north eastern section of Corridor DS2 (and should be avoided if possible)
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	**Very Low:** There are no Irish Geological Heritage Features identified in this corridor.	**Low to Midrange:**. A County Geological Site (CGS) is identified by the GSI at Priest Town. Described as a Limestone boulder moraine (2km long morainic ridge). Consultation with GSI important if route is selected near this location. Not obvious on site.
1.13.7	Potential to interact with contaminated land	**Midrange:** large sections of this corridor are located in developed areas where there may be Brownfield sites	**Midrange:** large sections of this corridor are located in developed areas where there may be Brownfield sites
1.13.8	Potential to sterilise mineral resource	**Low to Midrange:** no mines identified. Two quarries identified to the south of DS1, Huntstown Quarry and Bay Quarry.	**Low potential:** no mines identified. One quarry identified near the western boundary of the corridor at Priest Town. Not obvious on site.
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciples during construction - noise, dust etc)	**Low to Midrange:** areas where rock is at surface or near surface	**Low to Midrange:** areas where rock is at surface or near surface
1.13.10	Potential impact on karst features	**Low potential:** no karst features identified in this area. But one band of karstified aquifer recorded in the northern area, west of Skerries.	**Low potential:** One karst feature identified near the corridor: A CGS, Limestone boulder moraine (2km long morainic ridge) at Priest Town.
1.13.11	Potential to encounter soft ground	**Low potential impact**: no peat or wetland areas recorded in this area	**Low potential:** no peat or wetland areas recorded in this area
1.13.12	Soils Types	**Low potential:** no peat/bog identified in this area	**Low potential:** no peat/bog identified in this area
1.13.13	Sub Soil Types	**Low potential:** Gleys and Tills. Low potential for negative impact as no peat/bog identified in this area	**Low potential:** Gleys and Tills. Low potential for negative impact as no peat/bog identified in this area
1.13.14	Depth to rock	**Low:** Primarily >10m depth to bedrock, with rock at surface in places.	**Low:** Primarily >10m depth to bedrock, with rock at surface in places.
2.0	**Technical**		
2.1	**Planning Policy**		
	Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve areas identified for growth; care to be taken with location of pipeline with respect to wayleaves.	Pipeline suitable to serve areas identified for growth; care to be taken with location of pipeline with respect to wayleaves, although this option is more rural.
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.	3.4	2.4
2.2.2	Major Obstructions (National Primary/Secondary Roads, Major	Mid Range – this route requires 7no. Crossings	Mid Range – this route requires 5no. Crossings

Ref.	Criteria	Corridor D1	Corridor D2
	Rivers, Railways)		
2.2.3	Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	Mid Range – this route requires 75no. Crossings	Low – this route requires 46no. Crossings
2.2.4	Karst	Low – GSI database notes 3no. karst features along route	Low – GSI database notes 1no. karst features along route
2.2.5	Subsoils	Mid Range - this route contains 5% alluvium, 4% made ground and 3% shallow bedrock	Mid Range - this route contains 4% alluvium and 3% shallow bedrock
2.2.6	Accessibility	Low - the route is served by the M1/M2 and several regional roads	Low - the route is served by the M1/M2 and several regional roads
2.2.7	Elevation Profile	High – the route has significant elevation changes	Mid Range – the route has a relatively consistent elevation range, with some changes near its midpoint
2.3	**Traffic**		
2.3.1	Number of crossings required for access road	Not Applicable – Existing roads to be utilised	Not Applicable – Existing roads to be utilised
2.3.2	Number of crossings of Motorways	**High Impact -** Definite Crossing of M1 & M2/N2 Motorways Required	**High Impact:** Definite Crossing of M1 & M2/N2 Motorways Required
2.3.3	Number of crossings of National Roads	**Very Low Impact:** 0 crossings	**Very Low Impact:** 0 crossings
2.3.4	Number of crossings of Regional Roads	**Mid range impact:** 12 crossings	**Mid range impact:** 8 crossings
2.3.5	Number of crossings of Local Roads - Primary	**Low Impact:** 31 crossings (Primary, Secondary & Tertiary Combined)	**Low Impact:** 28 crossings - however more urban class roads to be crossed Primary, Secondary & Tertiary Combined)
2.3.6	Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** 31 crossings (Primary, Secondary & Tertiary Combined)	**Low Impact: 28 crossings - however more urban class roads to be crossed.**
2.3.7	Number of Railway Crossings	**Mid range impact:** Definite 1 no Crossings of Dublin - Belfast Railway Required	**Mid range impact:** Definite 1 no Crossings of Dublin - Belfast Railway Required
2.4	**Capital and Operational Costs**		
2.4.1	CAPEX	€ 70 – 80million	€ 65 – 75million
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.

4.1 Least constrained DS Route Corridor

The MCA process identified Route Corridor DS2 as the least constrained.

Route Corridor DS2 is considered to be the least constrained for the following reasons:

- Impacts to terrestrial ecology will be less than on DS1.
- More favorable elevation profile with relatively good access to the primary and secondary road network.
- Least potential for encountering poor ground and karst features
- Fewer total road crossings and further from high traffic volumes into and out of Dublin

Water Supply Project – Eastern and Midlands Region

Appendix G: Desalination MCA

Appendix G2: Idenification 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 to date:

- Balbriggan as the least constrained abstraction location for a Desalination Option, and
- Peamount as the least constrained terminal location, serviced via the Ballycoolin Reservoir in North Dublin.

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 0);

2. Areas were excluded where a constraint or combination of constraints ("Red" or "Amber" classification as listed in Chapter 0) 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 0) were of sufficient area to influence the routing of 2km route corridors. (detailed in Chapter 0);

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

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 G2-1 below.

Table G2 – 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	
Zoning Ireland	DoECLG		x	
Lakes WFD	EPA		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

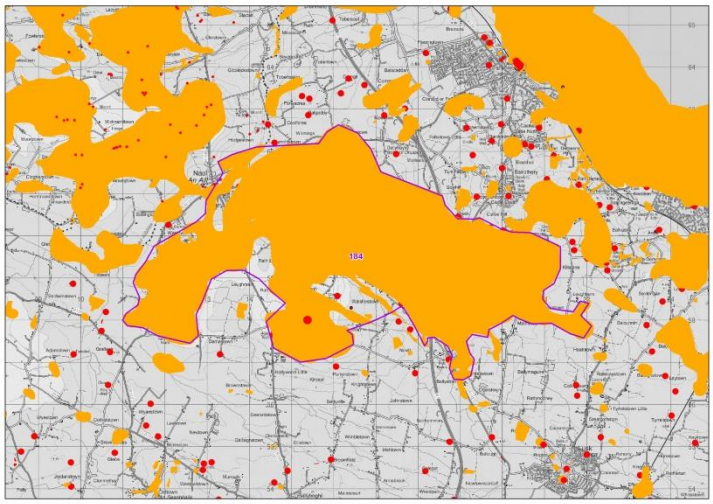
Dataset	Source	High	Medium	Low
Commonage Base Station 2011	NPWS			x
Commonage Base SU 2011	NPWS			x
High Power Electric Transmission Lines	ESB			x for Material Assets
WFD Groundwater Bodies	EPA			x
Groundwater Zones of Contribution	EPA			x
Blue Flag Beaches	MIDA			x
Fishing Spots	MIDA			x
Green Coast 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 buildings for the purposes of this constraint mapping process.

3 Areas Removed From "White Space" Based on Constraints

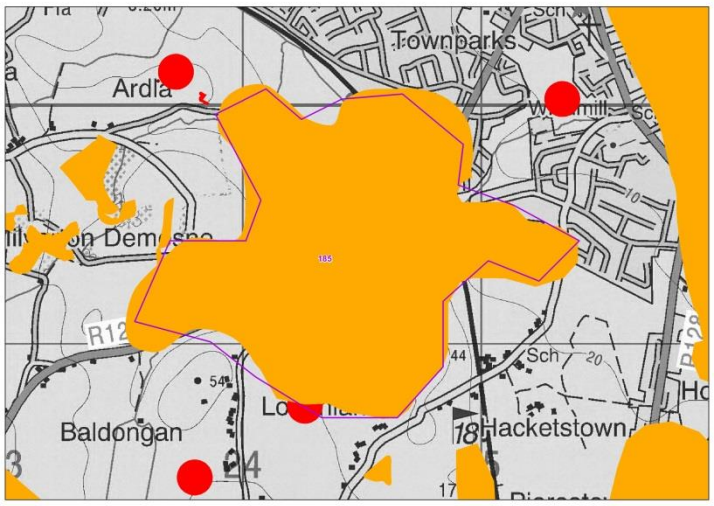
3.1 Area 184



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Grassland, Bog
Forestry
Groundwater Zone of Contribution
Geological Heritage Sites
SPA, pNHA

Additional Factors
N/A

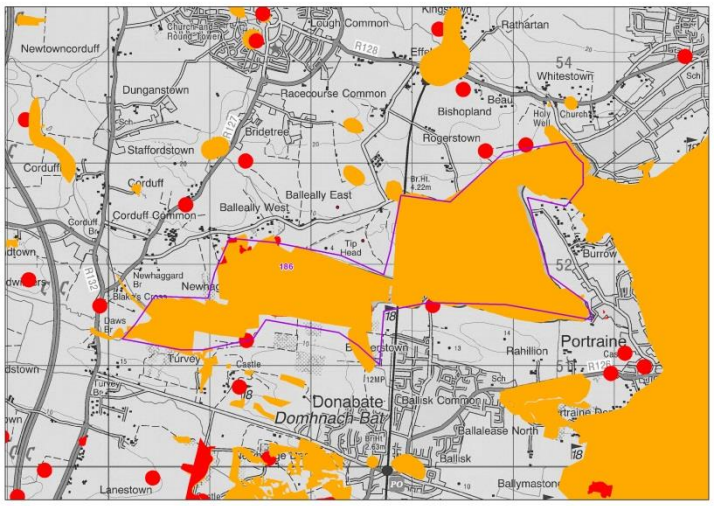
3.2 Area 185



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

Additional Factors
N/A

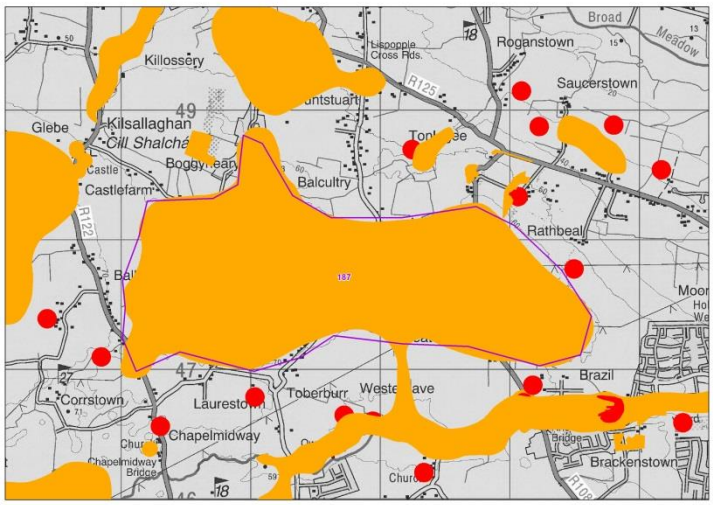
3.3 Area 186



Constraints
Important Habitats, Grassland, Bog
pNHA

Additional Factors
N/A

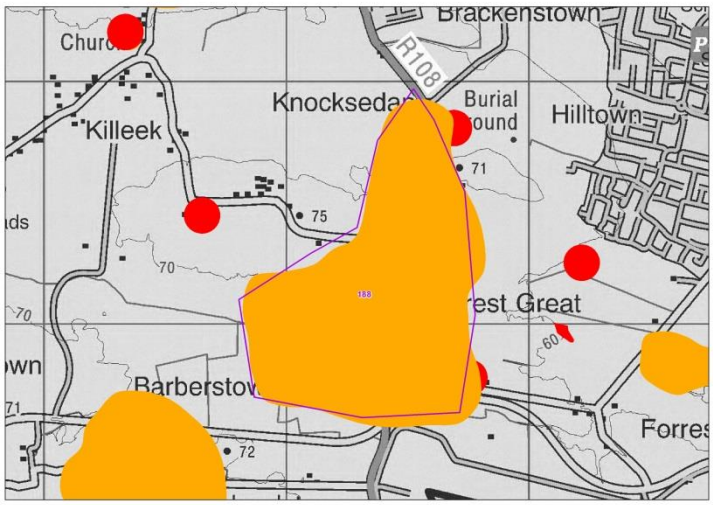
3.4 Area 187



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

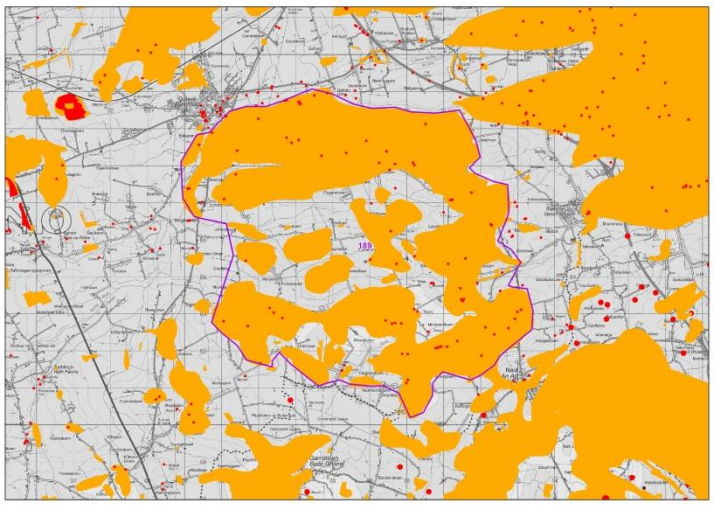
3.5 Area 188



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

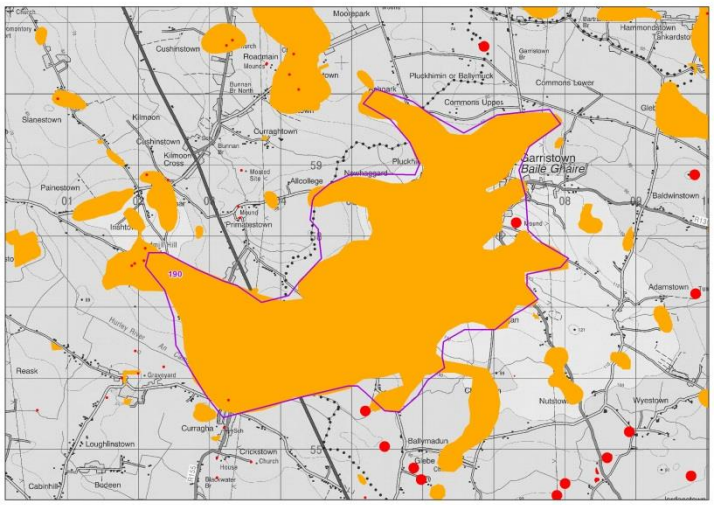
3.6 Area 189



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

Additional Factors
N/A

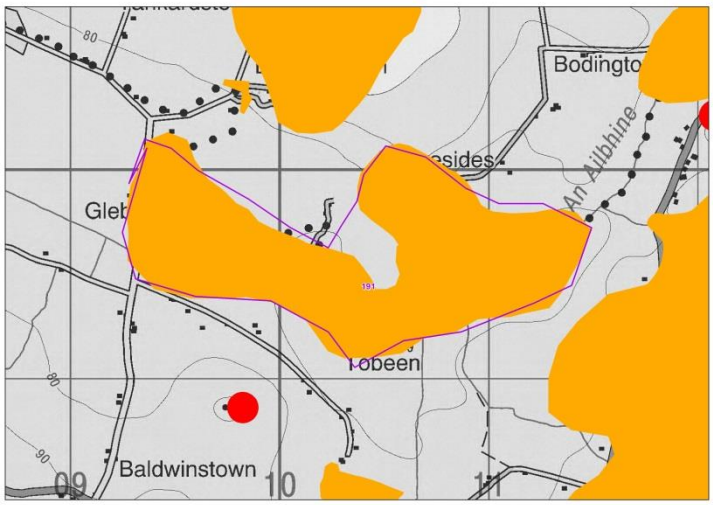
3.7 Area 190



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Forestry
Groundwater Zone of Contribution
SPA

Additional Factors
N/A

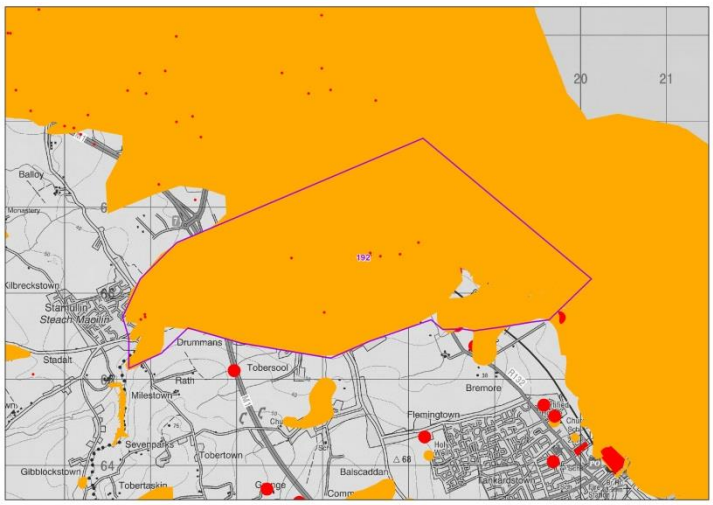
3.8 Area 191



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

3.9 Area 192

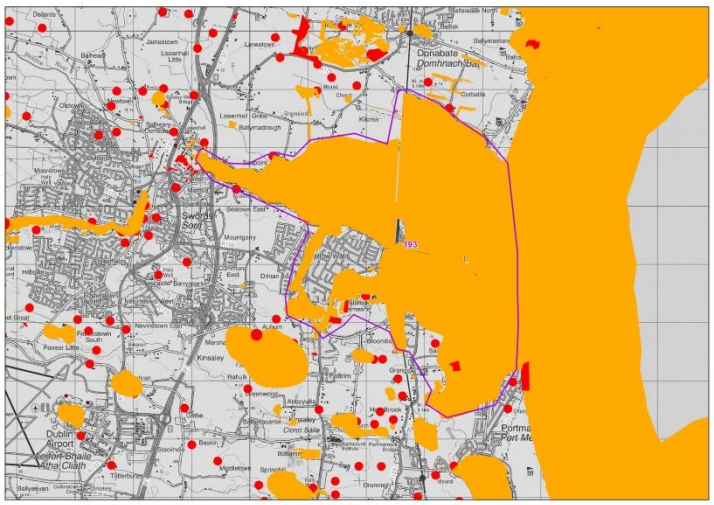


.

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

Additional Factors
N/A

3.10 Area 193



Constraints
Quarries
Groundwater Extreme Vulnerability and Rock at or Near surface
Important Habitats, Grassland, Woodland, Salt Marshes
Forestry
Geological Heritage Sites
SPA,SAC, pNHA, Ramsar

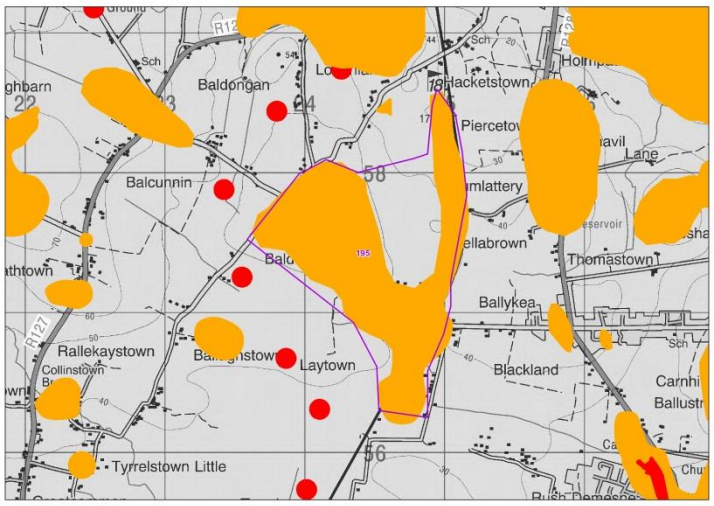
Additional Factors
N/A

3.11 Area 194

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

Additional Factors
N/A

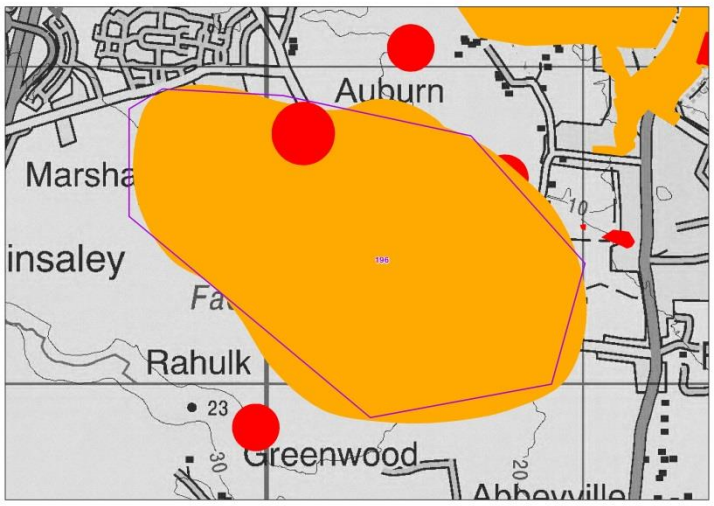
3.12 Area 195



Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

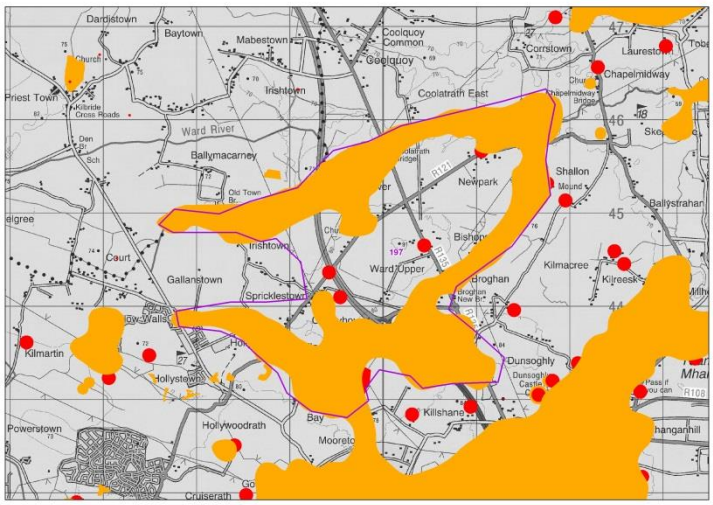
3.13 Area 196



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

Additional Factors
N/A

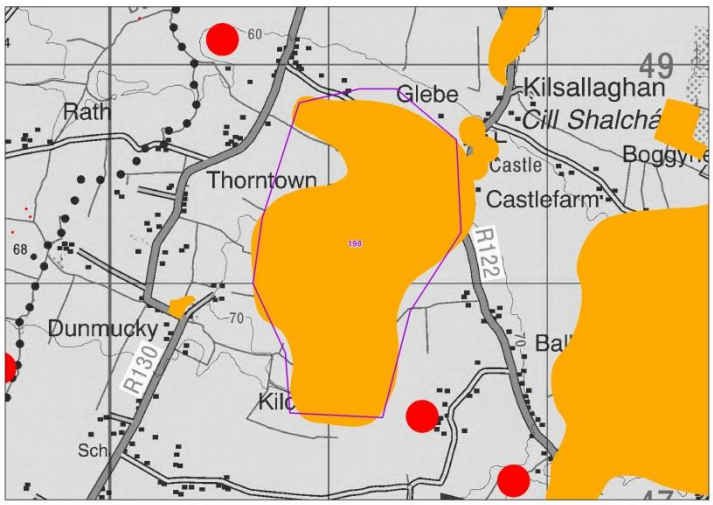
3.14 Area 197



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

Additional Factors
N/A

3.15 Area 198

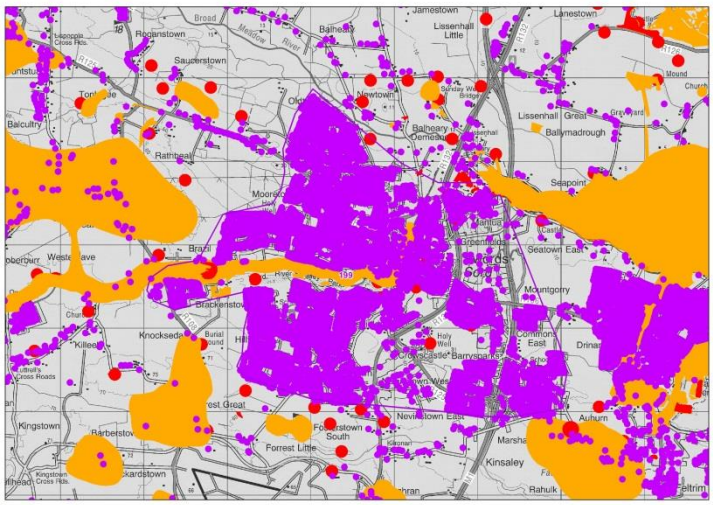


Constraints
Groundwater Extreme Vulnerability and Rock at or Near surface

Additional Factors
N/A

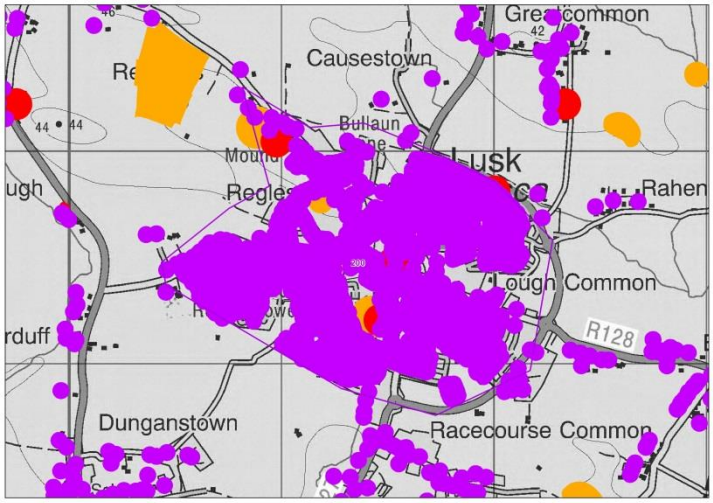
4 Areas Removed from White Space Based on Combination of Constraints and Geodirectory Building Locations

