

Water Supply Project

Eastern and Midlands Region

Appendix E

Raw Water Abstraction Site Selection



Water Supply Project, Eastern and Midlands Region

Irish Water

Final Options Appraisal Report – Non Linear Infrastructure Siting

Appendix E Raw Water Abstraction Site Selection

November 2016



Contents

1.	Raw Water Abstraction Siting – Process Summary	1
2.	Abstraction Location from POAR	27
3.	Screening to Identify Preliminary Sites.....	28
4.	RWA Site 1 (Western Shore)	38
5.	RWA Site 2 (Western Shore)	43
6.	RWA Site 3 (Eastern Shore)	48
7.	RWA Site 4 (East Shore)	53
8.	RWA Sites – MCA Comparison	58

1. Raw Water Abstraction Siting – Process Summary

Option C (Parteen Basin Reservoir Direct) has been confirmed as the Preferred Scheme on environmental grounds, on cost-benefit grounds, and in terms of meeting the fundamental objectives of the Water Services Strategic Plan and of the WSP itself; refer to Section 9 of the Final Options Appraisal Report (FOAR).

The Preferred Scheme will comprise a number of constituent components of infrastructure that collectively make up the water supply system (Figure 1.1). These can broadly be defined as:

Non – Linear Infrastructure, including the Raw Water Abstraction Works, Water Treatment Plant, Break Pressure Tank and Termination Point Reservoir (FOAR Section 11) and

The Transmission Pipeline (Linear Infrastructure) – refer to FOAR Section 12.

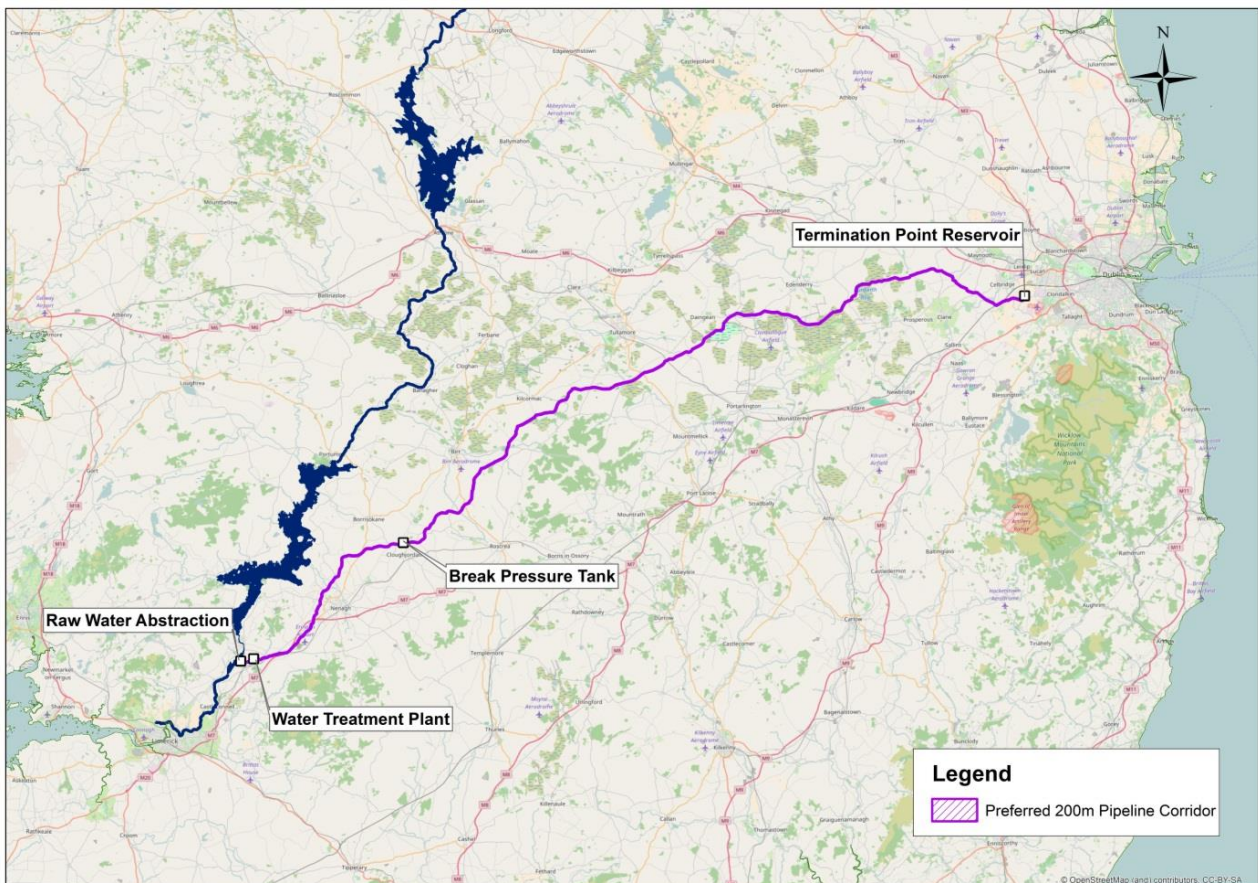


Figure 1.1 The Transmission Pipeline (Linear Infrastructure) and Other (Non – Linear Infrastructure)