4.1 Area 199



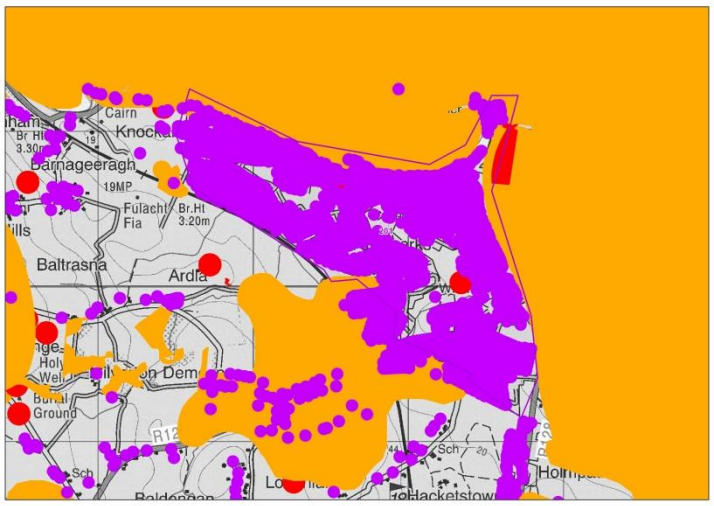
Constraints
Buildings

4.2 Area 200



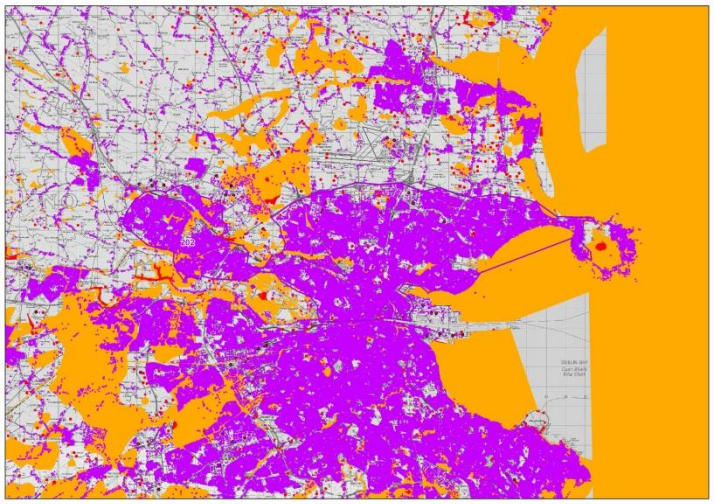
Constraints
Buildings

4.3 Area 201



Constraints
Buildings

4.4 Area 202

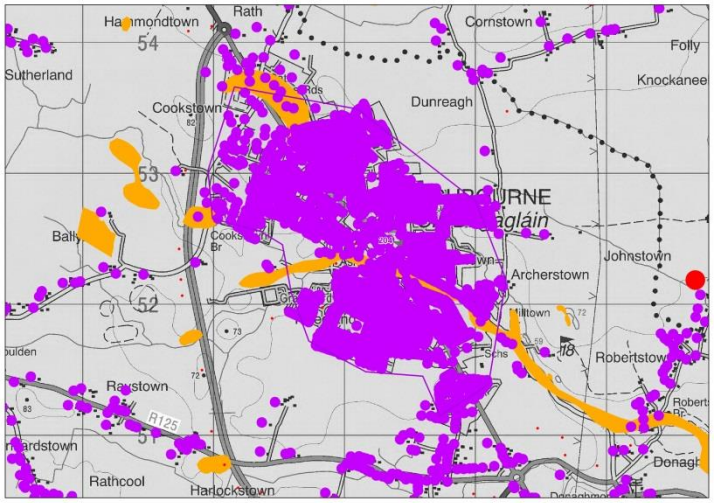


Constraints
Buildings

4.5 Area 203

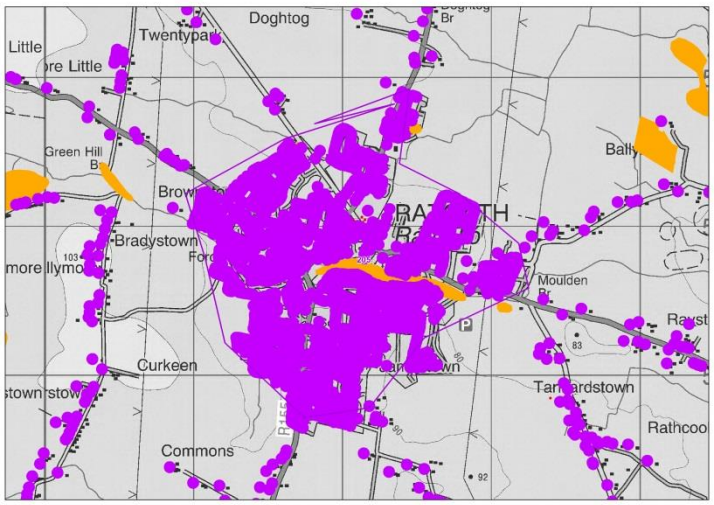
Constraints
Buildings

4.6 Area 204



Constraints
Buildings

4.7 Area 205

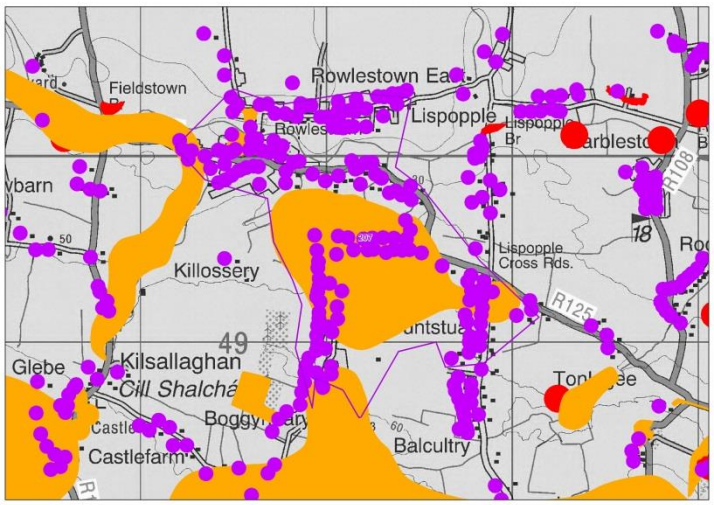


Constraints
Buildings

4.8 Area 206

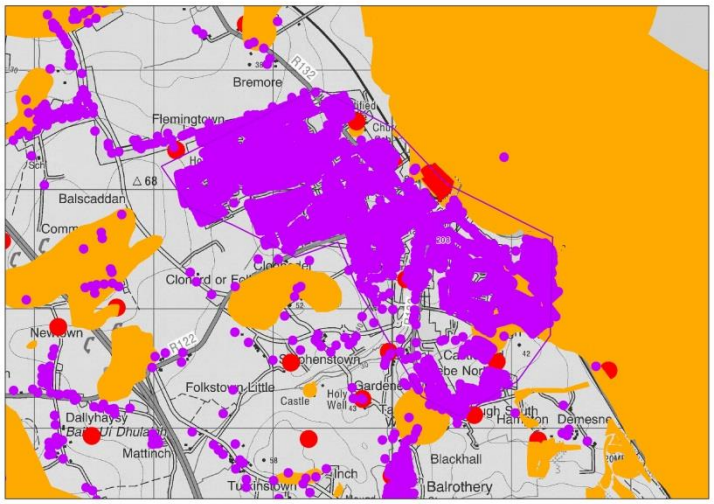
Constraints
Buildings

4.9 Area 207



Constraints
Buildings

4.10 Area 208



Constraints
Buildings

5 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.

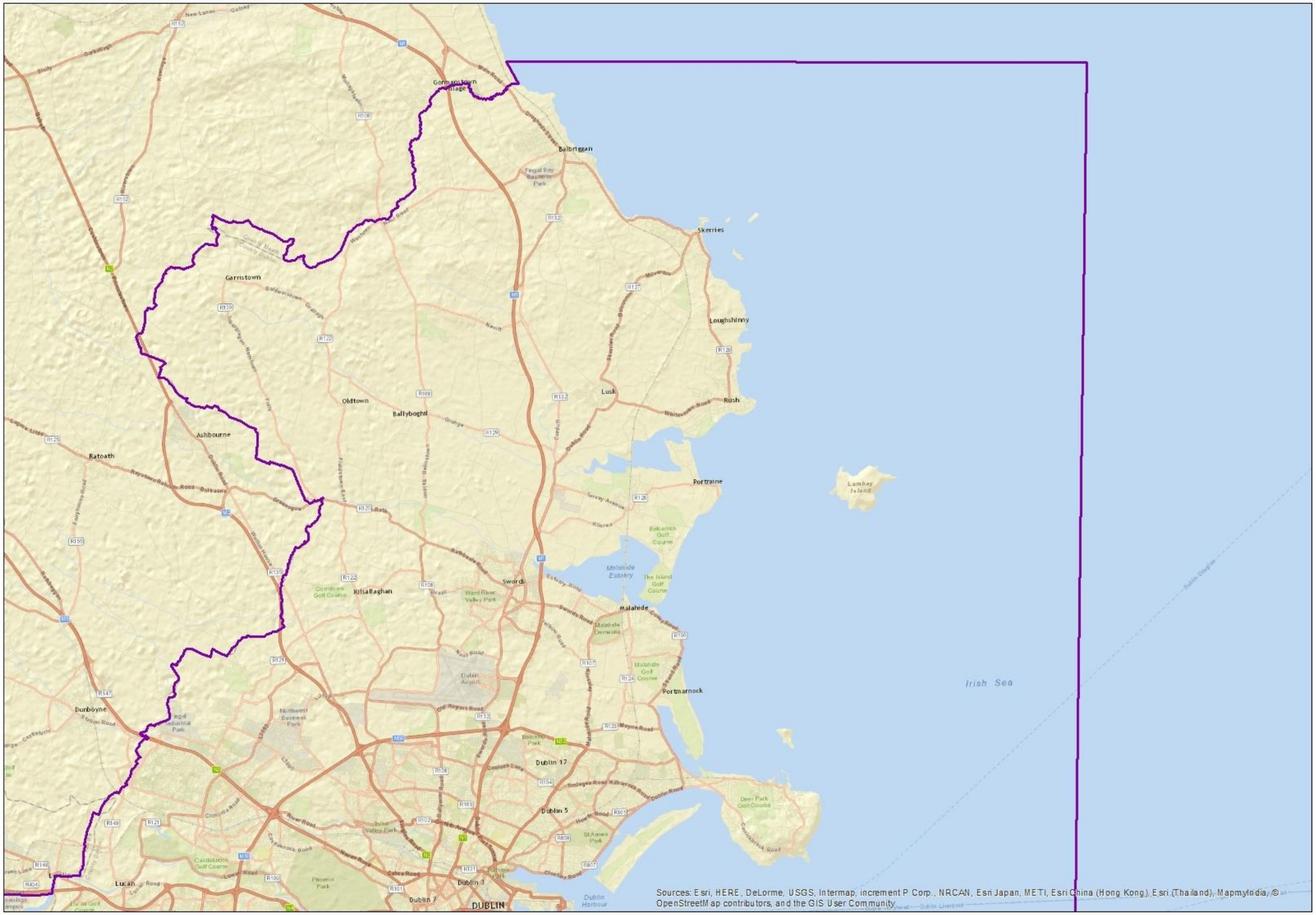


Figure G2 – 2 The "White Space"

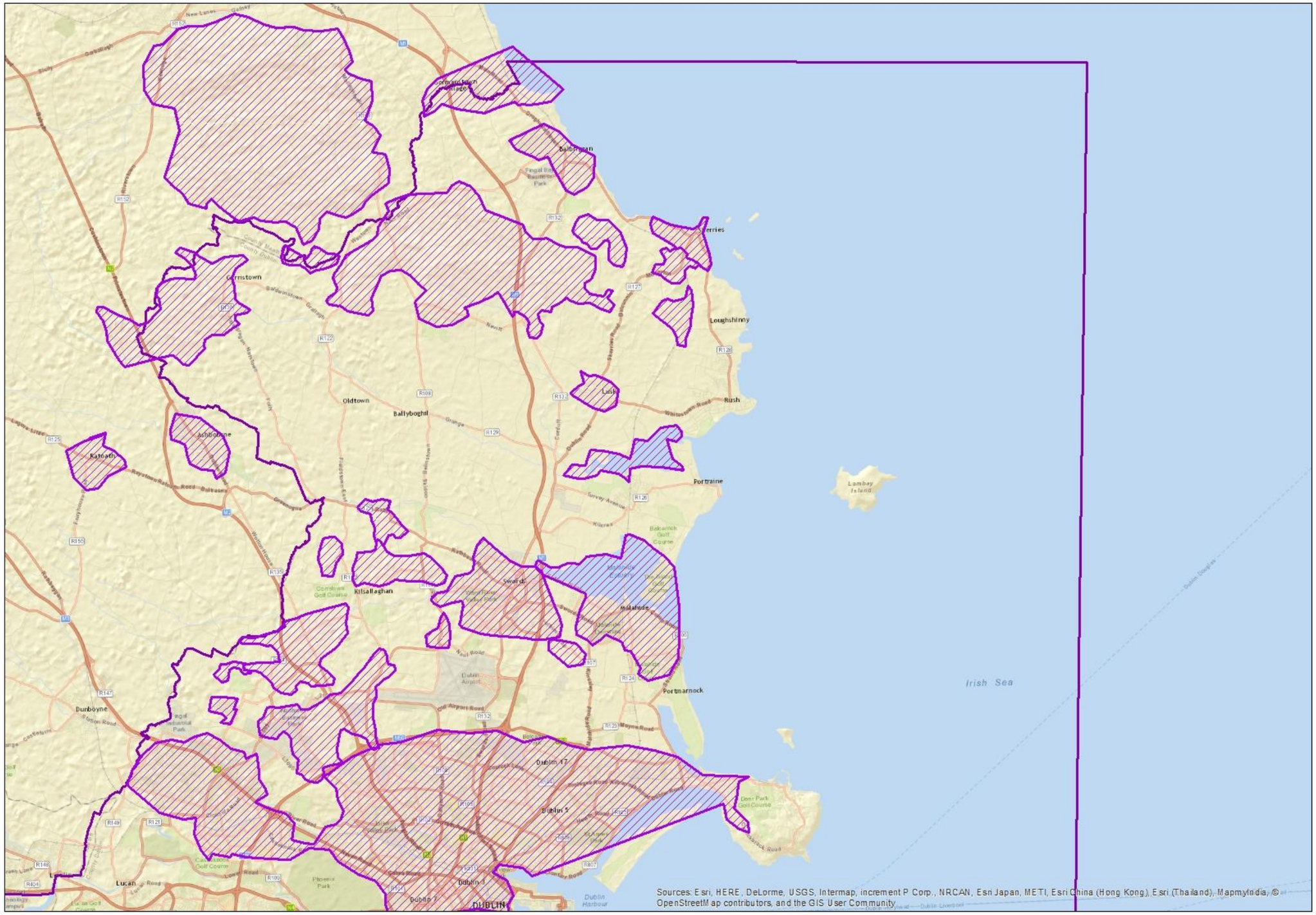


Figure G2 – 3 The "White Space" with further exlusions

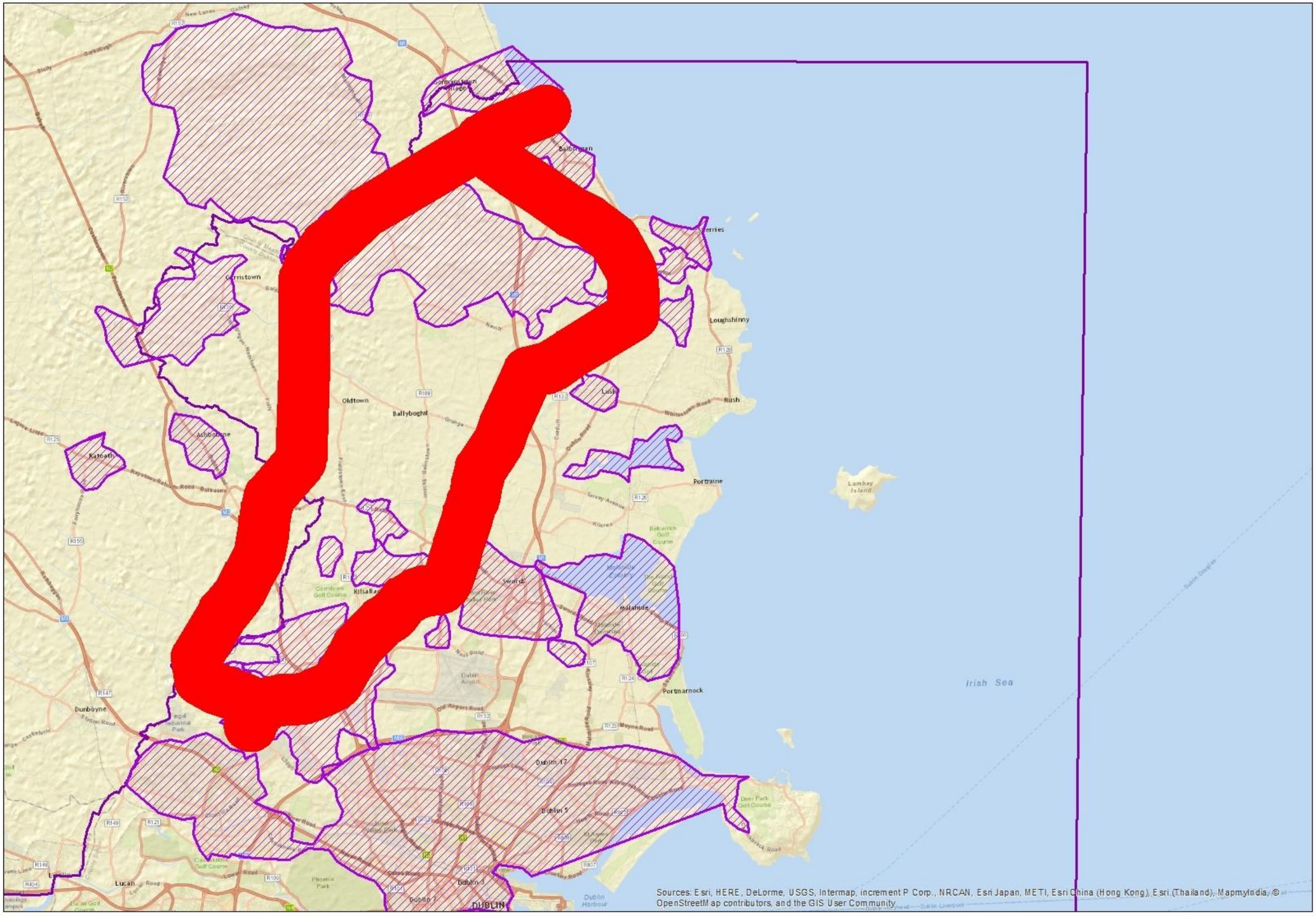


Figure G2 – 3 Routing of Preliminary Route Corridors

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G3: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G3 - 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 G3 - 1 Appraisal Criteria

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

This Appendix G3 is a statement on the specialism Biodiversity, terrestrial Flora and Fauna and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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, eleven 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 G4. The sub-criteria used for assessment within this report are as follows:

- Potential to impact on European Sites (Special Areas of Conservation – SAC and Special Protection Areas - SPA) (often referred to as Natura 2000 sites)
- 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
- Potential to impact marine/coastal birds

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 a review of existing databases, including in particular the 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 sites 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 to note / validate the presence of potential noteworthy habitats identified during the desk study.

1.2.2 Categories of impact

The relative analysis of potential locations to define a “least constrained” components element 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.

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.

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
- Habitats of local importance including hedgerows.

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 G3 - 1 Peamount Location

Peamount is located in west County 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 or nationally designated conservation site 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 I listed (undesignated) habitats are likely to occur on the site as it is intensively 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/treelines) only. Hedgerows/treelines 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 bats (recorded in the area), is low. No rivers 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 I listed bird species are unlikely to use the site e.g. Kingfisher (riparian species).

In summary the key considerations regarding terrestrial ecology are likely to be 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.

2.2 Matrix of Multi Criteria Analysis

Criteria	Peamount
Biodiversity, Flora & Fauna	**Low:** Overall this location is not of significant ecological value.
Potential to impact on Natura 2000 Sites (European sites)	**Very Low:** The proposed site is well removed from European 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:** The site is not located in Annex I habitats within a designated site.
Potential impact Annex I listed habitats (non-designated)	**Very Low:** It is unlikely that non-designated Annex I 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 which can be avoided or impact on 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.

Criteria	Peamount
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 I listed bird species.
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Low:** Hedgerows at this location have may be utilised 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***
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	***See Aquatic Ecological Assessment***
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	***See Aquatic Ecological Assessment***

Table G3 - 2 Summary of the MCA for Peamount

2.3 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 non-existent. Peamount is located in an area of intensively managed farmland with hedgerows/treelines thereby limiting terrestrial ecology constraints as intensively managed farmland is generally of low conservation value.

The key habitats to consider at this location are field boundaries (hedgerows and treelines) 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 terrestrial ecology along two potential route corridors, DS1 and DS2, associated with Option H (Desalination), was carried out and the results are set out below.

3.2 Methodology

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

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. The two corridors to be assessed are identified as Route Corridor DS1 and Route Corridor DS2, as shown in Figure G3-2 below.

Figure G3 - 2 Route Corridor Options DS1 and DS2 Locations

3.3 Route Corridor DS1

Route Corridor Option DS1 runs from Balbriggan to Ballycoolin, close to the coastline west of Skerries and Loughshinny and then changes direction to traverse rural and settled areas in the vicinity of Lusk, Swords and St. Margaret's, terminating at Ballycoolin. The route crosses land approximately 2.5km west of Dublin airport (and approximately 1km west of the airport runway).

This option crosses a landscape dominated by intensively managed farmland, dominated by grazing and arable lands. Terrestrial ecology of note is concentrated in boundary hedgerows and tree lines. A number of rivers will be crossed including the Rivers Ward and Delvin.

The key ecology observations on Route Corridor DS1 are:

- It does not cross any European (SAC/SPA) or nationally designated (NHA/pNHA) sites for conservation. This corridor passes through river catchments linked to European sites which may be indirectly impacted by the proposed development including; Baldoyle Bay SAC (000199), Malahide Estuary (000205), Broadmeadow/ Swords Estuary SPA (004025), Rogerstown Estuary SPA (004015) and Rogerstown Estuary SAC (000208). DS1 is closer than DS2 to these European coastal sites. and therefore risks of water pollutant impacts, albeit temporary, are greater and less controllable than along DS1.
- Designated Annex I listed habitats are avoided.
- The generally managed farmland nature of the landscape means the risk of encountering protected flora is low. Discrete areas of semi natural grassland with potential for protected flora may occur in this area. These can be identified and avoided at route design stage.
- The managed landscape crossed means risks of impacting non-designated Annex I listed habitats are low, except possibly at river crossings. Annex I Habitat, if present, is likely to be in small discrete units which can be avoided at route design stage.
- A number of rivers will be crossed including the Rivers Ward, Delvin, Ballyboghil and Broadmeadow. These rivers are considered to be ecologically valuable, hosting high value riparian habitats, protected aquatic species including Annex II and Annex IV species such as Otter and bat species; and Annex I bird species such as Kingfisher.
- Otter, bats and Freshwater Crayfish (considered under aquatic report) are the most likely Annex II listed species to be encountered along this route at rivers and smaller streams. The risk of encountering breeding sites for Otter is considered to be low. Key potential Otter sites can be identified at route design stage through surveys and avoided. Appropriate mitigation can be implemented to minimise risks to protected species if they occur.
- Bat species will potentially roost in more mature treelines which may be directly impacted. Appropriate design can reduce the risk of impacting on suitable roost sites.
- The route corridor avoids identified winter bird sites and SPA's. Kingfisher (Annex I listed) use rivers that are crossed such as the River Broadmeadow. Through appropriate project design any potential impacts will be minimised.
- Terrestrial ecology of note along DS1 is concentrated in boundary hedgerows and treelines. The route crosses approximately 32.9km of farmland with numerous field boundaries (hedgerows and treelines) which would be directly impacted. Large areas have potential to be replanted post

construction works, though many high value hedgerows would be permanently impacted (reduced ecological value).

- Option DS1 is approximately 1.7km longer than DS2 and may therefore impact more habitats of local ecological value (hedgerows) than DS2.

3.4 Route Corridor DS2

Route Corridor Option DS2 also commences at Balbriggan and terminates at Ballycoolin. This route is located further west than DS1, as shown in Figure F12-2 above.

Starting at Balbriggan, DS2 is routed along the County Meath/County Dublin boundary at Naul. The corridor then travels in a southerly direction crossing between Ashbourne and Ballyboghil, before turning towards Hollystown and terminating at Ballycoolin.

As per Route Corridor Option DS1, Route Corridor DS2 crosses a landscape dominated by intensively managed farmland however; it has more made ground (roads and built ground) than DS1. Terrestrial ecology of note is concentrated in boundary hedgerows and treelines. A number of rivers will be crossed including the River Ward.

The key ecology observations on Route Corridor DS2 include;

- This route corridor does not cross any European (SAC/SPA) or nationally designated (NHA/pNHA) site for conservation. This corridor passes through river catchments linked to European sites which may be indirectly impacted by the proposed development including; Baldoyle Bay SAC (000199), Malahide Estuary (000205) Broadmeadow/ Swords Estuary SPA (004025), Rogerstown Estuary SPA (004015) and Rogerstown Estuary SAC (000208). As DS2 is further from European coastal sites than DS1 it is considered that water pollutant risks, albeit temporary, are less controllable and more controllable than along DS1.
- Bog of the Ring pNHA (within 1.5km of DS2) and Knock Lake pNHA (0.5km from DS2) are relatively close to this corridor. Bog of the Ring in particular is a groundwater fed wetland and is therefore sensitive to possible drainage effects from the construction of a large diameter pipeline underground.
- Designated Annex I listed habitats are avoided be Route Corridor DS2.
- The generally managed farmland nature of the landscape means the risk of encountering protected flora is low. Discrete areas of semi natural grassland, with potential for protected flora, may occur in this area. These can be identified and avoided at route design stage.
- The managed landscape crossed means risks of impacting non-designated Annex I habitats are low except possibly at river crossings. Annex I habitat, if present, is likely to be in small discrete units which can be avoided at route design.
- A number of rivers will be crossed including the Rivers Ward, Ballyboghil, Broadmeadow and Matt. These rivers are considered to be ecologically valuable, hosting high value riparian habitats, protected aquatic species including Annex II and Annex IV species such as Otter and bat species; and potentially Annex I bird species such as Kingfisher.
- Otter and bats are the most likely protected species to be encountered along this route at rivers and smaller streams. The risk of encountering breeding sites for Otter however is considered to be low. With surveys, key potential

Otter sites can be identified at route design stage and avoided. Appropriate mitigation can be implemented to minimise risks to protected faunal species if they occur.

- Bat species will potentially roost in more mature treelines which will be directly impacted. Appropriate design can reduce the risk of impacting suitable roost sites.
- This route corridor avoids identified winter bird sites and SPA's.
- Terrestrial ecology of note is concentrated in boundary hedgerows and treelines. Route DS2 crosses approximately 31.2km of farmland with numerous field boundaries (hedgerows and treelines). Hedgerows would be directly impacted by the construction of a pipeline within the corridor. These areas can be replanted post works although many high value hedgerows would be permanently impacted (reduced ecological value). Built up areas, which are more extensive on this route, will likely be avoided with the result that farmland areas and associated hedgerows will be impacted.
- Option DS2 is approximately 1.7km shorter than DS1 and will impact less habitats of local ecological value (hedgerows)) than DS1.

3.5 Matrix of Multi Criteria Analysis

Criteria	Corridor DS1	Corridor DS2
Biodiversity, Flora & Fauna (Terrestrial)	**Moderate (overall)**	**Moderate (overall)**
Potential to impact on Natura 2000 Sites (European sites)	**Low:** This option does not cross any European site. It is within the drainage catchment of European sites and hence linked.	**Moderate:** This option does not cross any European site. It is within the drainage catchment of European sites and hence linked.
Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	**Very Low:** Natural Heritage Areas and proposed Natural Heritage areas are well removed from this option.	**Low:** Natural Heritage areas are removed from this option. Bog of the Ring pNHA (within 1.5km) and Knock Lake pNHA (0.5km) are relatively close to this corridor.
Potential impact Annex I listed habitats (designated)	**Low:** Designated Annex I listed habitats are directly avoided however they are located downstream.	**Low:** Designated Annex I listed habitats are avoided however they are located downstream.
Potential impact Annex I listed habitats (non-designated)	**Low:** The managed landscape crossed means risks of impacting non-designated Annex I habitats are low	**Low:** The managed landscape crossed means risks of impacting non-designated Annex I habitats are low
Potential to impact high ecological value habitats (semi natural habitats)	**Moderate:** The route crosses approximately 30.8km of farmland with numerous field boundaries (hedgerows and treelines) which would be directly impacted.	**Moderate:** The route crosses approximately 35.3km of farmland with numerous field boundaries (hedgerows and treelines) which would be directly impacted.
Potential to impact on protected Flora - Flora Protection Order	**Low:** The managed farmland nature of the landscape means the risk of encountering protected flora is low.	**Low:** The managed farmland nature of the landscape means the risk of encountering protected flora is low.
Potential to impact on Annex II species	**Low:** Otter are the most likely species to be encountered along this route at rivers and smaller streams.	**Low:** Otter are the most likely species to be encountered along this route at rivers and smaller streams.

Criteria	Corridor DS1	Corridor DS2
Potential to Impact on Annex IV species (wherever they occur)	**Moderate:** Bat species will potentially roost in more mature treelines which may be directly impacted.	**Moderate:** Bat species will potentially roost in more mature treelines which may be directly impacted.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	**Low:** The route corridor avoids identified winter bird sites and SPA's. Kingfisher (Annex I listed) may use rivers crossed.	**Low:** The route corridor avoids identified winter bird sites and SPA's. Kingfisher (Annex I listed) may use rivers crossed.
Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	**Moderate:** Badger and breeding bird species will likely use hedgerows and mature treelines which will be directly impacted.	**Moderate:** Badger and breeding bird species will likely use hedgerows and mature treelines which will be directly impacted.
Potential to impact on salmonid habitat - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact on a freshwater pearl mussel - protected under SI Reg	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact upon high quality aquatic habitat for protected aquatic species.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact on coastal zone habitats (intertidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact on marine habitats (e.g. Subtidal)	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact marine/coastal birds	**Low:** The route corridor avoids SPA's and as the corridor will be underground, loss/disturbance to habitat used by coastal species will be minimised.	**Very Low:** The route corridor avoids SPA's and as the corridor will be underground, loss/disturbance to habitat used by coastal species will be minimised.

Criteria	Corridor DS1	Corridor DS2
Potential to impact marine mammals	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***
Potential to impact on transient protected marine species (cetaceans and salmonids), which may pass through the affected area within the survey area footprint.	***See Aquatic Ecological Assessment***	***See Aquatic Ecological Assessment***

Table G3 - 3 Summary of the MCA for Route Corridors

3.6 Comparative Discussion

Both options cross a landscape dominated by managed farmland, with discrete areas of made ground. These habitats are of low ecological value. DS1 includes more made ground (roads and built areas) though these will be avoided where possible and managed farmland chosen for the route.

While both options avoid European (SAC/SPA) and nationally designated (NHA/ pNHA) sites, the risk of impacts to these sites is considered greater on DS1 because:

1. DS1 is much closer to coastal European estuarine sites and it is likely that much of this route runs within the drainage catchment of European sites such as Malahide Estuary (000205) Broadmeadow/ Swords Estuary SPA (004025), Rogerstown Estuary SPA (004015) and Rogerstown Estuary SAC (000208). As DS1 is closer to these coastal sites there is a greater risk of pollutants during construction compared to DS1, even with the implementation of pollutant management systems.
2. DS1 is closer to the groundwater fed Bog of the Ring pNHA. This site is already negatively impacted by existing abstraction schemes in the area and the introduction of an additional drainage source (trenched water main) would be considered a greater risk on DS1 compared to DS2.
3. Option DS1 is approximately 1.7 km longer than DS2. This means proportionally greater disturbance will arise to hedgerow/ treeline habitats and associated protected fauna on DS1.

In summary DS2 is the preferred option as impacts to terrestrial ecology will be less than on DS1.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G4: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G4 - 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 G4 - 1 Appraisal Criteria

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

This Appendix G4 is a statement on the specialism Aquatic Ecology and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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 corridor from the identified options, each corridor was assessed under nineteen criteria, fourteen of which are aquatic ecology sub-criteria, 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.
- Potential to impact on coastal zone habitats (inter tidal)
- Potential to impact on marine habitats (sub-tidal)
- Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets
- Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.

1.2.1 Desk Top study

The desk top assessments were carried out using data from the following sources:

- Data held in-house in AQUAFACT,
- data on the National Parks and Wildlife Service (NPWS) website
- data from Inland Fisheries Ireland (IFI),
- information in O'Reilly (2009)[4] and
- information on EPA web sites.

1.2.2 Categories of impact

The relative analysis of potential locations to define a "least constrained" components element 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 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 O'Reilly, P. 2009. Rivers of Ireland – a fly fisher's guide. Merlin Unwin. 404 pps

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 G4 – 1 Peamount Location.

As no significant water courses are present at the Peamount location, there will 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.
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 G4 - 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. Peaumount 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 two potential route corridors was carried out for Option H (Desalination).

3.2 Methodology

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

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. The two corridors to be assessed are identified as Route Corridor DS1 and Route Corridor DS2, as shown in Figure G4-2 below.

Figure G4 – 2 Route Corridor Options DS1 and DS2 Locations

3.3 Route Corridor DS1

This route, in common with DS2, starts on the eastern coastline to the north of Balbriggan, at Bremore Head and runs in a southwesterly direction towards the M1 Dublin – Belfast motorway. Near Balscadden, it separates from DS2 and turns in a southeasterly direction, where it crosses two small streams that runs into the sea at Balbriggan. DS1 continues to the southeast as far as Milverton Demesne, which is

to the west of Skerries. In this area, it crosses a number of small streams that flow into the sea in the Skerries area. From there it turns south and travels for approximately 1.5 km before turning in a southwesterly direction, towards the M1 (Dublin- Belfast motorway). In the northern part of this section, DS1 crosses two un-named streams, approximately 1.5 km north of Lusk; in the southern section, to the northwest of Lusk, it crosses a small tributary that flows into Rogerstown Estuary SAC (site code 000208). Once DS1 has crossed the M1, it crosses two other streams that flow into Rogerstown Estuary SAC (site code 000208). On crossing the R129, the DS1 corridor again crosses another small stream that flows into Rogerstown Estuary SAC site code 000208) and another stream that flows into the sea at Malahide Estuary SAC (site Code 00020%). To the northwest of Swords, the corridor crosses the Broadmeadow River and two of its tributaries. The Broadmeadow River flows into the sea at Malahide Estuary SAC (site code (000205). Further southwest, before it reaches the N2 (Dublin Derry route), it crosses the Ward River and two of its tributaries, while to the southwest of the N2, it crosses another tributary of the Ward River. The Ward River flows into the sea at Malahide Estuary SAC (site code 000205). Before it reaches Ballycoolin, DS1 crosses some very small tributaries of the Tolka River which flows into North Dublin Bay SAC (site code 000206).

With regard to possible effects on the downstream SACs noted above, these could arise from suspended sediments generated during the construction processes, accidental spillages of construction materials or fuels for machinery or waste water from pollution sources located close to or in the waterways. Adherence to proper construction methods will minimise/prevent all of these potential impacts.

3.4 Route Corridor DS2

Picking up from where DS1 and DS2 divide, DS2 crosses the M1 motorway to the west of Balbriggan and continues in a southwesterly direction crossing the Dublin – Meath County boundary (which is delineated by the Devlin River) before turning south southwest to the northeast of Naul. Here it crosses a small tributary of the Delvin River. It again crosses into County Dublin over the Devlin River and, to the south, it crosses another Devlin River tributary. South of this again, and before DS2 crosses the N2 Dublin to Derry road, DS2 crosses three small streams that eventually find their way into Rogerstown Estuary SAC (site code 000208). Further south the DS2 corridor crosses the Broadmeadow River and two of its tributaries, one of which is called Dun Water. Both these rivers enter the sea at Malahide Estuary SAC (site code 000205). Once again, the corridor crosses the N2, before crossing the Ward River and two of its tributaries. The Ward River enters the sea at Malahide Estuary SAC (site code 000205). Before reaching its end point in Ballycoolin, DS2 crosses a tributary of the Pinkeen River which in turn flows into the Tolka River. The Tolka River enters the sea at Clontarf which is part of North Dublin SAC (site code 000206).

With regard to possible effects on the downstream SAC's noted above, these could arise from suspended sediments generated during the construction processes, accidental spillages of construction materials or fuels for machinery or waste water from pollution sources located close to or in the waterways. Adherence to proper construction methods will minimise/prevent all of these potential impacts.

3.5 Matrix of Multi Criteria Analysis

Criterion	DS1	DS2
Potential to impact on Natura 2000 Sites	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206).	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206
Potential impact Annex I listed habitats (designated)	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206	**Very Low Impact** There are no Natura sites along this route. However, some of the rivers crossed by the route enter the sea through Natura sites *e.g.* Rogerstown Estuary SAC (site code 000208), Malahide Estuary SAC (site code 000208) and North Dublin Bay SAC (site code 000206
Potential impact Annex I listed habitats (non designated)	**Very low impact.** No non-designated Annex I aquatic habitats recorded for these water bodies.	**Very low impact.** No non-designated Annex I aquatic habitats recorded for these water bodies.
Potential to impact high ecological value habitats (semi natural habitats)	**Very low impact.** No high ecological aquatic habitats recorded for these waterbodies.	**Very low impact.** No high ecological aquatic habitats recorded for these waterbodies.
Potential to impact on protected Flora - Flora Protection Order	**Very low impact.** No protected aquatic flora or fauna recorded for these water courses.	**Very low impact.** No protected aquatic flora or fauna recorded for these water courses.
Potential to impact on Annex II species	**Very low impact.** No Annex II species recorded for these water courses.	**Very low impact.** No Annex II species recorded for these water courses.
Potential to Impact on Annex IV species (wherever they occur)	**Very low impact.** No Annex IV species recorded for these water courses.	**Very Low impact.** No Annex IV species recorded for these water courses.
Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	*See terrestrial section*	*See terrestrial section*

Criterion	DS1	DS2
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.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.
Potential to impact on Freshwater Pearl Mussels - protected under SI Reg	**Very low Impact** There are no known Freshwater Pearl Mussels in these water courses.	**Very low Impact** There are no known Freshwater Pearl Mussels in these water courses.
Potential to impact upon high quality aquatic habitat for protected aquatic species.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.	**Low impact.** Broadmeadow and Ward Rivers both support populations of Brown Trout and runs of sea trout.
Potential to impact on Coastal Zone habitats (intertidal)	**Very Low:** The corridors do not extend into coastal intertidal habitats	**Very Low:** The corridors do not extend into coastal intertidal habitats
Potential to impact on marine habitats (subtidal)	**Very Low:** The corridors do not extend into subtidal habitats.	**Very Low:** The corridors do not extend into subtidal habitats
Potential to impact marine/coastal birds	*See terrestrial section*	*See terrestrial section*
Potential to impact marine mammals	*See terrestrial section*	*See terrestrial section*
Potential to impact on water quality and inshore fishing grounds based on fisheries datasets	**Very Low:** The corridors do not extend into inshore fishing grounds.	**Very Low:** The corridors do not extend into inshore fishing grounds.

Criterion	DS1	DS2
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

Table G4 - 3 Summary of the MCA for Route Corridors

3.6 Comparative Discussion

The topography in the area where both DS1 and DS2 start and finish are quite similar; however, in the northern part, higher ground is found along the north western sector of DS2 which means that water courses in this high ground will be smaller in width and depth and therefore less biodiverse than their broader, deeper downstream sections. Furthermore, as the DS2 route is more distant from the sea than DS1, all water courses, whether rivers or streams, are smaller than along DS1. As noted in Section 1 2 above, smaller streams are considered less ecologically sensitive than larger, wider water courses. Another criterion noted in 1.2 is the number of water course crossings for each option: DS1 has 16 crossings while DS2 has 13.

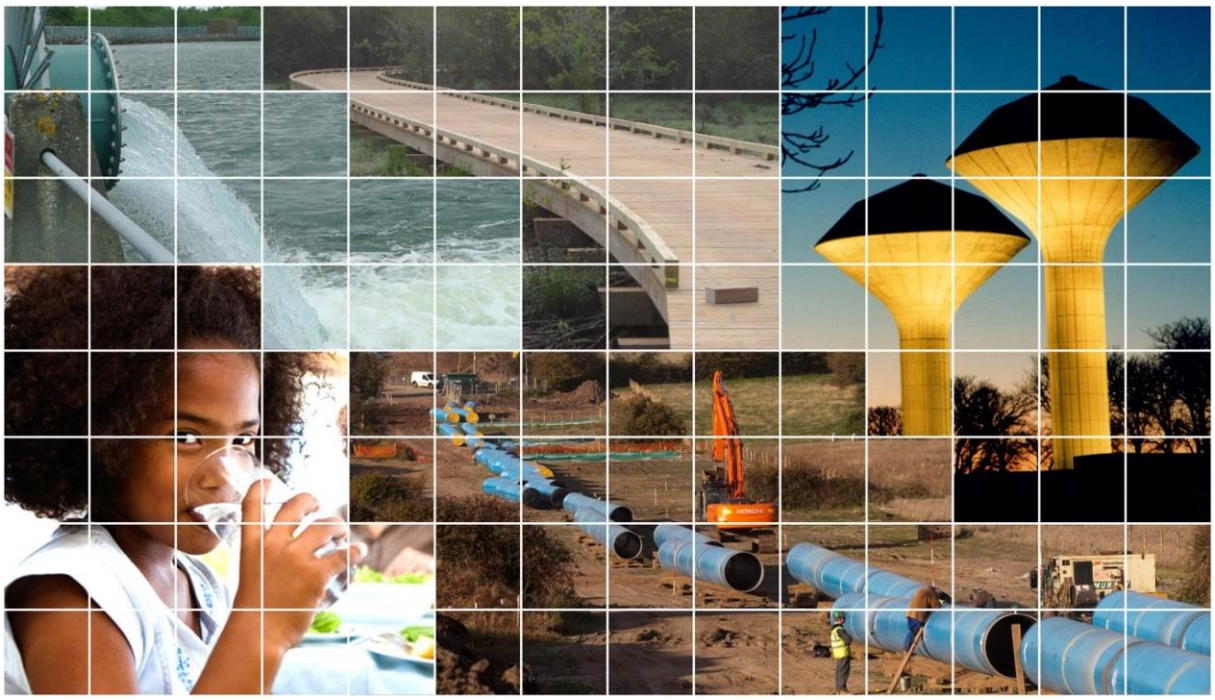
Based on these two criteria, DS2 is considered the less constrained desalination route corridor option from the shore north of Balbriggan to Ballycoolin.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G5: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G5 - 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 G5 - 1 Appraisal Criteria

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

This Appendix G5 is a statement on the specialism Surface Water Environment and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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.*

1.2.1 Desk Top study

A desk top study exercise was carried out facilitated with the software package *ArcReader*. The supplied datasets and information are as described in the *Site Selection Methodology.* Reference was made to the following key documents and data sources:

- Water Framework Directive (WFD) GIS Data and River Basin Management Plans(Environmental Protection Agency (EPA)); and
- The Office of Public Works (OPW) Preliminary Flood Risk Assessment (PFRA) Mapping for the 1% Annual Exceedance Probability (AEP) (2011).

1.2.2 Categories of impact

The relative analysis of potential locations to define a "least constrained" components element 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**

The options assessment considered the baseline conditions, i.e. the WFD status of the waterbodies (as report by the EPA in 2014) within the location/ corridors and the number and nature of the WFD protected areas as listed below (more information on these is contained in Appendix A):

- Waters used for the abstraction of drinking water;
- Areas designated to protect economically significant aquatic species;
- Recreational Waters;
- Nutrient sensitive areas; and
- Areas designated for the protection of habitats or species.

The terminal location assessment consisted of only one location therefore no comparative assessment was required. The methodology used to assess the potential significance of this location is outlined in Abstraction Location MCA Appendix E5: Surface Water Environment.

The desalination corridor option assessment was confined to the comparison of 2 options. The aim of this assessment is was to first identify, and then appraise, "Preliminary Route Corridors" (approximately 2 km wide) from which a "Least Constrained Route Corridor" can be identified. Potential impacts were considered similar for each corridor and are primarily related to the construction of the pipeline network as this is when most on-site activity and pollution potential is likely to occur. The key 'differentiators' in assessing the options and identifying the preferred corridor, comprised:

- WFD Status and number and type of WFD protected areas;
- The potential number of watercourse crossings; and
- Percentage of the corridor subject to flooding in the 1%Annual Exceedance Possibility (AEP).

As the corridor option assessment was confined to the comparison of 2 options therefore, the potential impact significance for the assessment was confined to two of the criteria outlined above i.e. low and mid- range. The choice of impact significance was then based on a comparison between the assessment criteria i.e. WFD status/protected areas, number of potential watercourse crossing required and the percentage of flooding within each corridor. In addition this assessment also took account of the size of the watercourses in line with the Strahler river order system as used by the EPA. Under this system stream order 3 and 4 are considered the largest river types (Figure 1) and are therefore considered more important.

The corridor option with the highest potential impact was then classified as midrange and the corridor option with the lowest potential impact was classified as low.

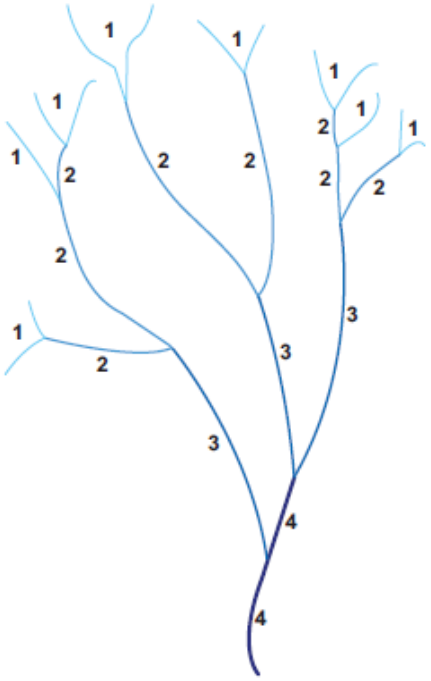


Figure G5-1: Strahler stream ordering system (Pierson et al., 2008)

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 G5 – 2 Peamount Location

(a) Water Framework Directive

The Peamount study area is approximately 4km^2.Table G5- 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 G5 - 2: WFD Waterbodies

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

(b) Fluvial Flooding

There is minimal flooding within the Peamount study area. There is fluvial flooding up to the 1% AEP event approximately 100m either side of the Griffen waterbody and approximately 5% of the study area is prone to flooding in the 1% AEP.

2.2 Multi Criteria Assessment and Conclusion

Table G5-3 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 G5 - 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 G5 – 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**.
- Area prone to flooding in the 1%AEP Fluvial	Some limited flooding does occur within the study area, however, impacts are considered to be **very low**.

Table G5 - 4: Summary of the MCA for the Terminal Location

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridors was carried out for Option H (Desalination).

Figure G5 – 2 Route Corridor Options DS1 and DS2 Locations

3.2 Route Corridor DS1 and DS2

Table G5 - 5 outlines the baseline conditions within the route corridor options DS1 and DS2.

Criteria	Corridor DS1	Corridor DS2
WFD Status	Bad, poor, moderate, good and high	Bad and 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	Balbriggan Front strand beach bathing location is in close proximity to the route There is an SAC Waterbody (river (SAC only) and coastal) within the corridor North-western Irish Sea shellfish area	Balbriggan Front strand beach bathing location is in close proximity to the route. SAC/SPA Waterbody (coastal only) North-western Irish Sea shellfish area
Area (km2) prone to flooding (PFRA) and predicted flood extents within and adjacent to the site	2.5	1.6
Percentage of total area of Route Corridor subject to fluvial flooding in the 1%AEP (Fluvial PFRA data)	3	2

Table G5 - 5: Baseline Data

Table G5 - 6 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 DS1 to DS2.

Criteria	Corridor DS1	Corridor DS2
Potential No. Watercourse Crossings	27	23
Crossing with a Stream Order 3 and/or 4	7	4

Table G5 - 6: Watercourse Crossings

Table G5 - 7 outlines the potential category of impact associated with each route corridor option, DS1 to DS2.

Criteria	Corridor DS1	Corridor DS2
Significance of Impact - WFD	Light Green	Green
Significance of Impact - Flooding	Green	Light Green
Significance of Impact - Watercourse Crossings	Green	Light Green

Table G5 - 7: Assessment Matrix

3.3 Comparative Discussion

Table G5 - 8 outlines the preferred route corridor options in terms of the WFD, flooding and watercourse crossing.

Criteria	Corridor
Significance of Impact - WFD	**DS1**
Significance of Impact - Flooding	**DS2**
Significance of Impact – Watercourse Crossings	**DS2**
Overall	**DS2**

Table G5 - 8: Preferred Route Corridor for Surface Water Assessment

Based on the baseline conditions, the number of potential watercourse crossings and the potential for flooding, route corridor option DS2 has been identified as the preferred route corridor.

4 References

- Department of the Environment Heritage and Local Government (2009). Eastern River Basin District River Basin Management Plan 2009 – 2015.
- Environmental Protection Agency (2015). Water Framework Directive (WFD) GIS Data.
- Suzanne, M., Pierson, B. J., Rosenbaum, L. D. McKay and Dewald, T. G., (2008). Strahler Stream Order and Strahler Calculator Values in NHDPlus.
- The Office of Public Works (OPW); Flood Extent Mapping from the Preliminary Flood Risk Assessment (PFRA) (2011).

Appendices

Appendix A - WFD Register of Protected Areas

The register consists of an inventory of protected area sites representing the protected area categories outlined below:

- Waters used for the abstraction of drinking water.
- Areas designated to protect economically significant aquatic species - These are protected areas established under earlier EC directives aimed at protecting shellfish (79/923/EEC) and freshwater fish (78/659/EEC).
- Recreational Waters - These are bathing waters designated under the Bathing Water Directive (76/160/EEC).
- Nutrient Sensitive Areas - These comprise nitrate vulnerable zones designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive under the Urban Waste Water Treatment Directive (91/271/EEC).
- Areas designated for the protection of habitats or species - These are areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection. These are designated under the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC).

Appendix B - Main River Crossings (WFD monitored waterbodies)

Route	EU Code	Waterbody Name	WFD Status
DS1			
DS1	IE_EA_08_763	EA_Broad Meadow Water164_BroadmeadowTRIB_Balheary	Poor
DS1	IE_EA_08_221	EA_Stream163_Ballough2_Upper	Pass
DS1	IE_EA_08_221	EA_Stream163_Ballough2_Upper	High
DS1	IE_EA_08_221	EA_Stream163_Ballough2_Upper	High
DS1	IE_EA_08_295	EA_Broad Meadow Water164_Broadmeadow2	Poor
DS1	IE_EA_08_295	EA_Broad Meadow Water164_Broadmeadow2	Poor
DS1	IE_EA_08_295	EA_Broad Meadow Water164_Broadmeadow2	Poor
DS1	IE_EA_08_643	EA_Broad Meadow Water164_WardTRIB_Ballystrahan1_Lower	Pass
DS1	IE_EA_08_643	EA_Broad Meadow Water164_WardTRIB_Ballystrahan1_Lower	High
DS1	IE_EA_08_643	EA_Broad Meadow Water164_WardTRIB_Ballystrahan1_Lower	High
DS1	IE_EA_08_670	EA_Broad Meadow Water164_BroadmeadowTRIB_Ward1_Lower	Poor
DS1	IE_EA_08_670	EA_Broad Meadow Water164_BroadmeadowTRIB_Ward1_Lower	Poor
DS1	IE_EA_08_670	EA_Broad Meadow Water164_BroadmeadowTRIB_Ward1_Lower	Poor
DS1	IE_EA_08_726	EA_Stream163_BalloughTRIB_Wimbletown2_Upper	Pass
DS1	IE_EA_08_726	EA_Stream163_BalloughTRIB_Wimbletown2_Upper	High
DS1	IE_EA_08_726	EA_Stream163_BalloughTRIB_Wimbletown2_Upper	High
DS1	IE_EA_08_794	EA_Coastalr1_Balbriggan1	Good
DS1	IE_EA_08_794	EA_Coastalr1_Balbriggan1	Good
DS1	IE_EA_08_794	EA_Coastalr1_Balbriggan1	Good
DS1	IE_EA_08_822	EA_Stream163_Ballyboghil1	Poor
DS1	IE_EA_08_822	EA_Stream163_Ballyboghil1	Poor
DS1	IE_EA_08_822	EA_Stream163_Ballyboghil1	Poor
DS2	IE_EA_08_179	EA_Broad Meadow Water164_BroadmeadowTRIB_Coolquoy	Poor
DS2	IE_EA_08_179	EA_Broad Meadow Water164_BroadmeadowTRIB_Coolquoy	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_238	EA_Delvin162_Delvin2_Upper	Poor
DS2	IE_EA_08_604	EA_Broad Meadow Water164_Broadmeadow3	Poor
DS2	IE_EA_08_604	EA_Broad Meadow Water164_Broadmeadow3	Poor
DS2	IE_EA_08_604	EA_Broad Meadow Water164_Broadmeadow3	Poor

Appendix C - Watercourse Crossings

Section	Route	Approx. No Crossings	Steam Order 3	Steam Order 4	Total Stream Order 3 & 4
D	DS1	27	4	3	7
	DS2	23	3	1	4

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G6: Air

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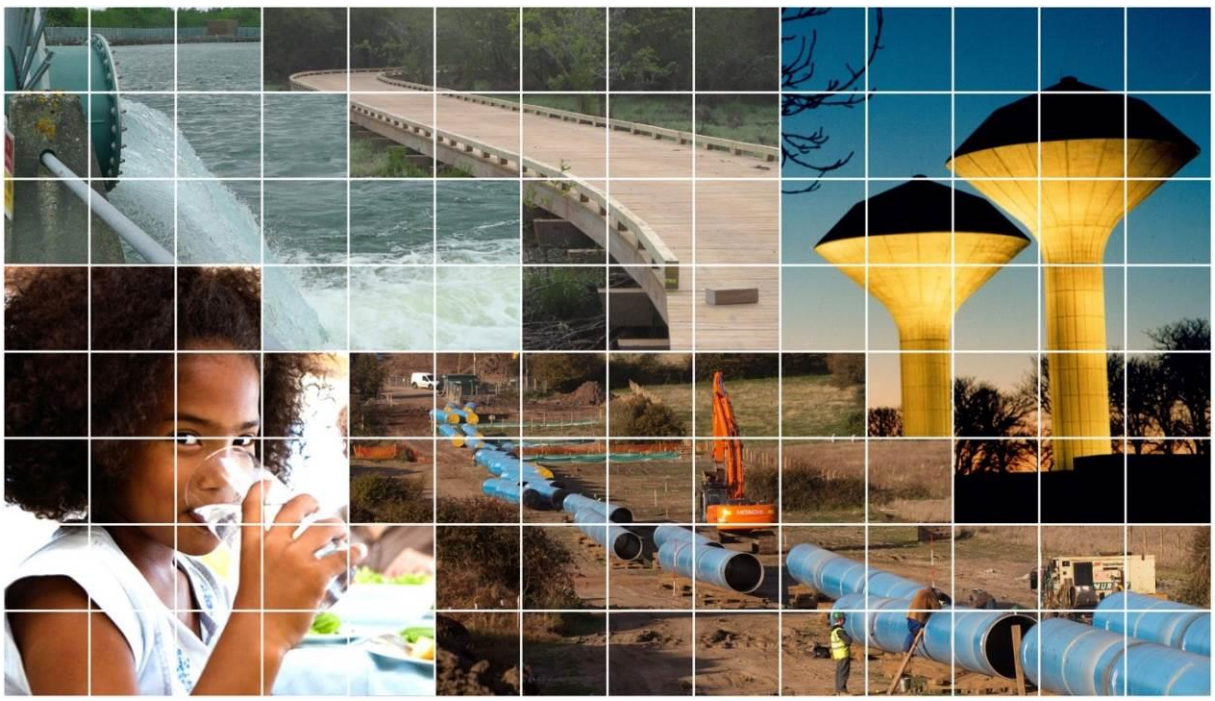

Contents

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, Sections 6 and 7. 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 transmission pipeline route corridor associated with **Option H (Desalination)**.

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 G6-1, 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 G6 - 1 Appraisal Criteria

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

This Appendix G6 is a statement on the specialism Air Quality and describes the decision making process used in identifying the least constrained route corridor associated with Option H (Desalination).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained 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.

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 on the components 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" components element 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 air quality, the potential impacts of the proposed development will be considered during both the construction and operational phases.

There is the potential for a number of emissions to the 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 location was carried out at the Peamount location; refer to Preliminary Options Appraisal Report, Section 8.

2.1.1 Peamount

One reservoir terminal location is proposed 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 point of view is the potential of 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.

Figure G6 – 1 Peamount Location

2.2 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 G6 - 2 Summary of the MCA for Peamount

2.3 Conclusion

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. Construction phase mitigation measures are described in section 1.2.2.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option H (Desalination).

Figure G6 – 2 Route Corridor Options DS1 and DS2 Locations

3.2 Route Corridor DS1

One desalination location which is proposed as part of the assessment process is Route Corridor DS1. The matrix in Section 2.4 outlines the impact magnitude for each constraint criteria on the location in question.

The background ambient air quality is likely to be reasonably low across the majority of this route. Nearby pollutant sources are likely to consist of traffic from local / regional roads and other anthropogenic sources. This route passes both the M2 and M1 motorways and therefore there will be sections where ambient air quality concentrations will be increased.

With regards to the proposed development at this location, the most significant potential impact from an air quality point of view is the potential for dust emissions during the construction phase. With consideration of standard good practice measures for the control of dust during construction (see section 1.2.2), there will

likely be a low impact on these receptors during the construction phase of this proposed corridor.

Operational traffic is likely to have a small air quality impact and there may be some fixed mechanical plant / pumps which will generate emissions. 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 due to traffic.

This route corridor passes slightly higher density residential receptors at Swords, Lusk, Skerries and Balbriggan south. As such a slightly higher rating by comparison to corridor DS2 has been applied.

3.3 Route Corridor DS2

One desalination location which is proposed as part of the assessment process is Route Corridor DS2. The matrix in Section 2.4 outlines the impact magnitude for each constraint criteria on the location in question.

The existing ambient air quality is likely to be reasonably low across the majority of this route. Nearby air pollutant sources are likely to consist of traffic from local / regional roads along other anthropogenic sources. This route passes both the M2 and M1 motorways and therefore there will be sections where ambient air quality concentrations will be increased.

With regards to the proposed development at this location, the most significant potential impact from an air quality point of view is the potential for dust emissions during the construction phase. The area is predominantly rural/suburban with low density residential development. With consideration of standard good practice measures for the control of dust during construction (see section 1.2.2), there will likely be a low impact on these receptors during the construction phase of this proposed corridor.

Operational traffic is likely to have a small air quality impact and there may be some fixed mechanical plant / pumps which will generate emissions. 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 due to traffic.

This route corridor passes slightly lower density residential receptors and as such a slightly lower rating by comparison to corridor DS1 has been applied.

3.4 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Potential for Construction phase Air Quality impact at Sensitive receptors	The area is predominantly suburban with mixed density residential development. Low impacts during construction phase	The area is predominantly rural/suburban with low density residential development. Very low impacts during construction phase, less predicted impacts in this corridor
Potential for Operational phase Air Quality impact at Sensitive receptors	Low impacts during operational phase, only operational impacts would be due to traffic generated from staff	Very low impacts during operational phase, only operational impacts would be due to traffic generated from staff
Proximity to EPA Waste Licensed facility	No facilities present in study area	No facilities present in study area
Proximity to EPA IPPC Licensed Intensive Agriculture facility	There are no EPA IPPC licenced facilities for intensive agriculture present in study area	There are no EPA IPPC licenced facilities for intensive agriculture present in study area
EPA Air Quality Zone Classification	Zone A and zone D	Zone A, with majority within zone D
Wind Rose Assessment	Dublin Airport Windrose (2010-2014) identifies west-south prevailing wind	Dublin Airport Windrose (2010-2014) identifies west-south prevailing wind
Construction Phase Impact rating	Low impact from construction dust emissions	Low impact from construction dust emissions
Operational Phase Impact rating	Low impact due to additional traffic (likely to be minimal) generated by development	Very low impact due to additional traffic (likely to be minimal) generated by development

Table G6 - 3 Summary of the MCA for Route Corridors

3.5 Comparative Discussion

It is considered that route corridor DS2 would be slightly less constrained from an air quality perspective due to the slightly lower density of residential development along this corridor. However, once mitigation measures (as shown in section 1.2.2) with respect to construction dust are put in place during the construction phase, it is considered that both options could be developed whilst having a negligible air quality impact.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G7: Noise

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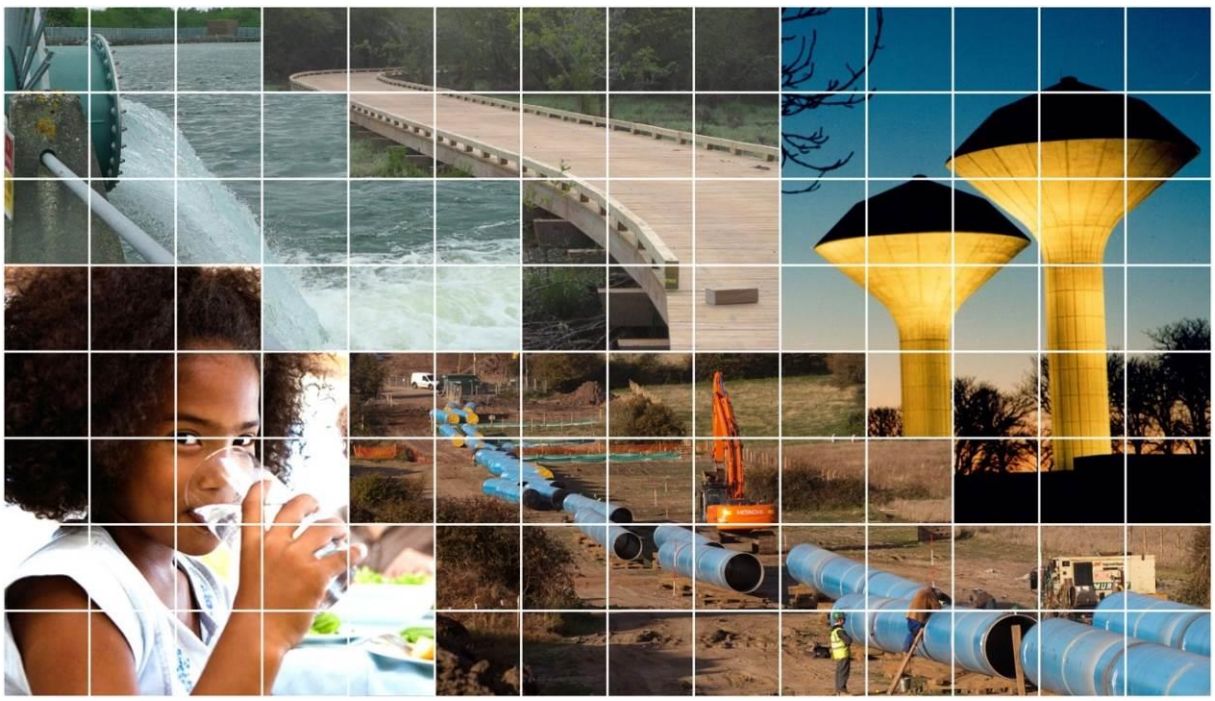

Contents

1 Introduction

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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 G7-1, 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 G7 - 1 Appraisal Criteria

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

This Appendix G7 is a statement on the specialism Noise and describes the decision making process used in identifying the least constrained route corridor associated with Option H (Desalination).

The *Site Selection Methodology* in Appendix B outlines the process employed in identifying the least constrained 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 a 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 on the components 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" components element 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 of 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 in the section 3.5) will ensure that noise and vibration impacts will not be excessive.

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 location was carried out at the Peamount location; refer to Preliminary Options Appraisal Report, Section 8.

2.1.1 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 point of view 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 G7 – 1 Peamount Location

2.2 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 G7 - 2 Summary of the MCA for Peamount

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 3.5), 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 corridor was carried out for Option H (Desalination).

Figure G7 – 2 Route Corridor Options DS1 and DS2 Locations

3.2 Route Corridor DS1

One desalination location which is proposed as part of the assessment process is Route Corridor DS1. The matrix in Section 2.2 outlines the impact magnitude for each constraint criteria on the location in question.

The existing ambient noise climate is likely to be reasonably low across the majority of this route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. This route passes both the M2 and M1 motorways and therefore there will be sections where ambient noise levels will be increased.

With regards to the proposed development at this location, the most significant potential impact from a noise point of view is the potential of noise emissions during the construction phase. The area is predominantly suburban with mixed density residential development. With consideration of 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 this proposed corridor.

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.

This route corridor passes slightly higher density residential receptors at Swords, Lusk, Skerries and Balbriggan south. As such a slightly higher rating by comparison to corridor DS2 has been applied.

3.3 Route Corridor DS2

One desalination location which is proposed as part of the assessment process is Route Corridor DS2. The matrix in Section 2.2 outlines the impact magnitude for each constraint criteria on the location in question.

The existing ambient noise climate is likely to be reasonably low across the majority of this route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. This route passes both the M2 and M1 motorways and therefore there will be sections where ambient noise levels will be increased.

With regards to the proposed development at this location, the most significant potential impact from a noise point of view is the potential of noise emissions during the construction phase. The area is predominantly rural/suburban with low density residential development. With consideration of 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 this proposed corridor.

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.

This route corridor passes slightly lower density residential receptors and as such a slightly lower rating by comparison to corridor DS1 has been applied.

3.4 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Potential for Construction phase noise impact at Sensitive receptors	The area is predominantly suburban with mixed density residential development. 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 this proposed corridor. This route corridor passes slightly higher density residential receptors at Swords, Lusk, Skerries and Balbriggan south. As such a slightly higher rating by comparison to corridor DS2 has been applied	The area is predominantly rural/suburban with low density residential development. 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 this proposed corridor. This route corridor passes slightly lower density residential receptors and as such a slightly lower rating by comparison to corridor DS1 has been applied
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.	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 across the majority of the route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. Both routes pass the M2 and M1 motorways and therefore there will be sections along the route where ambient noise levels will be increased.	Existing ambient noise climate likely to be reasonably low across the majority of the route. Nearby noise sources are likely to consist of traffic from local / regional roads along with rail traffic noise and other anthropogenic sources. Both routes pass the M2 and M1 motorways and therefore there will be sections along the route where ambient noise levels will be increased.
Construction Phase Impact rating	Low noise impact expected during construction phase	Very low noise impact expected during construction phase
Operational Phase Impact rating	Low noise impact expected during operational phase	Very low noise impact expected during operational phase

Table G7 - 3 Summary of the MCA for Route Corridors

3.5 Comparative Discussion

It is considered that route corridor DS2 would be slightly less constrained from a noise perspective due to the slightly lower density of residential development along this corridor. However, once consideration is given to standard good practice measures to control noise emissions during the construction and operational phases, it is considered that both options could be developed whilst having a negligible noise impact.

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.

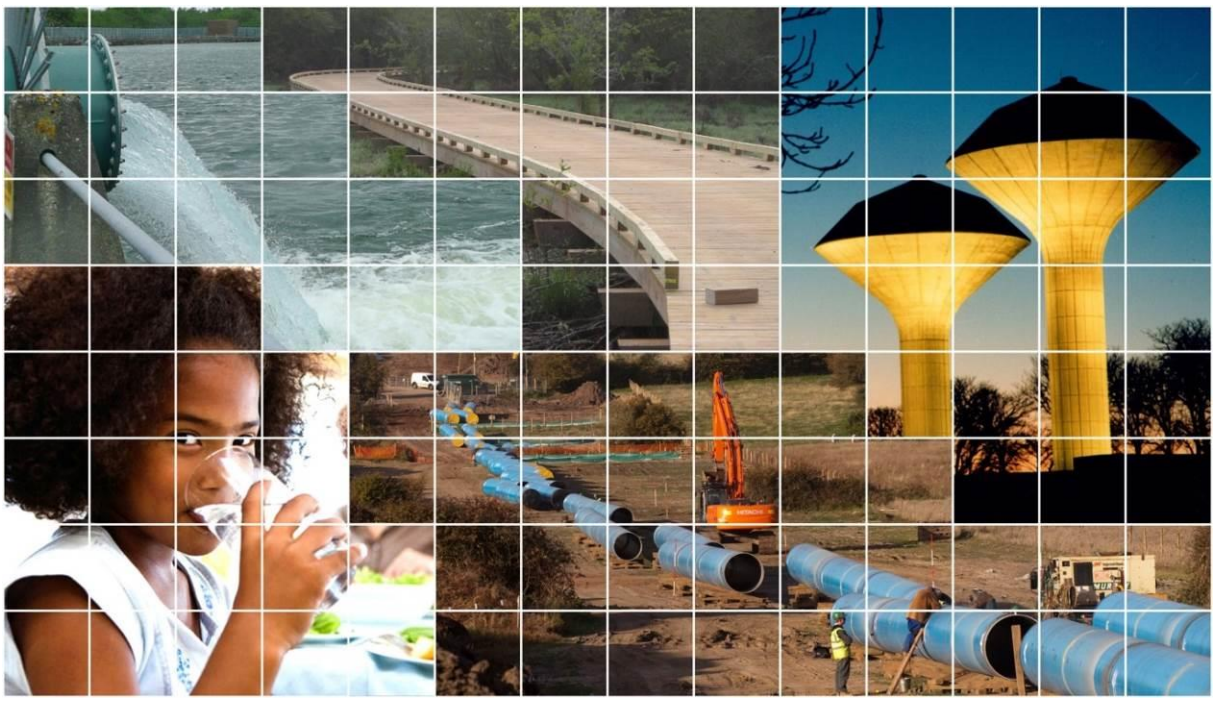
In terms of the operational phase of the development, any increase in noise associated with additional AADT traffic movements on existing roads is expected to be small and insignificant. Should there be any fixed plant required during the operational phase of the development, noise emissions will be 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.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G8: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G8-1, 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 G8 - 1 Appraisal Criteria

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

This Appendix G8 is a statement on the specialism Cultural Heritage and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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.*

1.2.1 Desk Top study

A desk top study exercise on the components 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” components element 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 G8 – 1 Peamount Location

Table G8 - 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

Table G8 - 2 Cultural Heritage Constraints (Peamount)

For the most part the Peamount area is relatively unconstrained with regards to the cultural heritage resource. Only one recorded archaeological site is located within the area. This is listed within the RMP, is not a National Monument and does not have 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 and 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 is 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 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 development
Potential to impact on ACA	Very low as none are present
Recorded shipwreck sites	Very low as none are present

Table G8 - 3 Summary of the MCA for Peamount Reservoir

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option H (Desalination).

Figure G8 – 2 Route Corridor Options DS1 and DS2 Locations

3.2 Methodology

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

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.

3.3 Route Corridor DS1

Table G8 - 4 details the Cultural Heritage constraints that have been identified within the DS1 corridor.

Site Type	ID Number	Classification	Statutory Protection
Preservation Order, RMP	DU002-001001-6	Passage tomb cemetery & fulacht fiadh	Yes
RMP	DU002-002001-3, 5, 6	Church, Graveyard, two architectural fragments, fortified house	Yes
SMR	DU001-016----	Industrial site	No
RMP	DU001-003001-5	Church, graveyard, holy well, graveslab & ecclesiastical enclosure	Yes
SMR	DU001-017----	Kiln - corn-drying	No
RMP	DU001-008----	House - 16th/17th century	Yes
SMR	DU002-014----	Field system	No
SMR	DU004-046----	House - Bronze Age	No
SMR	DU004-013----	Burnt pit	No
RMP	DU004-001----	Ringfort - unclassified	Yes
RMP	DU004-003----	Enclosure	Yes
RMP	DU002-003----	Mound	Yes
RMP	DU002-004----	Martello tower	Yes
RMP	DU002-013----	Barrow - unclassified	Yes
RMP	DU001-004----	Ritual site - holy well	Yes
RMP	DU002-005----	Settlement cluster	Yes
RMP	DU002-011----	House - 16th/17th century	Yes
SMR	DU001-014----	House - Neolithic	No
RMP	DU001-015----	Enclosure	Yes
RMP	DU002-015----	Quay	Yes
RMP	DU002-016----	Enclosure	Yes
RMP	DU002-017----	Mound	Yes
SMR	DU001-018----	Redundant record	No
RMP	DU002-018----	Enclosure	Yes
RMP	DU002-019----	Field system	Yes
SMR	DU001-022001/2	Excavation and pit	No
SMR	DU001-023----	Field system	No
SMR	DU001-024----	Enclosure	No
SMR	DU001-025----	Enclosure	No
SMR	DU001-026----	Excavation - miscellaneous	No
SMR	DU001-027----	Enclosure	No
SMR	DU001-028----	Excavation - miscellaneous	No
SMR	DU001-029----	Pit	No
SMR	DU001-030----	Kiln - corn-drying	No
RMP	DU001-031----	Enclosure	Yes
RMP	DU002-020----	Enclosure	Yes
RMP	DU002-021----	Burnt spread	Yes
RMP	DU001-002----	Ring-ditch	Yes
RMP	DU004-047----	Church	Yes
RMP	DU004-001----	Ringfort - unclassified	Yes
RMP	DU004-041----	Mill - unclassified	Yes

RMP	DU005-003----	Ritual site - holy well	Yes
RMP	DU005-042----	Souterrain	Yes
National Monument, RMP	DU005-0570071-8	Ritual site - holy well Castle - tower house Church Standing stone Graveyard Hilltop enclosure Ritual site - holy well	Yes
SMR	DU005-013003-	Souterrain	No
RMP	DU005-004----	Castle - tower house	Yes
RMP	DU005-005----	Ring-ditch	Yes
RMP	DU005-051----	Water mill - unclassified	Yes
SMR/ RMP	DU005-006001/2	Two enclosures	Yes
SMR	DU005-064----	Field system	No
SMR	DU005-065----	Kiln - corn-drying	No
RMP	DU005-008----	Mound	Yes
RMP	DU005-014----	Ring-ditch	Yes
RMP	DU005-015----	Ring-ditch	Yes
RMP	DU005-001----	Chapel	Yes
RMP	DU005-002----	Well	Yes
RMP	DU005-052001/2	Souterrain & excavation	Yes
RMP	DU005-054----	Inn	Yes
RMP	DU005-009002-	Inscribed stone	Yes
RMP	DU005-070----	Burial ground	Yes
RMP	DU005-076----	Burial ground	Yes
SMR	DU005-068----	Pit-burial	No
SMR	DU005-067----	Excavation - miscellaneous	No
SMR	DU005-102----	Field system	No
SMR	DU005-101----	Enclosure	No
RMP	DU005-115/001	Enclosure & field system	Yes
SMR	DU005-117----	Excavation - miscellaneous	No
SMR	DU005-118----	Fulacht fia	No
SMR	DU005-119001/2	Two Bronze Age Houses	No
SMR	DU005-120001-	Two medieval houses	No
SMR	DU005-121----	Kiln - corn-drying	No
SMR	DU005-122----	Industrial site	No
SMR	DU005-123----	House - Bronze Age	No
SMR	DU005-124----	Fulacht fia	No
SMR	DU005-125----	Road - road/trackway	No
SMR	DU005-126----	House - medieval	No
SMR	DU005-127----	Kiln - corn-drying	No
SMR	DU005-128----	Structure	No
SMR	DU005-129----	Kiln - corn-drying	No
SMR	DU005-130----	Pit	No
SMR	DU005-131----	Flat cemetery	No
SMR	DU005-132----	Pit	No

SMR	DU005-133----	Fulacht fia	No
SMR	DU005-134----	Excavation - miscellaneous	No
SMR	DU005-135001/2	Two cremation pits	No
SMR			No
SMR	DU005-136----	Ring-ditch	No
SMR	DU005-137----	Kiln - corn-drying	No
SMR	DU005-138001/2	Two ring-ditches	No
SMR	DU005-139----	Burial	No
SMR	DU005-140----	House - Bronze Age	No
SMR	DU005-141----	Kiln - corn-drying	No
RMP	DU005-017001-3	Mound & prehistoric sites - lithic scatters	Yes
RMP	DU005-071----	Enclosure	Yes
RMP	DU005-036----	Ritual site - holy well	Yes
RMP	DU005-023----	Cist	Yes
RMP	DU005-024001-6	Church, holy well, ecclesiastical enclosure, graveyard, field system	Yes
RMP	DU005-055----	Burial	Yes
RMP	DU005-058001/3	Fulacht fia & Prehistoric site - lithic scatter	Yes
RMP	DU005-016001-	Cairn - unclassified	Yes
RMP	DU005-061----	Prehistoric site - lithic scatter	Yes
RMP	DU005-073----	Enclosure	Yes
RMP	DU005-074----	Ring-ditch	Yes
RMP	DU005-078----	Cross (present location)	Yes
RMP	DU005-082----	Enclosure	Yes
RMP	DU005-083----	Enclosure	Yes
RMP	DU005-084----	Ring-ditch	Yes
RMP	DU005-087----	Enclosure	Yes
RMP	DU005-085----	Field system	Yes
RMP	DU005-088----	Enclosure	Yes
RMP	DU005-086----	Field system	Yes
RMP	DU005-096----	Enclosure	Yes
RMP	DU005-098----	Enclosure	Yes
RMP	DU005-099----	Enclosure	Yes
RMP	DU005-100----	Enclosure	Yes
RMP	DU005-105----	Enclosure	Yes
RMP	DU005-106----	Ring-ditch	Yes
RMP	DU005-107----	Ring-ditch	Yes
RMP	DU005-108----	Ring-ditch	Yes
RMP	DU005-109----	Enclosure	Yes
RMP	DU005-110----	Field system	Yes
RMP	DU005-114----	Enclosure	Yes
RMP	DU005-089----	Enclosure	Yes
RMP	DU005-090----	Ring-ditch	Yes
RMP	DU005-091----	Field system	Yes
RMP	DU005-152----	Ring-ditch	Yes
RMP	DU005-153----	Fulacht fia	Yes

RMP	DU005-154----	Burial	Yes
RMP	DU005-155----	Burial	Yes
RMP	DU005-156001/2	Two houses of indeterminate date	Yes
RMP	DU005-157----	Burial	Yes
RMP	DU005-158----	Burial	Yes
RMP	DU005-159----	House - prehistoric	Yes
RMP	DU005-160----	Burnt mound	Yes
RMP	DU005-161----	Kiln - corn-drying	Yes
RMP	DU005-162----	Structure	Yes
RMP	DU005-163----	Kiln - corn-drying	Yes
RMP	DU005-024007-	Field system	Yes
RMP	DU005-164----	Flat cemetery	Yes
RMP	DU005-165----	Ring-ditch	Yes
RMP	DU005-166----	House - prehistoric	Yes
RMP	DU005-167----	Burnt mound	Yes
RMP	DU005-168----	Burnt mound	Yes
RMP	DU005-169----	House - prehistoric	Yes
RMP	DU005-170001/2	Enclosure & prehistoric house	Yes
RMP	DU005-171----	House - prehistoric	Yes
RMP	DU005-172----	Ring-ditch	Yes
RMP	DU005-173----	Enclosure	Yes
RMP	DU005-177----	Standing stone	Yes
RMP	DU008-007----	Windmill	Yes
RMP	DU007-034----	Pit-burial	Yes
RMP	DU007-035----	Burnt pit	Yes
RMP	DU008-001----	Castle - unclassified	Yes
RMP	DU008-002----	Enclosure	Yes
RMP	DU008-016----	Moated site	Yes
RMP	DU008-069----	Fulacht fia	Yes
National Monument, RMP	DU005-037001/2	Church & graveyard	Yes
RMP	DU005-038----	Castle - Anglo-Norman masonry castle	Yes
RMP	DU005-039----	Fish-pond	Yes
RMP	DU008-066----	Field system	Yes
RMP	DU005-097----	Field system	Yes
RMP	DU007-052----	Enclosure	Yes
RMP	DU007-072001/2	Two ring-ditches	Yes
SMR	DU008-095----	Pit	No
RMP	DU008-096----	Enclosure	Yes
SMR	DU008-111----	Cremation pit	No
RMP	DU007-073----	Burnt mound	Yes
RMP	DU007-033----	Fulacht fia	Yes
RMP	DU007-016----	Ritual site - holy well	Yes
RMP	DU007-020----	Water mill - unclassified	Yes
RMP	DU011-085----	Burnt pit	Yes

RMP	DU007-015001-10	Graveslab Bridge Bridge Burial ground Religious house - Augustinian, of Arrouaise nuns Graveslab Ritual site - holy well Ritual site - holy well Mound Water mill - unclassified	Yes
RMP	DU007-044----	Enclosure	Yes
RMP	DU007-045----	Enclosure	Yes
RMP	DU007-046----	Ring-ditch	Yes
RMP	DU007-047----	Ring-ditch	Yes
RMP	DU007-048----	Ring-ditch	Yes
RMP	DU011-120----	Enclosure	Yes
RMP	DU007-051----	Ring-ditch	Yes
RMP	DU007-053----	Enclosure	Yes
RMP	DU007-054----	Field system	Yes
RMP	DU007-065----	Enclosure	Yes
RMP	DU011-134----	Enclosure	Yes
RMP	DU011-135----	Enclosure	Yes
RMP	DU011-136----	Enclosure	Yes
RMP	DU011-137----	Field system	Yes
RMP	DU007-069----	Ring-ditch	Yes
RMP	DU007-070----	Ring-ditch	Yes
RMP	DU011-138----	Enclosure	Yes
RMP	DU011-139----	Field system	Yes
RMP	DU011-140----	Enclosure	Yes
RMP	DU011-143----	Burial	Yes
RMP	DU011-144001-4	Ecclesiastical enclosure, burial & two field systems	Yes
RMP	DU011-145----	Water mill - horizontal-wheeled	Yes
RMP	DU011-150----	Enclosure	Yes
RMP	DU014-001----	Castle - motte	Yes
RMP	DU014-005001-6	Castle - tower house Chapel Castle - motte and bailey House - indeterminate date Crucifixion plaque House - 16th/17th century	Yes
RMP	DU014-006001/2	Two ringforts	Yes
RMP	DU011-024----	Fulacht fia	Yes
RMP	DU011-025----	Enclosure	Yes
RMP	DU011-026----	Enclosure	Yes
RMP	DU014-100----	Ring-ditch	Yes

RMP	DU014-096----	Standing stone	Yes
RMP	DU011-071----	Ringfort - unclassified	Yes
Preservation Order, RMP	DU011-027----	Castle - motte and bailey	Yes
RMP	DU011-028----	Bridge	Yes
RMP	DU011-031001-3	Ecclesiastical enclosure, church & graveyard	Yes
RMP	DU011-023001/2	Ringfort – unclassified & graveyard	Yes
RMP	DU011-029----	Mound	Yes
RMP	DU011-030----	Fish-pond	Yes
RMP	DU014-094----	Habitation site	Yes
RMP	DU011-016----	Earthwork	Yes
RMP	DU011-018----	Ritual site - holy well	Yes
RMP	DU011-040----	Mound	Yes
RMP	DU011-041----	Enclosure	Yes
RMP	DU011-019----	Structure	Yes
RMP	DU011-059----	House - 16th/17th century	Yes
RMP	DU011-067----	House - 16th/17th century	Yes
Preservation Order, RMP	DU011-086----	House - 16th/17th century	Yes
RMP	DU014-093----	Enclosure	Yes
RMP	DU011-110----	Ring-ditch	Yes
RMP	DU011-111----	Ring-ditch	Yes
RMP	DU011-112----	Enclosure	Yes
RMP	DU011-124----	Enclosure	Yes
RMP	DU011-125----	Field system	Yes
RMP	DU011-126----	Ring-ditch	Yes
RMP	DU011-128----	Road - road/trackway	Yes
RMP	DU011-127----	Field system	Yes
RMP	DU011-146001/2	Fulacht fia & ring-ditch	Yes
RMP	DU011-147----	Ringfort - unclassified	Yes
RMP	DU011-148----	Fulacht fia	Yes
RMP	DU011-149----	Settlement cluster	Yes
RMP	DU014-012001-3	Church, Burial ground & holy well	Yes
RMP	DU014-013----	Castle - motte and bailey	Yes
RMP	DU013-014001-4	Mound, three enclosures, souterrain	Yes
RMP	DU013-008001/2	Church & graveyard	Yes
RMP	DU014-048----	Burial ground	Yes
RMP	DU014-089----	House - 16th/17th century	Yes
RMP	DU013-007----	Field system	Yes
SMR	DU013-042----	Kiln - corn-drying	No
SMR	DU013-043----	Cremation pit	No
SMR	DU013-044001/2	Kiln & cremation pit	No
SMR	DU013-045001/2	Ring-ditch & cremation pit	No
SMR	DU013-046001/2	Excavation –	No

		miscellaneous & pit	
RPS	3	Passage Grave cemetery	Yes
RPS/ NIAH	12 11304001	Railway Bridge	Yes
RPS	13	St. Molaga's Church	Yes
RPS	14	Bremore Castle	Yes
RPS/ NIAH	15 11304003	Bremore Lodge	Yes
RPS	11	Lady's Well	Yes
RPS/ NIAH	6	Church	Yes
RPS/ NIAH	7 11304010	Church, in ruins & graveyard	Yes
RPS	8	Former thatched cottage	Yes
RPS	9	Potential site - earthwork	Yes
NIAH	11304007	Balscadden House	No
NIAH	11304009	Cottage	No
NIAH	11314001	Cottage	No
RPS	96	Enclosure site	Yes
RPS	10	Potential site	Yes
RPS	75	Chapel site	Yes
RPS	76	Well	Yes
RPS	73	Lady Well	Yes
RPS	74	Castle, in ruins	Yes
RPS	70	Corn mill	Yes
RPS	71	Mill dam	Yes
RPS	72	Mill race	Yes
RPS	80	Blackhall House	Yes
RPS	800	White Hart House	Yes
RPS	77	Ring ditch	Yes
RPS/ NIAH	78 11309001	Inch House	Yes
RPS	79	Potential site	Yes
RPS	82	Mound	Yes
RPS	90	Reservoir & sluices	Yes
RPS	89	Ring ditch	Yes
RPS/ NIAH	83 & 84 11309002	Church and medieval church tower	Yes
RPS/ NIAH	85 11309003	Tower house	Yes
RPS	81	Holy well	Yes
RPS	86	Standing stone	Yes
RPS	85	Tower house	Yes
NIAH	11309004	Tara House	No
RPS	93	Ring ditch	Yes
RPS/ NIAH	94 11310001	Ardgillan House	Yes
RPS/ NIAH	239 11310004	Milverton demesne outbuildings	Yes
RPS/ NIAH	240 11310003	Ruined church & graveyard	Yes

RPS	241	Holy well	Yes
RPS	242	Home Farm	Yes
RPS/ NIAH	238 11317003	House	Yes
RPS/ NIAH	237 11317003	Gate lodge	Yes
RPS/ NIAH	238 11317004	Gate lodge	Yes
RPS/ NIAH	235 11317005	Balcunnin Lodge	Yes
RPS/ NIAH	234 11310005	Gate lodge	Yes
RPS	243	Lady Well	Yes
RPS/ NIAH	306 11323022	Rose Cottage	Yes
RPS	308	Castle site	Yes
RPS	309	Glebe House	Yes
RPS	310	Mound	Yes
RPS	321	Lady's Well & St. Bridget's Well	Yes
RPS	322	Nunnery	Yes
NIAH	11328002	Gracedieu Bridge	No
RPS	323	St. Bridget's Well	Yes
RPS	373	Murray's Bridge	Yes
RPS/ NIAH	374 11335021	Church	Yes
NIAH	11335022	Sommerville House	No
RPS	370	Glasmore Abbey & St Cronan's Well	Yes
RPS	377	Dwelling site	Yes
RPS	378	Possible fortifications	Yes
RPS	363	Mill ponds, sluice and mill race	Yes
RPS/ NIAH	364 11343018	Brackenstown House	Yes
RPS/ NIAH	369 11342004	Knocksedan House	Yes
RPS	365	Motte	Yes
RPS/ NIAH	367	Knocksedan Bridge	Yes
RPS/ NIAH	366 11342004/ 9	Knocksedan Post house & post box	Yes
RPS	368	Mound	Yes
RPS/ NIAH	338 11334001-7	Rathbeale Hall, outbuildings & gate lodge	Yes
RPS/ NIAH	376	Leas House	Yes
RPS	646	Potential site	Yes
RPS/ NIAH	634 11342011	Killeek Bridge	Yes
RPS/ NIAH	633 11342010	Killeek Church & Graveyard	Yes
RPS/ NIAH	636 11342006	Thatched cottage	Yes
RPS	639	Owens Bridge	Yes

RPS	638	Possible fulacht fiadh	Yes
RPS	632	Ringfort site	Yes
RPS	640	Enclosure & graveyard	Yes
RPS	637	Mound	Yes
RPS	623	Dunsoghly Castle	Yes
RPS	626	St Margaret's Church	Yes
RPS/ NIAH	627 11342008	Killreesk Bridge	Yes
RPS	619	Ringfort	Yes
RPS	620	Possible ringfort	Yes
RPS	663	Kilshane Church & holy well	Yes
RPS	662	Kilshane Moat	Yes
RPS	674	Cloghran Church	Yes
RPS	675	Site of enclosure	Yes
RPS/ NIAH	665 11347001	Hollywoodrath House & gate lodge	Yes
Architectural Conservation Area	N/a	Ardgillan Demesne	Yes
Architectural Conservation Area	N/a	Balrothery	Yes
Architectural Conservation Area	N/a	Balscaddan	Yes
Architectural Conservation Area	N/a	Milverton Demesne	Yes
Designed landscape	1	Gormanstown Castle demesne	Principal structure is in RPS
Designed landscape	20	Inch House demesne	Principal structure is in RPS
Designed landscape	21	Glebe House demesne	No
Designed landscape	22	Hampton Hall demesne	No
Designed landscape	23	Ardgillan Castle demesne	Principal structure is in RPS & demesne is an ACA
Designed landscape	24	Milverton demesne	Gate lodges and farm complex are in RPS & demesne is an ACA
Designed landscape	25	Woodpark House demesne	No
Designed landscape	26	Newlawn House demesne	No
Designed	27	Saucerstown House	No

landscape		demesne	
Designed landscape	28	Rathbeale Hall demesne	Principal structure is in RPS
Designed landscape	29	Leas House demesne	Principal structure is in RPS
Designed landscape	30	Brackenstown House demesne	Principal structure is in RPS
Designed landscape	31	Kingstown House demesne	No
Designed landscape	32	Kilreask House demesne	No
Designed landscape	16	Tyrrelstown House demesne	Principal structure is in RPS
Designed landscape	17	Powerstown House demesne	No
Designed landscape	18	Cruiserath House demesne	No
Designed landscape	19	Bay House demesne	No

Table G8 - 4 Cultural Heritage Constraints (Route Corridor DS1)

3.4 Route Corridor DS2

Table G8 - 5 details the Cultural Heritage constraints that have been identified within the DS2 corridor.

Site Type	ID Number	Classification	Statutory Protection
Preservation Order, RMP	DU002-001001-6	Passage tomb cemetery & fulacht fiadh	Yes
RMP	DU002-002001-3, 5, 6	Church, Graveyard, two architectural fragments, fortified house	Yes
SMR	DU001-016----	Industrial site	No
RMP	DU001-003001-5	Church, graveyard, holy well, graveslab & ecclesiastical enclosure	Yes
SMR	DU001-017----	Kiln - corn-drying	No
RMP	DU001-008----	House - 16th/17th century	Yes
SMR	DU002-014----	Field system	No
SMR	DU004-046----	House - Bronze Age	No
SMR	DU004-013----	Burnt pit	No
RMP	DU004-001----	Ringfort - unclassified	Yes
RMP	DU004-003----	Enclosure	Yes
RMP	DU002-003----	Mound	Yes
RMP	DU002-004----	Martello tower	Yes
RMP	DU002-013----	Barrow - unclassified	Yes
RMP	DU001-004----	Ritual site - holy well	Yes
RMP	DU002-005----	Settlement cluster	Yes
RMP	DU002-011----	House - 16th/17th	Yes

		century	
SMR	DU001-014----	House - Neolithic	No
RMP	DU001-015----	Enclosure	Yes
RMP	DU002-015----	Quay	Yes
RMP	DU002-016----	Enclosure	Yes
RMP	DU002-017----	Mound	Yes
SMR	DU001-018----	Redundant record	No
RMP	DU002-018----	Enclosure	Yes
RMP	DU002-019----	Field system	Yes
SMR	DU001-022001/2	Excavation and pit	No
SMR	DU001-023----	Field system	No
SMR	DU001-024----	Enclosure	No
SMR	DU001-025----	Enclosure	No
SMR	DU001-026----	Excavation - miscellaneous	No
SMR	DU001-027----	Enclosure	No
SMR	DU001-028----	Excavation - miscellaneous	No
SMR	DU001-029----	Pit	No
SMR	DU001-030----	Kiln - corn-drying	No
RMP	DU001-031----	Enclosure	Yes
RMP	DU002-020----	Enclosure	Yes
RMP	DU002-021----	Burnt spread	Yes
RMP	DU001-002----	Ring-ditch	Yes
RMP	DU004-047----	Church	Yes
RMP	DU004-001----	Ringfort - unclassified	Yes
RMP	DU004-041----	Mill - unclassified	Yes
RMP	DU004-042----	House - 18th/19th century	Yes
RMP	DU004-045001-9	Castle - tower house Ritual site - holy well Church Graveyard Water mill - unclassified Bridge Enclosure Cross	Yes
RMP	ME034-005----	Barrow - mound barrow	Yes
RMP	ME034-006----	Barrow - mound barrow	Yes
RMP	ME034-008----	Mill - unclassified	Yes
RMP	ME034-009----	Mill - unclassified	Yes
RMP	ME034-010----	Castle - unclassified	Yes
RMP	ME034-011----	Enclosure	Yes
RMP	ME034-012----	Megalithic tomb - unclassified	Yes
RMP	DU004-056----	Enclosure	Yes
RMP	DU004-057----	Field system	Yes
RMP	DU004-061----	Enclosure	Yes
RMP	DU001-020----	Enclosure	Yes
RMP	DU001-021----	Field system	Yes
RMP	ME034-026----	Ring-ditch	Yes

RMP	ME034-027----	Enclosure	Yes
RMP	DU004-055----	Field system	Yes
RMP	DU004-005----	Barrow - unclassified	Yes
RMP	DU004-004----	Enclosure	Yes
RMP	ME033-033----	Mound	Yes
RMP	ME033-034----	Mound	Yes
RMP	ME034-023----	Ring-ditch	Yes
RMP	ME033-060----	Field system	Yes
RMP	ME033-061----	Ringfort - rath	Yes
RMP	DU007-001001-4	Church, holy well, graveyard, saint's stone	Yes
RMP	DU007-002----	Ritual site - holy well	Yes
RMP	DU007-005----	Enclosure	Yes
RMP	DU007-006001/2	Church & graveyard	Yes
RMP	DU004-019----	Ringfort - unclassified	Yes
RMP	DU004-018----	Mound	Yes
RMP	DU004-049----	Field system	Yes
RMP	DU004-050----	Enclosure	Yes
RMP	DU007-063----	Enclosure	Yes
RMP	DU007-024----	House - 16th/17th century	Yes
RMP	DU007-013001-3	Graveyard, church & holy well	Yes
RMP	DU007-012----	Mound	Yes
RMP	ME045-007----	Castle - motte	Yes
RMP	ME045-008/001	Church & graveyard	Yes
RMP	ME045-009----	Souterrain	Yes
RMP	ME045-010----	Ring-ditch	Yes
RMP	ME045-017----	Barrow - mound barrow	Yes
RMP	ME045-018----	Church	Yes
RMP	ME045-018001-3	Watchman's hut - burial ground/ graveyard, cross	Yes
RMP	ME045-050----	Ring-ditch	Yes
RMP	ME045-054----	Ring-ditch	Yes
RMP	DU007-055----	Enclosure	Yes
RMP	DU007-064----	Ring-ditch	Yes
RMP	DU006-009----	Ring-ditch	Yes
RMP	ME045-060----	Ring-ditch	Yes
RMP	ME045-059----	Ring-ditch	Yes
RMP	ME045-063----	Ritual site - holy well	Yes
RMP	DU011-008----	Ringfort - unclassified	Yes
RMP	ME045-016----	Enclosure	Yes
RMP	ME045-021----	Ringfort - rath	Yes
RMP	ME045-022----	Ringfort - rath	Yes
RMP	ME045-023----	Enclosure	Yes
RMP	ME045-025/001	Church & graveyard	Yes
RMP	ME051-001----	Earthwork	Yes
RMP	ME051-009----	Enclosure	Yes
RMP	ME045-027----	Enclosure	Yes
SMR	ME045-028----	Excavation - miscellaneous	No

RMP	ME045-044----	Enclosure	Yes
RMP	ME045-055----	Enclosure	Yes
RMP	ME045-056----	Field system	Yes
RMP	ME045-061----	Ring-ditch	Yes
RMP	DU013-032----	Enclosure	Yes
RMP	DU013-001----	Enclosure	Yes
RMP	DU013-009----	Ritual site - holy well	Yes
RMP	DU013-002001-3	Church, ecclesiastical enclosure, field system	Yes
RMP	DU013-006----	House - 16th/17th century	Yes
RMP	DU013-007----	Field system	Yes
RMP	DU013-003----	Earthwork	Yes
RMP	DU013-004----	Earthwork	Yes
RMP	DU013-036----	Enclosure	Yes
RMP	DU013-037----	Enclosure	Yes
RMP	DU013-038----	Ring-ditch	Yes
RMP	DU013-039----	Enclosure	Yes
RMP	DU013-040----	Ring-ditch	Yes
RMP	DU013-041----	Enclosure	Yes
RMP	ME051-004----	Ringfort - rath	Yes
RMP	ME051-005----	Field system	Yes
SMR	DU013-042----	Kiln - corn-drying	No
SMR	DU013-043----	Cremation pit	No
RMP	DU013-010003-	Graveyard	Yes
RPS	3	Passage Grave cemetery	Yes
RPS/ NIAH	12 11304001	Railway Bridge	Yes
RPS	13	St. Molaga's Church	Yes
RPS	14	Bremore Castle	Yes
RPS/ NIAH	15 11304003	Bremore Lodge	Yes
RPS	11	Lady's Well	Yes
RPS/ NIAH	6	Church	Yes
RPS/ NIAH	7 11304010	Church, in ruins & graveyard	Yes
RPS	8	Former thatched cottage	Yes
RPS	9	Potential site - earthwork	Yes
NIAH	11304007	Balscadden House	No
NIAH	11304009	Cottage	No
NIAH	11314001	Cottage	No
RPS/ NIAH	97 11303002/ 5	Whitestown House & gate lodge	Yes
RPS	98	Ringfort	Yes
RPS	99	Grange Mount House	Yes
RPS/ NIAH	34 11303001	Coolfore's Bridge	Yes
RPS/ NIAH	101 11308006/ 8	Reynoldstown House & gatelodge	Yes

NIAH	11308007	Post box	No
RPS	102	Naul House	Yes
RPS/ NIAH	106 11308003	Naul Bridge	Yes
RPS/ NIAH	107 11308002	Water mill	Yes
RPS	108	Thatched cottage	Yes
RPS/ NIAH	109 11308001	Roman Catholic Church	Yes
RPS	103	Holy well	Yes
RPS/ NIAH	104 11308004	Church, in ruins & graveyard	Yes
RPS	105	Castle	Yes
NIAH	11308005	Water pump	No
RPS	116	Enclosure site	Yes
RPS	117	Cockles Bridge	Yes
RPS	139	Burial mound	Yes
RPS	140	Ringfort	Yes
NIAH	11314004	Prospect Hill	No
NIAH	11314005	Spring Hill	No
NIAH	11314006	Spring Hill Farm	No
NIAH	11314009	Post Box	No
RPS/ NIAH	141 11314007	Grallagh Church & holy well	Yes
RPS	142	St John's well	Yes
RPS/ NIAH	143 11314008	Trallie House	Yes
RPS	137	Potential site	Yes
RPS	144	Enclosure site	Yes
NIAH	11320002	Cottrelstown House	Yes
NIAH	11320014	Jordanstown House	Yes
RPS	136	Mound site	Yes
RPS	135	Church, in ruins	Yes
RPS	666	Mound	Yes
RPS	667	Site of earthwork	Yes
RPS	668	Kilmartin Church	Yes
RPS/ NIAH	665 11347001	Hollywoodrath House & gate lodge	Yes
RPS	674	Cloghran Church	Yes
RPS	676	Field system site	Yes
Architectural Conservation Area	N/a	Balscaddan	Yes
Architectural Conservation Area	N/a	Naul	Yes
Designed landscape	1	Gormanstown Castle demesne	Principal structure is in RPS
Designed landscape	2	Herbertstown House demesne	No
Designed landscape	3	Weston House	No

Designed landscape	4	Reynoldstown House demesne	Principal structure is in RPS
Designed landscape	5	Prospect Hill demesne	No
Designed landscape	6	Ashgrove demesne	No
Designed landscape	7	Trallie House demesne	Principal structure is in RPS
Designed landscape	8	Brownscross House demesne	No
Designed landscape	9	Jordanstown House demesne	No
Designed landscape	10	Priest Town House demesne	No
Designed landscape	11	Ballymacarney House demesne	No
Designed landscape	12	Ballintry House demesne	No
Designed landscape	13	Kilmartin House demesne	No
Designed landscape	14	Larch Grove demesne	No
Designed landscape	15	Hollywoodrath House demesne	Principal structure is in RPS
Designed landscape	16	Tyrrelstown House demesne	Principal structure is in RPS
Designed landscape	17	Powerstown House demesne	No
Designed landscape	18	Cruiserath House demesne	No
Designed landscape	19	Bay House demesne	No

Table G8 - 5 Cultural Heritage Constraints (Route Corridor DS2)

3.5 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Cultural Heritage		
Potential to impact (direct/indirect) on National Monuments (designated sites)	Low as only five are recorded within the corridor, which covers a large area	Very low as none are present
Potential to impact (direct/indirect) on RMPs (designated sites)	Mid-range as a large amount of sites (183) are recorded within the corridor although the area itself is large	Mid-range as a large amount of sites (106) are recorded within the corridor although the area itself is large
Potential to impact (direct/indirect) on RPS (designated sites)	Mid-range as a large amount of sites (84) are recorded within the corridor although the area itself is large	Low as only 40 are recorded within the corridor, which covers a large area
Potential to impact (direct/indirect) on NIAH	Low as only 34 are recorded within the corridor, which covers a large area	Low as only 25 are recorded within the corridor, which covers a large area
Potential to impact (direct/indirect) on historic designed landscapes	Mid-range as 18 landscapes are recorded within the corridor although the area itself is large	Mid-range as 19 landscapes are recorded within the corridor although the area itself is large
Potential to impact on ACA	Very low as only 2 are recorded within the corridor, which covers a large area	Low as 4 are recorded within the corridor, which covers a large area
Recorded shipwreck sites	Very low as none are present	Very low as none are present

Table G8 - 6 Summary of the MCA for Route Corridors

3.6 Comparative Discussion

The two route options are both similar in size and cross a landscape characterised by arable and pastoral farming. Corridor DS1 is considered to be the least preferable of the route options based on the fact that there are 183 recorded sites or groups of sites located within the corridor, along with three sites that are further protected with Preservation Orders and two that are listed as National Monuments. In addition, there are 56 SMRs within the corridor, which in most cases relate to archaeological sites that have already been excavated. With regards to the built heritage resource a total of 84 protected structures are located within the corridor. Of these, 28 are also recorded in the NIAH survey. A further six structures are recorded within the NIAH survey. A total of 18 designed landscapes have been identified within the corridor, eight of which are associated directly with protected structures. There are also four Architectural Conservations Areas within the DS1 route corridor. These are situated at Ardgillan Demesne, Milverton Demesne, Balrothery and Balscaddan.

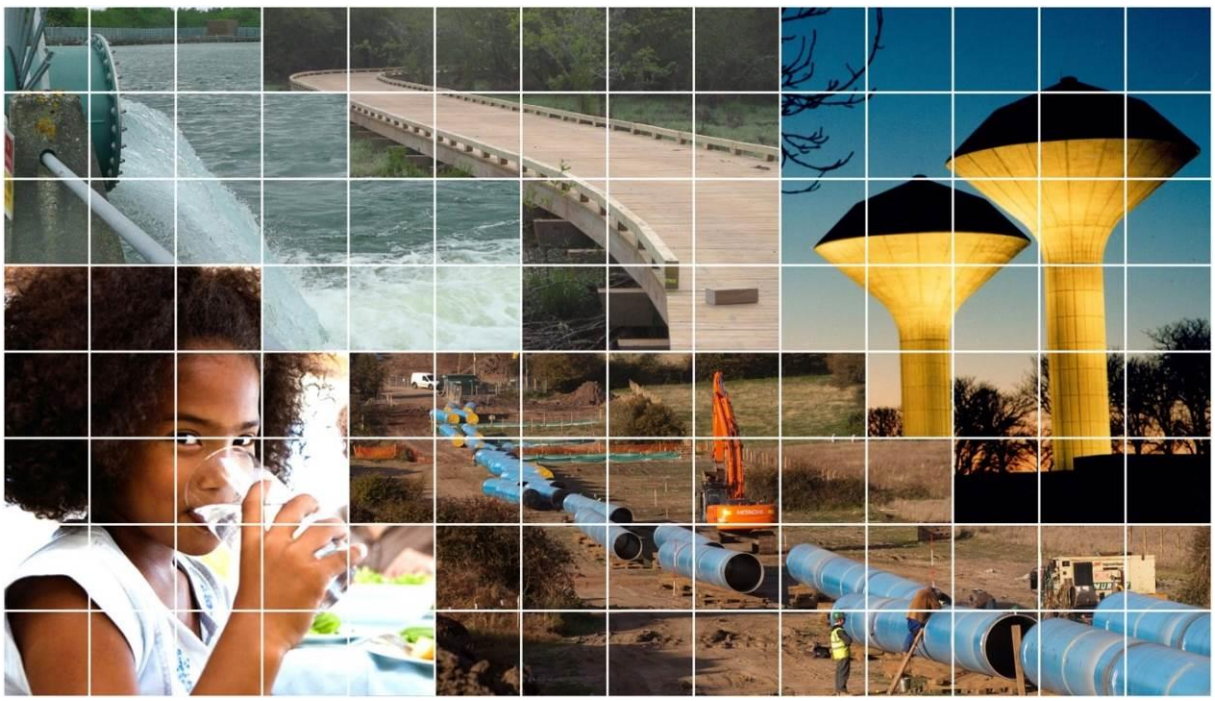
The most preferable route from a cultural heritage perspective is DS2. There are 106 RMPs recorded within the corridor, along with one site that has a Preservation Order. There are no National Monuments located within this corridor. A further 19 sites are listed within the SMR, which again, for the most part represent sites that have already been excavated. A total of 40 protected structures are recorded, 14 of which are also recorded within the NIAH survey. A further 11 structures are included within the NIAH survey that are no protected structures. A total of 19 designed landscapes have been recorded within the corridor, five of which are directly associated with protected structures. There are also two Architectural Conservation Areas located within this corridor, at Naul and Balscaddan.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G9: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G9-1, 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 G9 - 1 Appraisal Criteria

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

This Appendix G9 is a statement on the specialism Landscape and Visual and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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 H (Desalination), 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 on the components 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” components element 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 at the Peamount location, 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 G9 – 1 Peamount Location

Due to engineering constraints at other potential terminal point locations, the only location presented to the environmental specialists for a constraints review was the Peamount location in South County Dublin. This location lies in agricultural land between the Grand Canal to the north and the Grange Industrial/Business Park to the east. To the southeast is Peamount Hospital with Casement Aerodrome a short distance beyond.

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 G9 - 2 Summary of the MCA for Lough Derg/Parteen Basin

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 H (Desalination).

Figure G9 – 2 Route Corridor Options DS1 and DS2 Locations

3.2 Methodology

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

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.

3.3 Route Corridor DS1

Route corridor DS1 commences immediately inland of Balbriggan and runs in a south-easterly direction towards the coastal headland occupied by the settlements of Skerries and Rush. It loops to the southwest passing inland of these coastal settlements and the Dublin-Belfast railway line and crosses the M1 motorway just to the west of the settlement of Lusk. The corridor then veers in a southerly direction

passing close to the western outskirts of Swords and skirting to the north of Dublin Airport. The final leg crosses the M2 motorway and finishes adjacent to the north of several industrial estates that lie on the north-eastern side of the N3 at Blanchardstown.

3.4 Route Corridor DS2

Route corridor DS2 emanates from a common nodal point with DS1 just to the north of Balbriggan and runs directly inland in a south-westerly direction along the border of County Dublin and County Meath. Before reaching Garristown, the corridor veers to the south passing to the east of Ashbourne before crossing the M2 motorway and connecting with route corridor DS1 at their common nodal point near Blanchardstown.

3.5 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Landscape and Visual		
Potential to impact on designated areas of 'Highly Sensitive Landscape'	Mid range – Passes through designated 'highly sensitive' coastal landscape area between Skerries and Rush	Mid range – Incorporates a sensitive landscape designation associated with Balscadden (FCC) and the 'Coastal Plains' and 'Ward Lowlands' LCAs of County Meath.
Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc)	Low – skirts coastline between Balbriggan and Skerries but this can be avoided	Very Low – a modified and fairly typical rural landscape
Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	Low – hedgerows and treelines throughout	Low – hedgerows and treelines throughout
Potential to impact on woodlands and significant tree groups	Mid range – Mature parkland/woodlands at Ardgillan Demesne and Milverton Demesne near Skerries	Very low – there would not appear to be any significant woodlands within the corridor
Potential to impact on historic designed landscapes	Mid range – Mature parkland/woodlands at Ardgillan Demesne and Milverton Demesne near Skerries	Low – Some small demesnes / demesne remnants (see cultural heritage appraisal), but these could be avoided through refinement
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 – passes through coastal area with numerous designated scenic views but will not result in a permanent intrusion	Low – encompasses numerous scenic views in the hilly landscape of north Fingal / southeast Meath, but no permanent visual intrusion

Potential to impact on views from heritage/tourist/amenity features of national or regional importance	Low – Ardgillan Castle but will not result in a permanent intrusion	Low – does not appear to be any such features
Potential to impact on views from settlements	Low – runs in close proximity to Balbriggan, Skerries, Lusk and Swords	Very Low – tends to thread between notable settlements
Potential to impact on views from dwellings / local roads	Low - some relatively dense clusters of rural housing throughout this part of North County Dublin	Low – Some relatively dense clusters of rural development and small settlements such as Naul
Potential to impact on views from motorways	Low – crosses M1 and M2 motorways	Low – crosses M1 and M2 motorways
Potential to impact on views from other major roads (national or regional roads)	Low – crosses several regional roads	Low – crosses several regional roads
Potential to impact on views from rail lines	Low – encompasses a small section of Dublin-Belfast railway line northwest of Skerries	Very low – Dublin – Belfast railway line only crossed at common node with DS1
Potential to impact on arrival views from Airports including aerial approach and vehicular egress	Very low – although it passes relatively close to Dublin airport it does not represent a noticeable permanent intrusion in the landscape	Very low – considerable distance from Dublin Airport
Potential to impact on views from national 'way marked' walking routes	Very Low – no national Way marked walks within the corridor	Very Low – no national Way marked walks within the corridor
Potential to impact on local walks	Low - Fingal ‘Green Infrastructure’ maps identify several coastal walking loops	Very low - No formalised walks apparent

Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	Low – North County Dublin beaches	Very low - none apparent
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 G9 - 3 Summary of the MCA for Route Corridors

3.6 Comparative Discussion

The main landscape and visual constraints associated with corridor DS1 relate to its initial coastal sections in the vicinity of Skerries, Rush and Lusk. This is an area where the coastal landscape has been designated as highly sensitive in the Fingal County development plan (2011 – 2017). There are also numerous designated scenic views associated with the coastal landscape. Corridor DS1 incorporates a small section of the coastline itself just to the north of Skerries and although this could be avoided by any further refinement of the corridor, it is a highly sensitive feature. Also contained within this coastal zone are Ardgillan Castle and demesne and the Milverton Hall and its associated demesne. These are significant designed landscapes containing mature parkland settings incorporating woodlands and exploited coastal views. It is considered that even though the pipeline would be laid underground it has some potential to disrupt these mature landscape settings. The more inland (westerly) sections of corridor DS1 encompass a more robust rural landscape incorporating various other forms of infrastructural and industrial development. Consequently, there would be much lower potential for landscape and visual impacts arising from the pipeline corridor to occur away from the coast.

Corridor DS2 also encompasses a more sensitive landscape in its initial easterly sections where it passes through an elevated rural landscape at the border of County Meath and County Dublin. Indeed, both County Councils have designated the landscape to the west of Balbriggan as highly sensitive with a number of elevated scenic views designated in this area. By comparison, the more south-westerly sections of DS2 encounter a more robust lowland rural landscape nearing the outskirts of Dublin.

Table G9 – 3 clearly indicates that corridor DS2 is less constrained from a landscape and visual perspective than DS1. This is mainly due to the sensitivity of the coastal landscape encountered by corridor DS1 along the associated landscape and visual designations. The impact on the designed landscapes of Ardgillan demesne and Milverton demesne is also differentiating factor between the two corridor options.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G10: Agronomy

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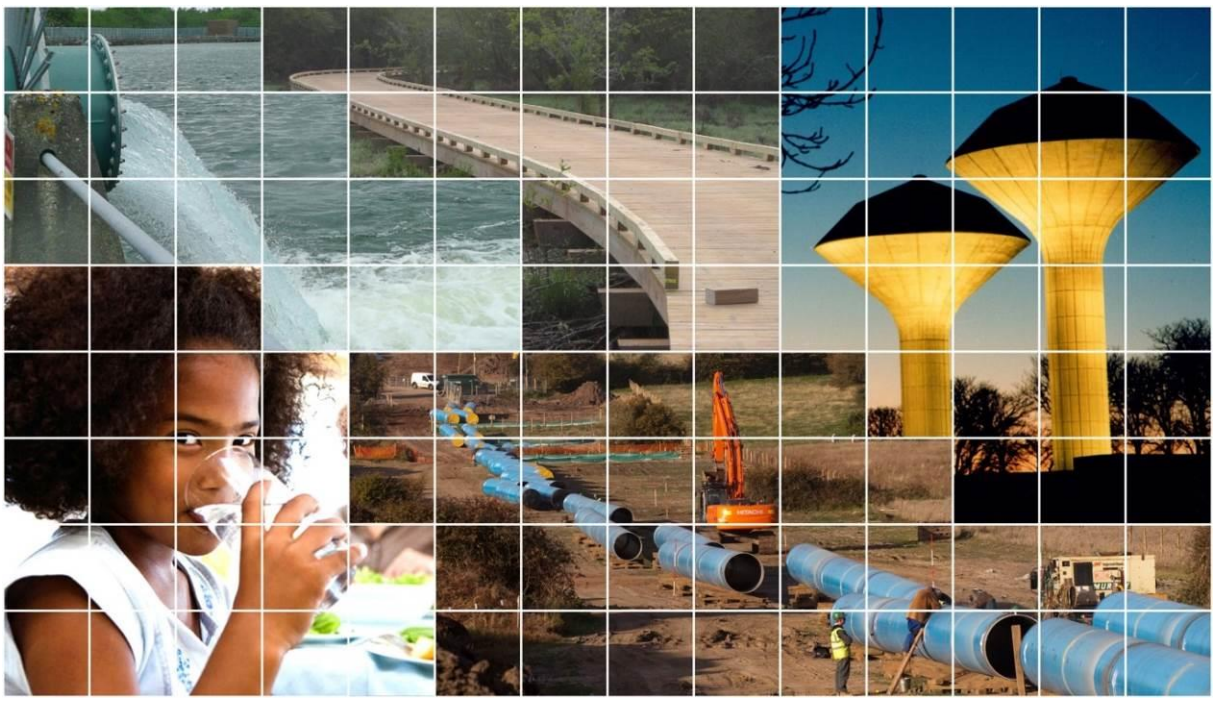


Contents

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, Sections 6 and 7. 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 H (Desalination)**.

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 G10-1, 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 G10 - 1Appraisal Criteria

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

This Appendix G10 is a statement on the specialism Agronomy and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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

To effectively determine the least constrained corridor option for the reasonable alternative options, the potential route corridors were assessed under 8 no. Agronomy sub-criteria

- Approximate % Reduction in overall farm holding
- Farming Enterprise
- Number of landowners impacted within site boundary
- Land Quality
- Severance based on site location within overall land holdings
- Potential Impacts on landholdings
- Crop rotation practiced
- Overall Impact

1.2.1 Desk study

A desk study exercise of the potential route corridors was carried out using 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" 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**

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 G10 – 1 Peamount Location

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

Farm enterprise

The predominant farm enterprises within the study area are grass based and tillage production.

Number of Land owners Impacted

There are approximately 3-5 individual landowners within the study area.

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.

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.

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 G10 - 2Summary of the MCA for Lough Derg/Parteen Basin

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 H (Desalination).

Figure G10 – 3 Route Corridor Options DS1 and DS2 Locations

3.2 Methodology

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

To effectively determine the least constrained corridor option for the reasonable alternative options, the potential route corridors were assessed under 8 no. Agronomy sub-criteria:

- Approximate % Reduction in overall farm holding
- Farming Enterprise
- Number of landowners impacted within site boundary
- Land Quality

- Severance based on site location within overall land holdings
- Potential Impacts on landholdings
- Crop rotation practiced
- Overall Impact

3.2.1 Desk study

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

3.2.2 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**

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.

3.3 Route Corridor DS1

The identified route corridor DS1, in the main, passes through agricultural land. The identified route is rural in character and consists predominantly of farm land.

3.3.1 Farm Enterprises

The predominant farm enterprises along the route corridor are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and of particular relevance there are areas devoted to intensive horticultural production. Due to the proximity of urban settlements a substantial number of small scale, mainly recreational sports equine enterprises are found.

3.3.2 Number of Land owners Impacted

There are approximately 300-400 individual landowners within the route corridor.

3.3.3. Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. When combined with prevailing climatic factors the soils are well suited for horticulture. The land quality would be described as very good quality due to it' soils and typography

3.3.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage particularly cereal production is rotated with intensive horticultural production, potato production is common within the area.

3.3.5 Overall Impact

In the absence of a defined route and with the absence of individual farms surveyed it is possible only to generalise about the overall impacts. The principal impacts are predicted to be at the construction phase and to be temporary loss of land, noise, dust and other general disturbance.

The overall impact is deemed to be mid-range reflecting the presence along the route corridor of a significant number of intensive horticultural enterprises and equine enterprises.

3.4 Route Corridor DS2

The identified route corridor DS2, (Western) in the main passes through agricultural land. The identified route is rural in character and consists predominantly of farm land

3.4.1 Farm Enterprises

The predominant farm enterprises along the route corridor are grass based with mainly cattle, sheep and equine production. In addition there are areas of tillage and of particular relevance there are areas devoted to intensive horticultural production. Due to the proximity of urban settlements a substantial number of small scale, mainly recreational sports equine enterprises are found.

3.4.2 Number of Land owners Impacted

There are approximately 300-400 individual landowners within the route corridor.

3.4.3. Land Quality

The soils encountered along the route corridor are broadly described as loamy drift with a limestone base. In addition small areas of alluvium soils are encountered. These soils are suitable for a wide range of agricultural uses. When combined with prevailing climatic factors the soils are well suited for horticulture. The land quality would be described as very good quality due to it' soils and typography

3.4.4 Crop Rotations Practised

The predominant crop within the identified route corridor is permanent pasture. Areas of tillage particularly cereal production is rotated with intensive horticultural production, potato production is common within the area.

3.4.5 Overall Impact

In the absence of a defined route and with the absence of individual farms surveyed it is possible only to generalise about the overall impacts. The principal impacts are predicted to be at the construction phase and to be temporary loss of land, noise, dust and other general disturbance. The overall impact is deemed to be mid-range reflecting the presence along the route corridor of a significant number of intensive horticultural enterprises and equine enterprises.

3.5 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Farm Enterprises	Low Impact	Low Impact
No. of Landowners	Low Impact	Low Impact
Land Quality	Low Impact	Low Impact
Crop Rotation	Mid-range Impact	Mid-range Impact

Overall Impact	Mid-range Impact	Mid-range Impact

Table G10 - 3Summary of the MCA for Route Corridors

3.6 Comparative Discussion

From an agricultural perspective the two potential route corridor options, namely DS1 and DS2 both impact on lands with broadly similar characteristics. A desk top study of each of the potential corridor options has been carried out for the purpose of establishing the least constrained route corridor.

The study was carried out having regard to the land quality and agricultural practises within the potential corridor options. Individual farm studies were not conducted.

The two potential corridor options as outlined above are broadly similar with regards to all impacts studied. However as it is deemed that DS1 would impact on a greater number of equine and horticultural farms corridor option DS2 is deemed to be the least constrained.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G11: 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, Sections 6 and 7). These options 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 H (Desalination)**.

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 G11 - 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 G11 - 1Appraisal Criteria

The assessments are presented as individual statements within this Appendix G11

This Appendix G11 is a statement on the specialism Soils, Geology and Hydrogeology and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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 H (Desalination), the potential corridors 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, EPA and FCC 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
- 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 desk top study exercise on the components 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" components element 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.

A “significant” constraint is described as a feature or area that has been identified as being particularly vulnerable to disturbance (e.g. peatland or an important groundwater aquifer) or may have recognised value or importance (e.g. a Geological Heritage Site) and that may be impacted by the proposed 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 a small area 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, potentially vulnerable groundwater 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 G11 – 1 Peamount Location

The Peamount site is located in West County Dublin, in an area comprised primarily of managed 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, such as caves, springs or swallow holes, are identified at Peamount. 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 (CMP) 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 all be included in the CEMP.

2.3 Matrix of Multi-Criteria Analysis

Soils, Geology and Hydrogeology	Location 1 - Peamount
Aquifer Classification - importance of the groundwater resource to a given area	**Low potential impact:** LI moderately productive
Vulnerability Classification - potential for groundwater contamination	**Midrange:** Extreme Vulnerability (with some rock at surface)
GSI Groundwater Protection Response matrix	**Midrange:** 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 to no potential impact:** No features identified in this area
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	None within the vicinity of Peamount
Potential to impact on Irish Geological Heritage Sites / County Geological Sites	**Very Low to no potential impact:** as no Irish Geological Heritages sites are recorded in this area
Potential to interact with contaminated land	**Very Low potential:** as 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.)	**Midrange 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	**Very Low potential**: 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	**Midrange potential:** <3m to bedrock (based on Vulnerability Classification) . Potential for direct impact on bedrock during construction, with potential for impact on the underlying groundwater aquifer

Table G11 - 2Summary 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 corridor was carried out for Option H (Desalination).

3.2 Methodology

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

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. The two corridors to be assessed are identified as Route Corridor DS1 and Route Corridor DS2, as shown in Figure G11 - 2 below.

Figure G11 - 2 Route Corridor Options DS1 and DS2 Locations

3.3 Route Corridor DS1

Route Corridor Option DS1 runs from Balbriggan to Ballycoolin, close to the coastline west of Skerries and Loughshinny and then changes direction to traverse rural and settled areas in the vicinity of Lusk, Swords and St. Margaret's, terminating

at Ballycoolin. The route crosses land approximately 2.5km west of Dublin airport (and approximately 1km west of the airport runway).

The geology in the DS1 Corridor Option is comprised primarily of deep, poorly drained mineral soils (Gleys) with some grey, brown podzolic soils and shales and sandstone tills, overlying a combination of bedrock formations including sandstone and mudstones in the north, dark limestone and shale bedrock in the centre (Calp) and southern section of the corridor.

The northern section of DS1 is classified as a Locally Important Aquifer (Lm), Moderately Productive. A narrow band of karstified aquifer is recorded across the width of the corridor, to the west of Skerries. The majority of the southern section of DS1 is classified as a Poor Aquifer (Pl) with areas of Locally Important Aquifer (Ll), moderately productive only in local zones.

The vulnerability of approximately 50% of the underlying groundwater is classified as Low, according to the GSI. There are areas of Moderate to Extreme vulnerability recorded in the northerly section of the corridor and also in the majority of the southern section of the corridor (with rock at the surface in localised areas).

The Bog of the Ring groundwater abstraction scheme is located between DS1 and DS2, south west of Balbriggan. The Source Protection Area (SPA) for this groundwater source, including both the Outer and Inner Protection Areas, is not impacted by the DS1 Corridor option.

There are no Irish Geological Heritage Features identified in this corridor option.

No significant mines are identified within the corridor. Two quarries are evident to the south of DS1, namely Huntstown Quarry and Bay Quarry. If DS1 is selected as the preferred option for this development, consultation with the quarry operators will be required in order to mitigate against any potential impact on current and future operations.

There is moderate potential to encounter unknown areas of contaminated land within DS1 as sections of the corridor may be located in areas of made ground and historical development. As a result, there may be brownfield sites within the corridor that could impact on the underlying groundwater environment, if disturbed by the development.

One karst feature has been identified by the GSI near the corridor. The feature is classified as a County Geological Site (CGS) at Priest Town and is described as a limestone boulder moraine (2km long morainic ridge). The feature is currently shown as a Polygon on the GSI records and is not evident on the ground. Further consultation with the GSI will be required if this corridor is selected as the preferred route for the Desalination option. As mentioned above, one narrow band of karstified bedrock aquifer is also recorded in the northern area of the corridor, west of Skerries, County Dublin.

3.4 Route Corridor DS2

Route Corridor Option DS2 also commences at Balbriggan and terminates at Ballycoolin. This route is located further west than DS1, as shown in Figure F12-2 above.

Starting at Balbriggan, DS2 is routed along the County Meath/County Dublin boundary at Naul. The corridor then travels in a southerly direction crossing between Ashbourne and Ballyboghil, before turning towards Hollystown and terminating at Ballycoolin.

The soils and subsoil geology in the DS2 Corridor Option is comprised primarily of deep, poorly drained mineral soils (Gleys) with some grey, brown podzolic soils and shales and sandstone tills, overlying primarily dark grey to black limestone and shale bedrock (Calp).

Similar to DS1, the northern section of DS2 is classified as a Locally Important Aquifer (Lm), which is Moderately Productive. The majority of the southern section of DS2 is classified as a Locally Important Aquifer (Ll) which is moderately productive only in local zones. Minor areas of Poor Aquifer (Pl) are recorded within the northern most section and the extreme southerly section of the DS2 corridor.

The majority of the DS2 Corridor is classified as an area of Low groundwater vulnerability, according to the GSI. Similar to DS1, there are areas of Moderate to Extreme vulnerability recorded in the northerly section of the corridor. There are also small areas of Low to Moderate groundwater vulnerability in the southern section of the corridor.

The Bog of the Ring groundwater abstraction scheme is located to the south east of DS2. A section of the Outer Source Protection Area (SO, SPA) for this groundwater source is traversed by the DS2 Corridor. However, consultation with Irish Water and Fingal County Council and careful route design will mitigate any potential impact on the underlying aquifer.

One Irish Geological Heritage Feature has been identified within Route Corridor Option DS2. The GSI have recorded a County Geological Site (CGS) in the southern section of the Corridor. The CGS is described as a *"quarry within a 2km long morainic ridge showing limestone boulder diamicton. The moraine, composed of bedrock, tectonite and till, marks the active, oscillating ice margin as it was retreating northwestwards".* This feature is located at Priest Town, County Meath but is not visible on aerial photography.

No significant mines or quarries are identified within the DS2 corridor.

Sections of the DS2 corridor may be located in areas of made ground and historical development and, therefore, there is moderate potential to encounter unknown areas of contaminated land in this area. Brownfield sites may be located within the corridor that could impact on the underlying groundwater environment if disturbed by the development.

One karst feature, a limestone boulder moraine (2km long morainic ridge), has been identified by the GSI near the corridor, as described above. The feature is currently shown as a Polygon on the GSI records and is not evident on the ground. Further consultation with the GSI will be required if this corridor is selected as the preferred Desalination option.

As there are no known areas of peatland/bog within the corridor, there is low potential to encounter areas of soft ground along the route that might impact on the construction phase of the development. Possible impacts that should be considered if soft ground is encountered include a potential increase in the volume of suspended solids in surface water runoff entering nearby watercourses as a result of disturbance of peat during construction.

3.5 Matrix of Multi Criteria Analysis

Soils, Geology and Hydrogeology	DS1	DS2
Aquifer Classification - importance of the groundwater resource to a given area	**Very Low Potential** Northern Section – Lm - Locally Important Aquifer, moderately productive. Narrow band of karstified aquifer across the corridor, west of Skerries. Southern Section – Majority of southern section classified as a Poor Aquifer (Pl) with areas of Ll -Locally Important Aquifer, moderately productive only in local zones. Low potential impact on the aquifer.	**Very Low Potential** Northern Section – Lm - Locally Important Aquifer, moderately productive. Southern Section – Ll -Locally Important Aquifer, moderately productive only in local zones. Small areas classified as Poor Aquifers. Low potential impact on the aquifer.
Vulnerability Classification - potential for groundwater contamination	**Midrange:** 50% of the corridor –Low Groundwater Vulnerability with areas of Moderate-Extreme vulnerability in the northerly section of corridor and majority of southern section of the corridor (with some rock at surface)	**Midrange:** Majority of the corridor –Low Groundwater Vulnerability with areas of Moderate-Extreme vulnerability in the northern section and extreme south of corridor (with some rock at surface)
GSI Groundwater Protection Response matrix	**Midrange:** No data available for this area	**Midrange:** 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:** No features identified in this area	**Very Low:** No features identified in this area
Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	**Very Low:** The Bog of the Ring groundwater abstraction scheme is located between DS1 and DS2. The source protection area for this groundwater source is not impacted by the DS1 Corridor option.	**Midrange:** The Bog of the Ring groundwater abstraction scheme is located between DS1 and DS2. An area of the Outer Protection Zone (SO) encroaches on the north eastern section of Corridor DS2 (and should be avoided if possible)

Potential to impact on Irish Geological Heritage Sites / County Geological Sites	**Very Low:** There are no Irish Geological Heritage Features identified in this corridor.	**Low to Midrange:**. A County Geological Site (CGS) is identified by the GSI at Priest Town. Described as a Limestone boulder moraine (2km long morainic ridge). Consultation with GSI important if route is selected near this location. Not obvious on site.
Potential to interact with contaminated land	**Midrange:** large sections of this corridor are located in developed areas where there may be Brownfield sites	**Midrange:** large sections of this corridor are located in developed areas where there may be Brownfield sites
Potential to sterilise mineral resource	**Low to Midrange:** no mines identified. Two quarries identified to the south of DS1, Huntstown Quarry and Bay Quarry.	**Low potential:** no mines identified. One quarry identified near the western boundary of the corridor at Priest Town. Not obvious on site.
Potential to encounter shallow bedrock during construction (interactions with other disciplines during construction - noise, dust etc.)	**Low to Midrange:** areas where rock is at surface or near surface	**Low to Midrange:** areas where rock is at surface or near surface
Potential impact on karst features	**Low potential:** no karst features identified in this area. But one band of karstified aquifer recorded in the northern area, west of Skerries.	**Low potential:** One karst feature identified near the corridor: A CGS, Limestone boulder moraine (2km long morainic ridge) at Priest Town.
Potential to encounter soft ground	**Low potential impact**: no peat or wetland areas recorded in this area	**Low potential:** no peat or wetland areas recorded in this area
Soils Types	**Low potential:** no peat/bog identified in this area	**Low potential:** no peat/bog identified in this area
Sub Soil Types	**Low potential:** Gleys and Tills. Low potential for negative impact as no peat/bog identified in this area	**Low potential:** Gleys and Tills. Low potential for negative impact as no peat/bog identified in this area
Depth to rock	**Low:** Primarily >10m depth to bedrock, with rock at surface in places.	**Low:** Primarily >10m depth to bedrock, with rock at surface in places.

Table G11 - 3Summary of the MCA for Route Corridors

3.6 Comparative Discussion

In summary, there is no significant difference between the Soils, Geology and Hydrogeology Constraints identified in the Desalination Route Corridor Options DS1 and DS2.

The underlying aquifer classifications for DS1 and DS2 are very similar. Both corridors are primarily underlain by a Locally Important Aquifer which is moderately productive. The southern section of DS1 includes a large area which is described as a Poor Aquifer, with poor/low groundwater productivity. Therefore, the potential impact on the aquifers in DS1 and DS2 as a result of the proposed development is low.

This is also supported by the fact that the groundwater vulnerability in each Corridor is classified as Low overall. The depth to bedrock is estimated as being greater than 10m, which assumes that the Gley and Till soils and subsoils recorded in both corridors act as an important source of attenuation for any potential surface contaminants that might impact on the underlying bedrock aquifer.

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 section of the Outer Source Protection Area (SO) for the groundwater abstraction scheme identified as “Bog of the Ring” is located within the north east section of Corridor DS2. This area is located near Balbriggan, North County Dublin and care will need to be taken to route the project away from this area, if possible. Consultation with Irish Water, Fingal Co. Co. and the GSI will be important if the project is ultimately routed through this area of the SPA.

There are no Irish Geological Heritage Sites identified within DS1 and also no karst features, with the exception of a narrow band of karstified bedrock that is recorded in the northern section of the DS1 Corridor. One Geological Heritage site is recorded within DS2 and is defined as a County Geological Site (CGS). This feature is described as a quarry within a 2km long limestone, boulder, moraine. There are no obvious signs of this feature on the aerial photography in the area of interest, Priest Town, County Meath. However, further site work will need to be carried out in this area, as well as consultation with the GSI, if DS2 is selected as the preferred route for this project.

There are no recorded mines or areas of potential mineral resource recorded within either corridor option.

Two quarries are evident to the south of DS1; Huntstown Quarry and Bay Quarry. If DS1 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.

Both corridors traverse areas of known “Made Ground” where there is current and historical development. This may result in the identification of Brownfield sites that are currently unknown but may be a source of contamination and pollution if directly disturbed by the project route.

In summary, there is little difference between the Soils, Geology and Hydrogeology Constraints identified within the Desalination Route Corridor Options DS1 and DS2.

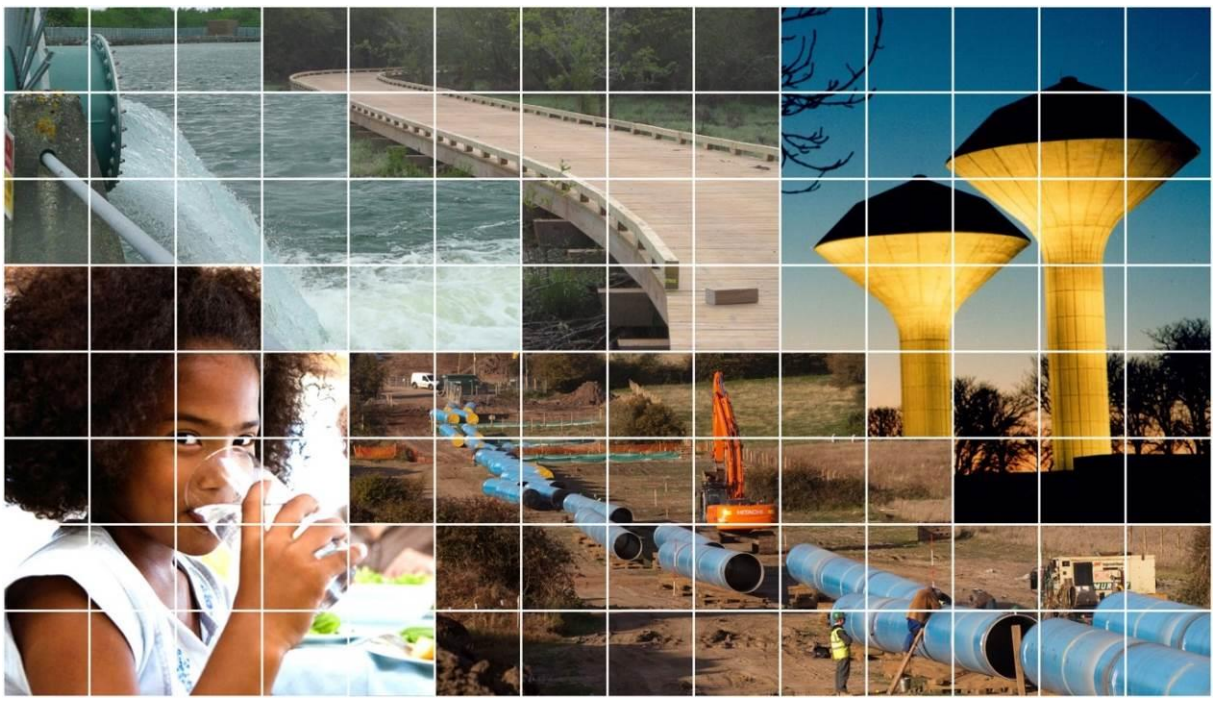
However, the DS1 Corridor is preferred for this specialist area as the DS2 corridor impacts on the Bog of the Ring Outer Source Protection Area and also crosses an area where there is a potential County Geological Site in the form of a limestone moraine.

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G12: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G12 - 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 G12 - 1Appraisal Criteria

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

This Appendix G12 is a statement on the specialism Planning Policy and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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.*

To effectively determine the least constrained components for Option H (Desalination), they were assessed under 2 no. planning policy sub-criteria.

- Proximity to areas identified for growth
- Land use and wayleaves

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.

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 for the Greater Dublin Area. 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. Dublin			
Large Growth Town/major areas for growth	e.g. Swords, Dunboyne			
Moderate Growth town		e.g. Ashbourne, Skerries		
Small town			e.g.Ratoath, Portrane	
Village subject to Settlement Plan and small growth				e.g.The Naul
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. The corridors run through rural 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 and in the cases where pipe corridors are located along zoned lands, care will have to be taken when the final route is determined, to ensure that there is a minimum impact caused by potential wayleaves.

1.2.1 Desk Top study

A desk top study exercise on the components 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” components element 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 location 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 G12 – 1 Peamount Location

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 Strategic Development Zone, 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/Baldonnell 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	Baldonnell/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 G12 - 2Summary of the MCA for TPR

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 H (Desalination).

3.2 Methodology

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

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.

Both corridor options begin in north county Dublin.

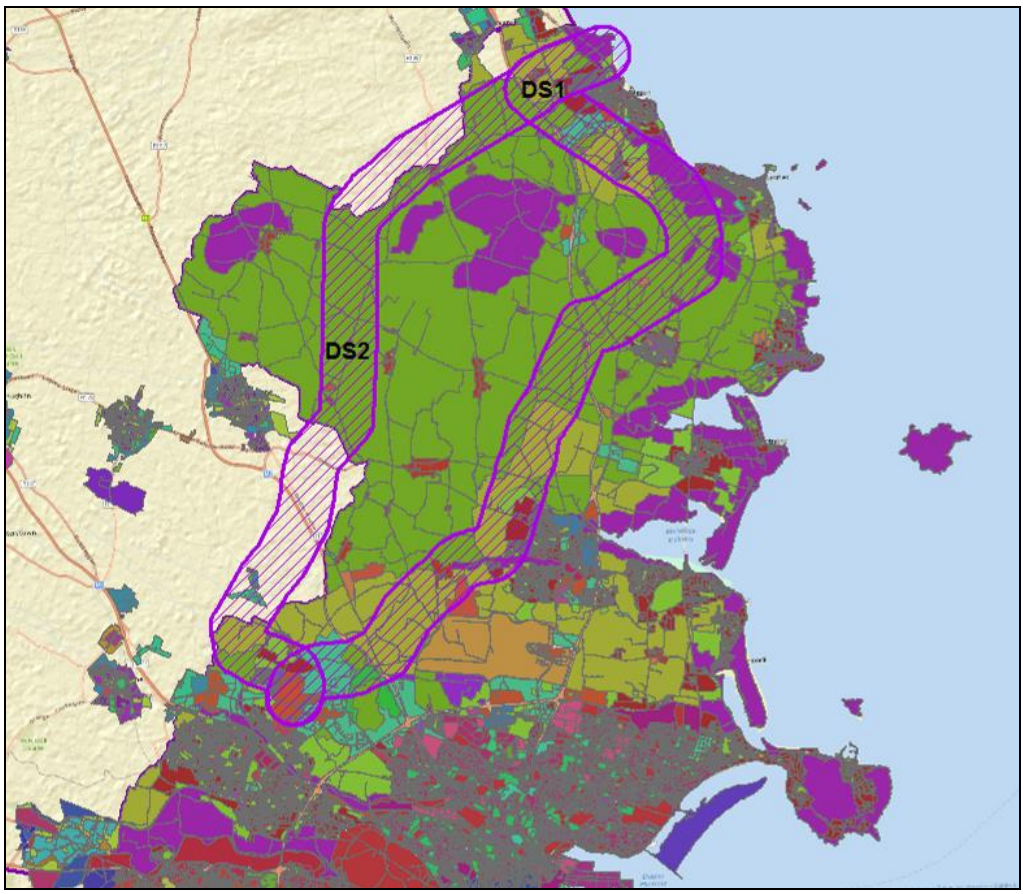


Figure G12 – 2 Corridor Options

3.3 Route Corridor DS1

Route Corridor DS1 runs within the Fingal County Council administrative area. If Balbriggan is chosen as the location for the water treatment plant and DS1 is the preferred option, this option will run entirely within Fingal's functional area, which may have advantages with respect to assessing the application.

Corridor DS1 runs through more built up areas which may have implications for future development on zoned land. It is likely that wayleaves will be required for the pipeline which should be considered for future changes to land use.

DS1 is closer to the towns identified for growth and identified as 'Metropolitan Consolidation Towns' in the Fingal County Development Plan 2011 – 2017, such as Swords and Blanchardstown. The Regional Planning Guidelines indicate that the longterm anticipated population growth for these towns is in the range of up to 100,000. Balbriggan is identified as a 'Large Growth Town II' with an anticipated population growth up to 30,000.

3.4 Route Corridor DS2

DS2 is routed through two administrative areas – Fingal County Council and Meath County Council. Both Councils will have to assess the project during the consent process.

DS2 runs through more rural parts of the counties. Wayleaves, if required, may have a more limited effect on the land use in rural areas. Future development will have to be cognisant of any wayleaves.

DS2 runs closer to the towns of Ashbourne, Ratoath and Dunboyne. Dunboyne is identified as a 'Large Growth Town II' in the Meath County Development Plan 2013 – 2019, and Ashbourne is identified as a 'Moderate Sustainable Growth Town'. The Regional Planning Guidelines also identify these towns for growth.

3.5 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Planning Policy		
Pipelines suitable to provide water to areas already identified for growth	Pipeline suitable to serve areas identified for growth; care to be taken with location of pipeline with respect to wayleaves.	Pipeline suitable to serve areas identified for growth; care to be taken with location of pipeline with respect to wayleaves, although this option is more rural.

Table G12 - 3Summary of the MCA for Route Corridors

3.6 Comparative Discussion

Both options could serve towns identified for growth in the Regional Planning Guidelines for the Greater Dublin Area, as well as the respective County Development Plans.

Both pipeline corridors could serve the identified 'Metropolitan Consolidation Towns' of Swords and Blanchardstown – however, DS1 is more proximate to both.

With respect to wayleaves, DS2 travels through more rural areas and potentially could have a lesser impact on future development. However, it is possible that a pipeline route in corridor DS1 could be found, to minimise the impact on future land use with respect to wayleaves.

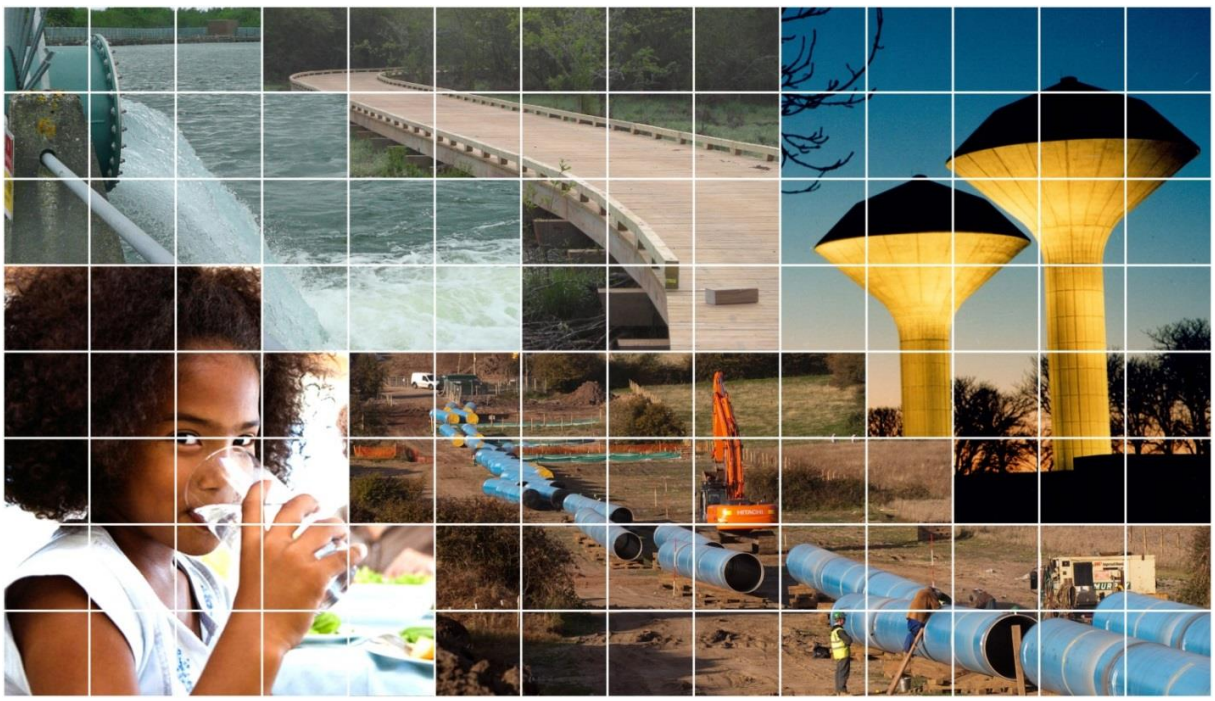
Route corridor DS1 runs entirely through Fingal County Council administrative area, while DS2 runs through Meath Council as well as Fingal Council area.

Water Supply Project
Eastern and Midlands Region (WSP)

Option G: Desalination MCA

Appendix G13: Engineering & Design

October 2015 **F01**



Contents

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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, Sections 6 and 7. 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 H (Desalination)**.

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 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 F5 - 1 Appraisal Criteria

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

This Appendix G13 is a statement on the specialism Engineering & Design and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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 H (Desalination)**, route corridors were assessed under 5 no. Engineering and Design sub-criteria:

- Obstructions;
- Ground Conditions;
- Accessibility;
- Idealistic Elevation; and
- Flooding.

1.2.1 Desk Top study

A desk top study exercise on the components 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” components element 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 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 G13-1.

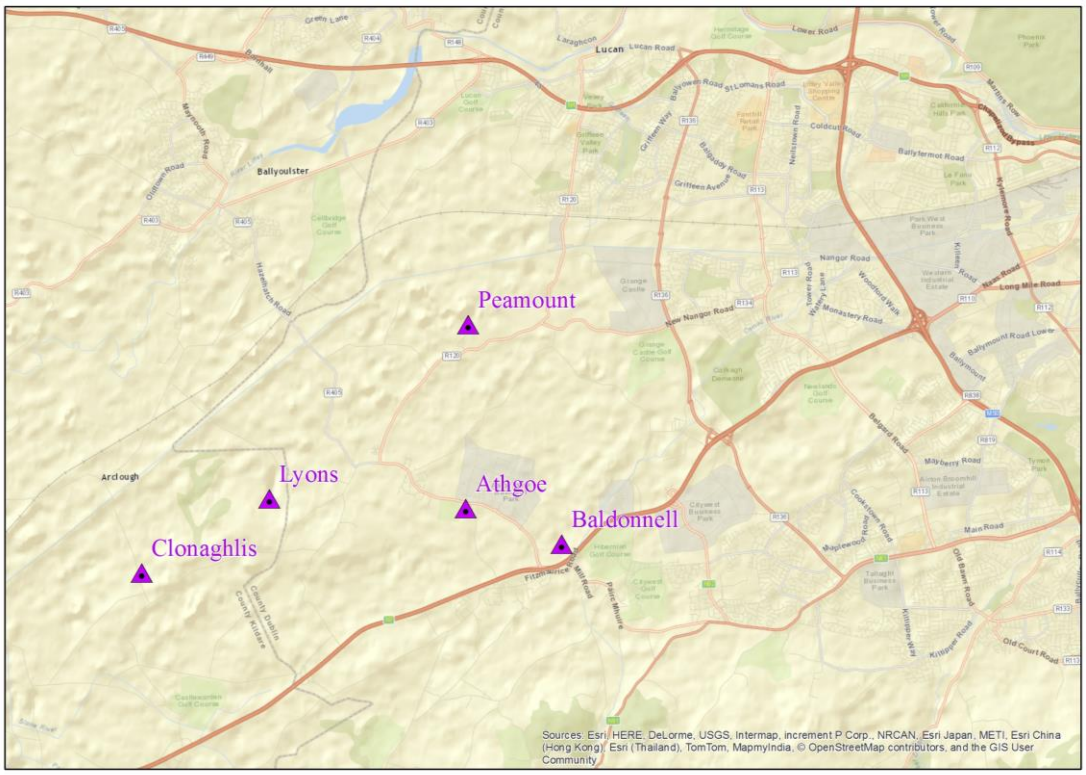


Figure G13-1 Potential Terminal Point Locations

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 E2-19, is limited to the environs of the remaining identified location i.e. Peamount.

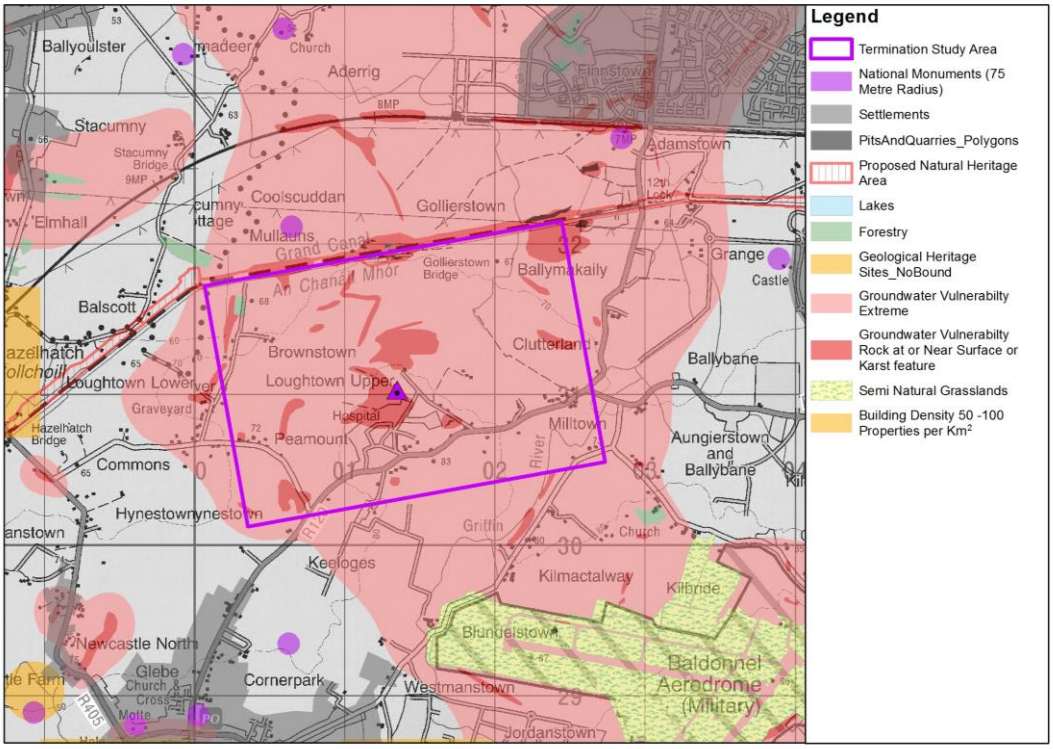


Figure G13-2 Peamount Location

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; refer to Preliminary Options Appraisal Report, Section 8.

3 Transmission Pipeline Route Corridors

3.1 Corridor Options

An assessment of the potential route corridor was carried out for Option H (Desalination).

3.2 Methodology

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

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.

3.3 Route Corridors for Options H (Desalination)

3.3.1 Overview of Route Option for Corridors DS1 & DS2

This section considers a number of options (variations) for routing a transmission pipeline from Balbriggan to Ballycoolin, i.e. Corridor DS1 and DS2.

These options are routed through counties Dublin and Meath. Corridor DS1 passes near the towns of Skerries, Lusk, Swords while Corridor DS2 passes near the towns of Gormanstown, Garristown, Ashbourne and Dunboyne; see Figure G13-3.

Figure G13-3 Proposed route for Corridors DS1 and DS2

3.3.2 Obstructions

Obstructions (crossings) were identified along the route of each corridor.

Table G13-1 Obstructions (Crossings)

Amenity	Corridor DS1	Corridor DS2
National Primary (motorway and non-motorway)	2 (M1, M2)	2 (M1, M2)
National Secondary Roads	1 (N2)	1 (N2)
Regional Roads	8 (R121, R132 x2, R127, R129, R125, R108, R122)	5 (R108, R129, R130, R125,R121)
Local Roads	45	24
Major Rivers*	3 (Huntstown [4], Ward [5], Broadmeadow [5])	1 (Broadmeadow [4])
Minor Rivers/Streams*	22	17
Railways	1	1
Total (Major Crossings**)	7	5
Total (Minor Crossings)	75	46

*Based on Strahler stream order from EPA database
** National Primary/Secondary Roads, Major Rivers and Railways

Corridor DS2 has the least number of major and minor crossings based on this assessment.

3.3.3 Ground Conditions

(a) Karst

A number of karst features (orange triangle) have been noted along each corridor and are detailed in Figure G13-4 and Table G13-2.

Table G13-2 Karst Features

Route Corridor	No. of Karst Features
DS1	3
DS2	1

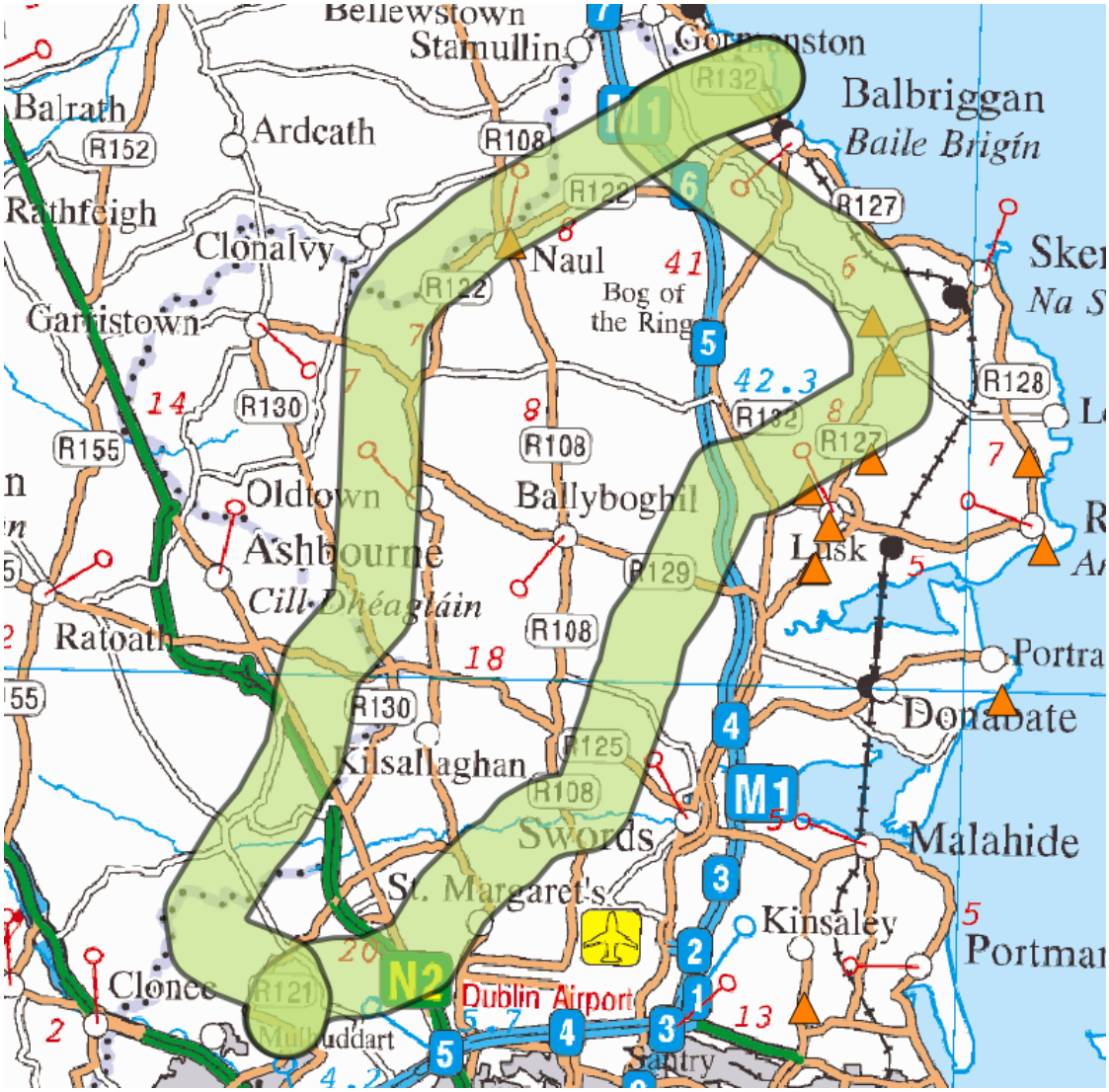


Figure G13-4 Karst Features

Corridor DS2 has the least potential to encounter karst features.

(b) Subsoils

Sub-soils encountered along the corridors are shown in Figure G13-5. The soil present along all routes is primarily Limestone till (“green” colour in Figure G13-5). Significant areas of sandstone and shale till (“blue” colour in Figure G13-5) and

shale and sandstones till (Namurian) ("pink" colour in Figure G13-5) are noted along both corridors.

Table G13-3 Subsoils

Subsoil Type	Colour[1]	Corridor DS1 (%)	Corridor DS2 (%)
Limestone till	Green	47.4	40.1
Shales and sandstones till (Namurian)	Pink	10.9	11.0
Sandstone and shale till (Lower Palaeozoic) with matrix of Irish Sea Basin origin	Blue	18.5	26.8
Sandstone and shale till (Lower Palaeozoic)	Gold	8.0	6.8
Alluvium	Orange	4.8	3.8
Made Ground	Light blue	3.7	-
Bedrock at surface	Yellow	3.0	3.4
Sandstone and shale sands and gravels (Lower Palaeozoic)	Light green	-	3.0
Other Soil Types	-	3.7	5.1
Total		100	100

[1] Refer to Figure G13-5

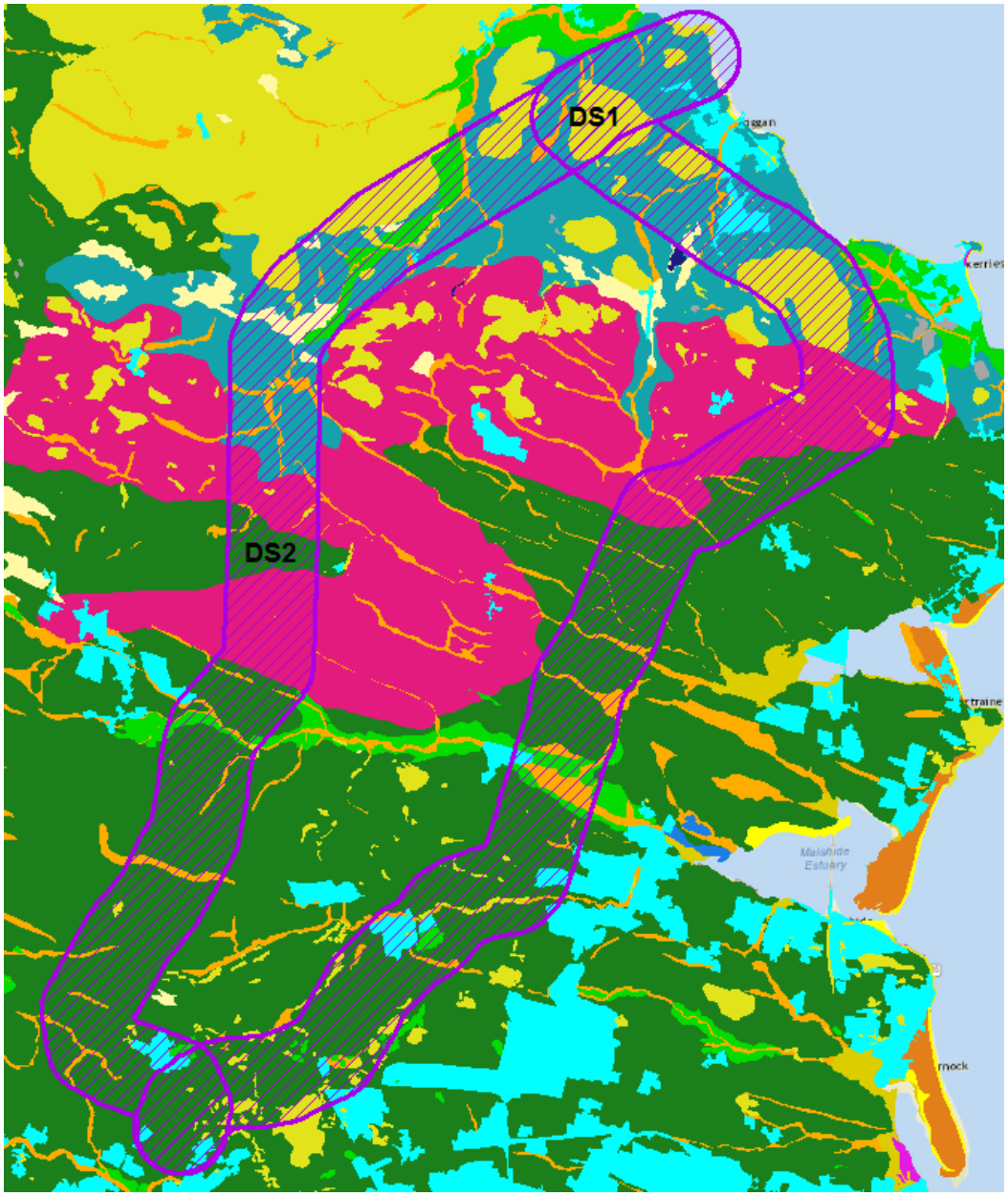


Figure G13-5 Subsoils

3.3.4 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 G13-3.

Corridor DS1 can be accessed via the M1, M2 and a combination of several regional roads. Some supplementary upgrade works may be required to utilise local roads in the area.

Corridor DS1 can be accessed via the M1, M2 and a combination of several regional roads. Some supplementary upgrade works may be required to utilise local roads in the area.

Corridor DS1 has the best potential for access from the national motorway network along its route, while Corridor DS2 has higher potential to require supplementary upgrade works to utilise local roads.

3.3.5 Elevation Profile

Elevation profiles of the branches were prepared; see Figure G13-6 and Figure G13-7.

An assessment was completed of the elevation profiles of the branches. The assessment produced a consistent rise along the route for corridor DS2, with fluctuations in levels occurring along Corridor DS1.

The profile along Corridor DS1 could result in potential hydraulic issues during the operation stage due to the significant variation in elevations along the route.

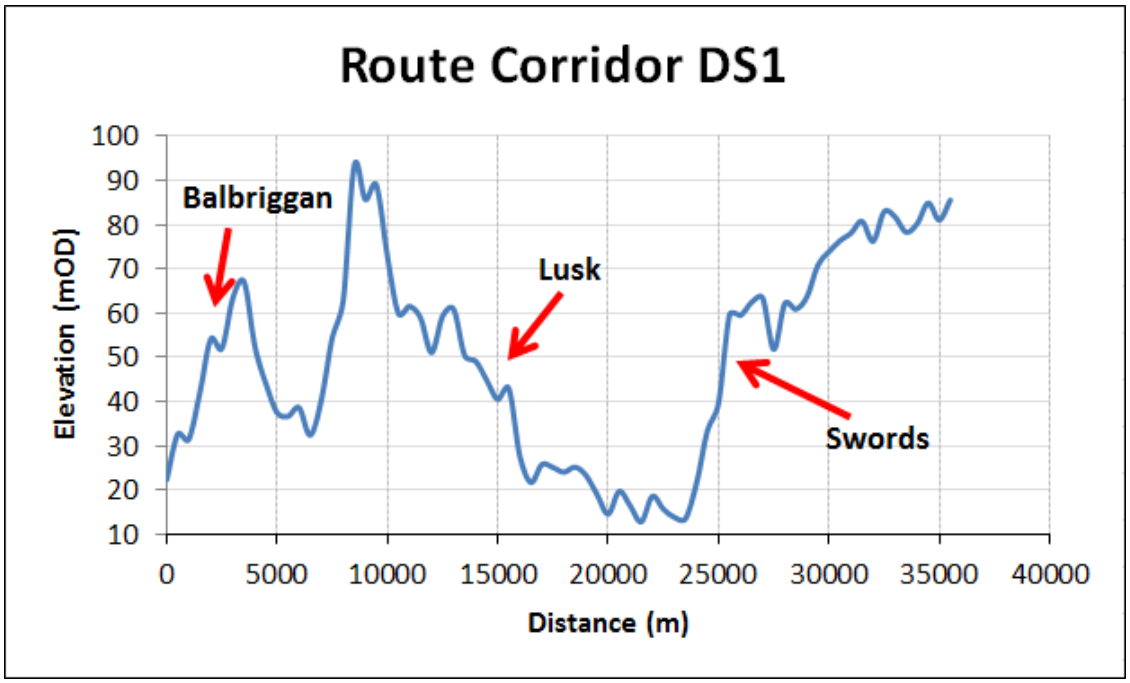


Figure G13-6 Corridor DS1 Elevation Profile

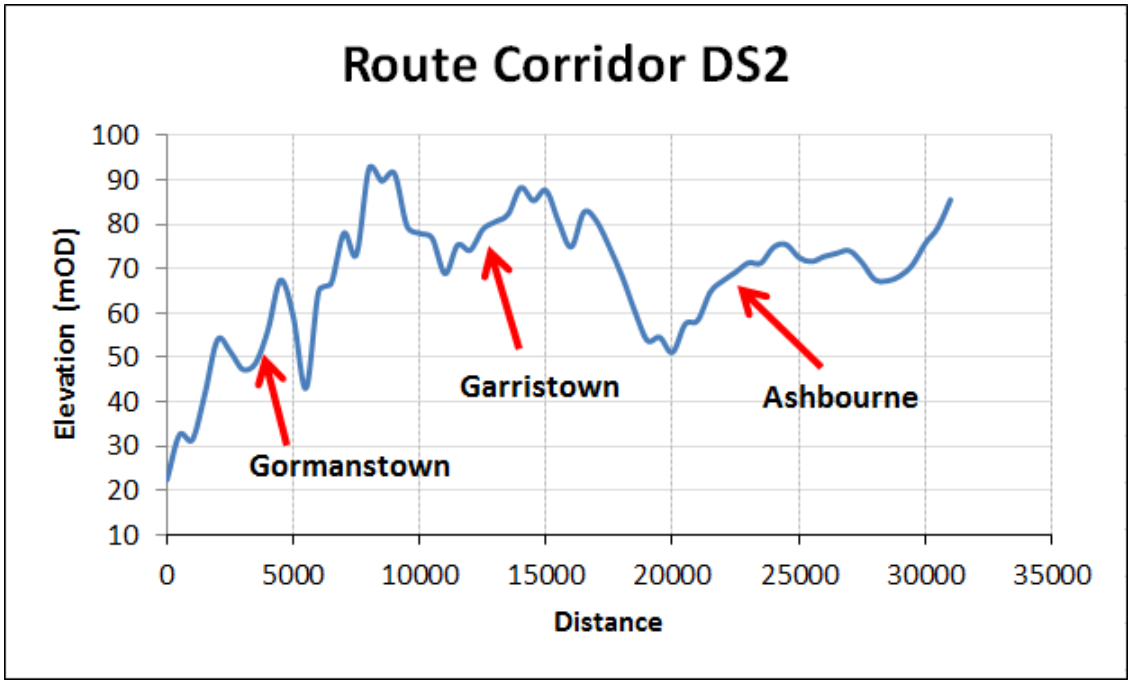


Figure G13-7 Corridor DS2 Elevation Profile

3.3.6 Flooding

Areas subject to flooding were identified along the route of each corridor; see Table G13-4.

Table G13-4 Breakdown of Flood Types

Flood Type	Corridor DS1 (%)	Corridor DS2 (%)
Fluvial	3.4	2.4

Corridor DS2 has the most potential to avoid predicted flood zones; however there is little difference between the two corridors.

3.4 Conclusion

The 'Engineering and Design' assessment has concluded that for the pipeline transmission corridor associated with **Option H (Desalination), Option DS2** is the least constrained on the basis of the following:

1. The corridor has a more favourable elevation profile;
2. The corridor has relatively good access to the primary and secondary road networks;
3. The corridor has the least potential to be subjected to flooding;
4. The corridor has the least potential for encountering poor ground (corridor DS1 has higher quantities of alluvium and made ground);
5. The corridor has the least number of minor and major crossings;
6. The corridor has the least potential to encounter karst features.

All corridors face a number of challenges due to the uncertainty of ground conditions and changing topography.

3.5 Matrix of Multi Criteria Analysis

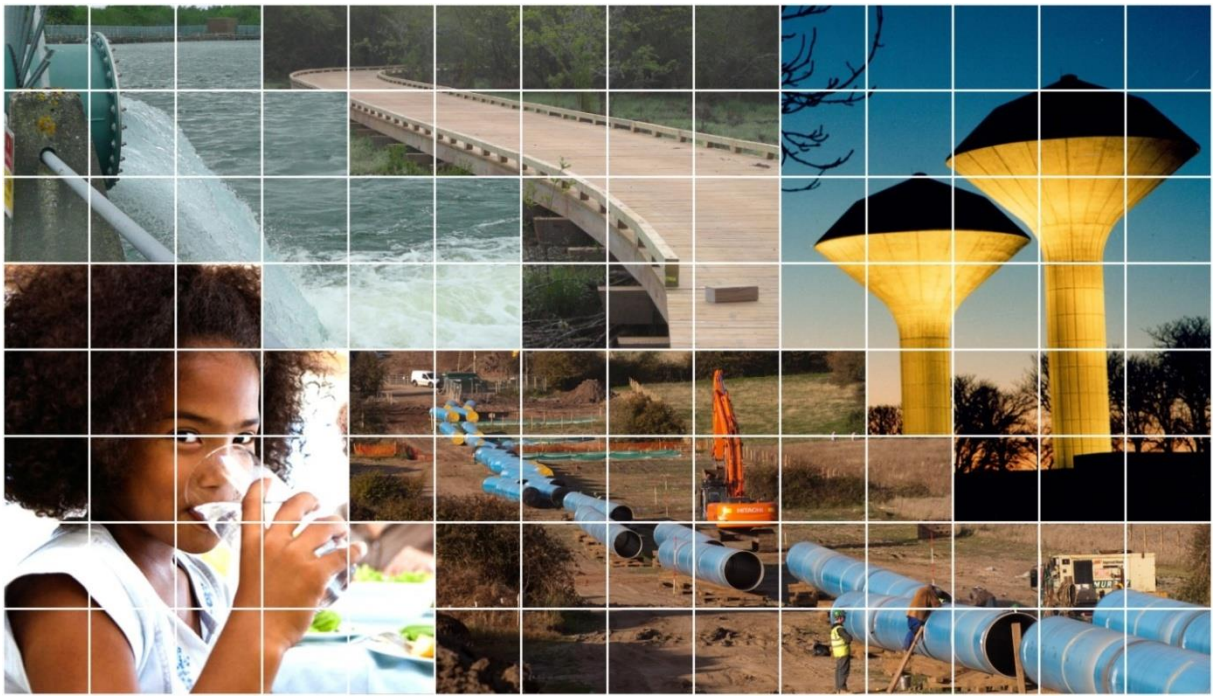
Criteria	Corridor DS1	Corridor DS2
Area prone to flooding (PRFA/SCFRAMs) and predicted flood extents within and adjacent to the site. - Proximity to water bodies in terms of flooding and as an indicator of sensitive surface water receptors.	3.4	2.4
Major Obstructions (National Primary/Secondary Roads, Major Rivers, Railways)	Mid Range – this route requires 7no. Crossings	Mid Range – this route requires 5no. Crossings
Minor Obstructions (Regional/Local Roads, Minor Rivers/Streams)	Mid Range – this route requires 75no. Crossings	Low – this route requires 46no. Crossings
Karst	Low – GSI database notes 3no. karst features along route	Low – GSI database notes 1no. karst features along route
Subsoils	Mid Range - this route contains 5% alluvium, 4% made ground and 3% shallow bedrock	Mid Range - this route contains 4% alluvium and 3% shallow bedrock
Accessibility	Low - the route is served by the M1/M2 and several regional roads	Low - the route is served by the M1/M2 and several regional roads
Elevation Profile	High – the route has significant elevation changes	Mid Range – the route has a relatively consistent elevation range, with some changes near its midpoint

Water Supply Project
Eastern and Midlands Region (WSP)

Appendix G: Desalination MCA

Appendix G14: 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, Sections 6 and 7. 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 H (Desalination)**.

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 G14 - 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 G14 - 1Appraisal Criteria

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

This Appendix G14 is a statement on the specialism on Roads and Traffic and describes the decision making process used in identifying the least constrained terminal point and route corridor associated with Option H (Desalination).

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 H (Desalination), they were assessed under 5 no. Roads and Traffic sub-criteria.

- Number of crossings of Motorways;
- Number of crossings of National Roads;
- Number of crossings of Regional Roads;
- Number of crossings of Local Roads (Primary, Secondary & Tertiary); and
- Number of Railway Crossings

1.2.1 Desk Top study

A desk top study exercise on the components 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” components element 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

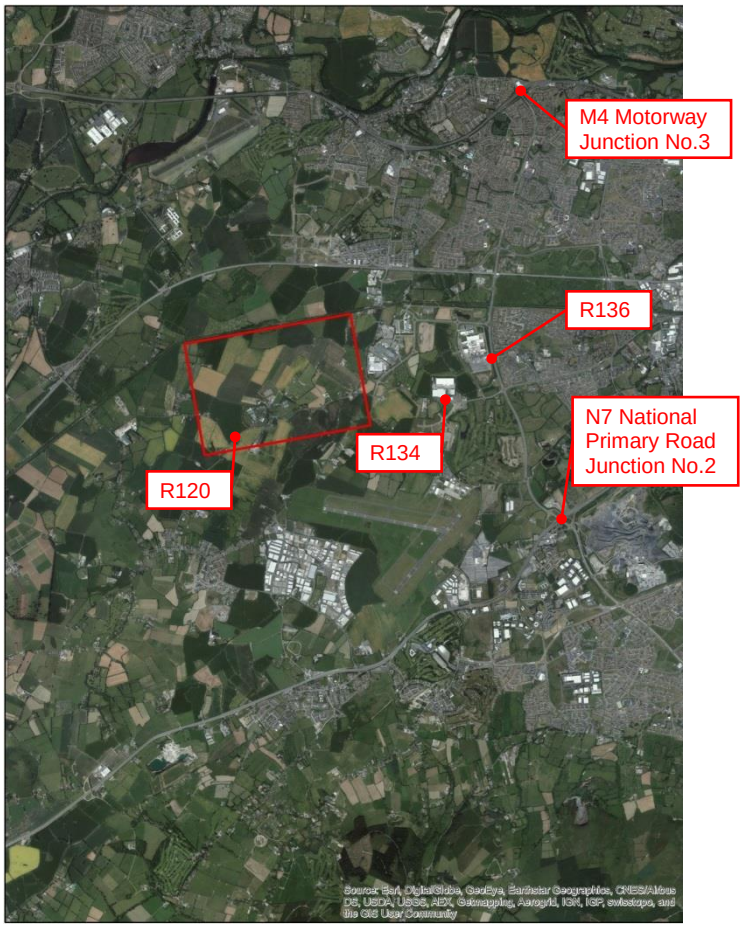


Figure G14 – 1 Peamount Location

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/N4 and to the south via the N7 junction no. 2 and along the R136 dual carriageway.

The R134 and R120 links the R136 to the Peamount site. Sections of both the R136 and the R120 are proposed to be improved by South Dublin County 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 G14 - 2 Summary of the MCA for Peamount Location

2.4 Comparative Discussion

There should be direct access to a reservoir in the Peamount Location 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 corridors was carried out for Option H (Desalination).

3.2 Methodology

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

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.

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. The two corridors to be assessed are identified as Route Corridor DS1 and Route Corridor DS2, as shown in Figure G14-2 below.

Figure G14 – 2 Route Corridor Options DS1 and DS2 Locations

3.3 Route Corridor DS1

Corridor DS1 intersects with the following transport corridors:

- Crossing of the M1 and M2 motorways;
- 1 no. crossing of the Dublin to Belfast railway;
- 12 no. crossings of the Regional Road network; and
- Up to 31 no. crossings of the Local Road networks.

The motorway and railway interfaces are unavoidable and are considered to be of a high / mid range impact.

The crossings of the regional road network pass closer to built up areas and these roads are likely to carry significant traffic flows. The regional road interfaces are unavoidable and are considered to be of a mid range impact.

The crossings of the local road network also pass close to built up areas and are likely to carry lower traffic flows than the regional roads, albeit still a significant volume. The majority of the local road interfaces are unavoidable but are considered to be generally of low impact; however some local roads in industrial or other built up areas may have a mid range impact.

3.4 Route Corridor DS2

Corridor DS2 intersects with the following transport corridors:

- Crossing of the M1 and M2 motorways;
- 1 no. crossing of the Dublin to Belfast railway;
- 8 no. crossings of the Regional Road network; and
- Up to 28 no. crossings of the Local Road network.

The motorway and railway interfaces are unavoidable and are considered to be of a high / mid range impact.

The crossings of the regional road network pass further west of significant built up areas than DS1, but are still likely to carry significant traffic flows, although these are likely to be lower volumes of traffic than those crossing Route Corridor DS1. The regional road interfaces are however unavoidable and are considered to be of a mid range impact.

The crossings of the local road network again pass further west of significant built up areas thank DS1 but are likely to carry significant traffic flows, albeit again lower than those encountered on Route Corridor DS1. The majority of the local road interfaces are unavoidable but are considered to be generally of low impact; however some local roads in industrial or other built up areas may have a mid range impact.

3.5 Matrix of Multi Criteria Analysis

Criteria	DS1	DS2
Number of crossings required for access road	Not Applicable – Existing roads to be utilised	Not Applicable – Existing roads to be utilised
Number of crossings of Motorways	**High Impact -** Definite Crossing of M1 & M2/N2 Motorways Required	**High Impact:** Definite Crossing of M1 & M2/N2 Motorways Required
Number of crossings of National Roads	**Very Low Impact:** 0 crossings	**Very Low Impact:** 0 crossings
Number of crossings of Regional Roads	**Mid range impact:** 12 crossings	**Mid range impact:** 8 crossings
Number of crossings of Local Roads	**Low Impact:** 31 crossings (Primary, Secondary & Tertiary Combined)	**Low Impact:** 28 crossings - however more urban class roads to be crossed Primary, Secondary & Tertiary Combined)
Number of crossings of Local Roads - Secondary / Tertiary	**Low Impact:** 31 crossings (Primary, Secondary & Tertiary Combined)	**Low Impact: 28 crossings - however more urban class roads to be crossed.**
Number of Railway Crossings	**Mid range impact:** Definite 1 no Crossings of Dublin - Belfast Railway Required	**Mid range impact:** Definite 1 no Crossings of Dublin - Belfast Railway Required

Table G14 - 3Summary of the MCA for Route Corridors

3.6 Discussion

Both Corridors unavoidably cross the M1 and M2 motorways, both of which would have a high potential for traffic impact.

Route Corridor DS2 has fewer total road crossings than Route Corridor DS1 and it is envisaged that traffic volumes on the regional and local road networks may be lower the further west they are from the built up areas in the vicinity of corridor DS1. Therefore it is considered that Route Corridor DS2 may have potentially better construction access via the regional road and local primary road network as there will be less disruption to traffic flows.

Therefore Route Corridor DS2 is considered to be the marginally preferred corridor from a traffic impact point of view.

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