FOAR Sections 11 and 12 outline how the different siting options for these components were developed to minimise impact on their environment; Appendices E to H detail the appraisal of these site and route options. They set out multi-criteria analyses (MCA) of the options available, to identify a preferred site for each component from the multiple sites considered (FOAR Section 11), and to identify the preferred pipeline route corridor in a similar way (FOAR Section 12), with recommendations on preferred sites and pipeline routes.

The process of multi-criteria analysis is outlined in the FOAR Section 11.1.

The non – linear infrastructure components comprise the followings assets:

Intake and Raw Water Pumping Station (FOAR Section 11.3 and this Appendix E)

Abstraction of raw water will be from the Lower Lake (Parteen Basin) via a submerged pipeline or open channels, which will extend a relatively short distance out into the basin. The abstraction works will incorporate a raw water pumping station which will deliver raw water to the proposed water treatment plant.

Water Treatment Plant (FOAR Section 11.4 and Appendix F)

The water treatment plant will treat the raw water from Parteen Basin to Drinking Water Standards for human consumption in accordance with relevant legislation. The water treatment plant will also incorporate a high lift pumping station to deliver treated water to a Break Pressure Tank.

Note: The transmission pipeline is discussed in FOAR Section 12 and Appendix I.

Break Pressure Tank (FOAR Section 11.5 and Appendix G)

A Break Pressure Tank (BPT) will be located at the highest elevation of the transmission pipeline and is required to manage the water pressures that will be generated in the operation of the transmission pipeline. The tank is the point at which the transmission line will change from a pumped to a gravity flow. In practice, treated water will be pumped from the water treatment plant to this tank, and the water will flow by gravity from the tank to the termination point reservoir. It will act as a balancing tank for pumped flows, e.g. from the WTP, it will help to limit variability in operating pressures, and it will provide sufficient storage such that there is adequate reserve flow to maintain the on-going pipe full after the pumps have stopped or tripped.

Termination Point Reservoir (FOAR Section 11.6 and Appendix H)

Located at the end of the transmission pipeline, the Termination Point Reservoir (TPR) acts as storage facility for the treated water; providing capacity to serve the varying demand profile of the Dublin Water Supply Area. The TPR will be integrated with the existing water distribution system (FOAR Section 11.7) at Peamount in south Dublin, ensuring onward transmission to end users.

This Section E describes the multi criteria analysis (MCA) process used to appraise a **Least Constrained Raw Water Abstraction Site (RWA)** for the Intake and Raw Water Pumping Station.

Multi criteria analysis (MCA) is a mechanism that explicitly considers multiple criteria within a decision-making environment. The fundamental approach is to utilise Specialist expertise to conduct the analysis. Comparing alternatives against multiple objectives and criteria through MCA allows for a collective balancing of different impact types, understanding of the merits of each option, and the establishment of a preference ranking, in a collective way; informing and justifying the decision making process.

For the MCA the following specialisms and disciplines were involved:

- 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 following methodology was employed:

1. Each of the specialist disciplines (identified above) assessed the site options against the criteria of Table 1-1 to determine the site option for each ancillary component with the overall least impact from their specialist perspective.
e.g. The ecology specialist assessed the four raw water abstraction sites against Biodiversity, Flora and Fauna, Fisheries criteria to determine the site option with least impact from an ecology perspective.
2. The preliminary position of each Specialist, on each ancillary component, presented in matrix format, was collated for each of the ancillary components and presented at a workshop where all the Specialists were represented.
e.g. The ecology specialist assessment for raw water abstraction sites was compiled with the assessments of Air and Noise etc. to present a complete MCA assessment of the sites.
3. In this workshop setting, the matrix of preliminary individual assessments for each individual component was presented to the collective specialist group. The position of each of the specialists was then discussed to reach a consensus of agreement on a preferred site for each main infrastructure component, from the various alternatives.
e.g. The ecology specialist assessment was balanced against that of the other specialists to inform an overall ranking of raw water abstraction sites, and support preference towards one.

A breakdown of the criteria employed by each of the specialisms is presented in Table 1-1.

Table 1-1 Applicable Criteria for each Specialism

Specialism	Applicable Criteria
Ecology	Biodiversity, Flora and Fauna, Fisheries
Air and Noise	Air/Climatic Factors
Cultural Heritage	Cultural Heritage (including Architecture & Archaeology)
Soils, Geology and Hydrogeology	Soils, Geology and Hydrogeology
Landscape and visual	Landscape & Visual
Agronomy	Material Assets (Land use)
Water	Water
Engineering	Material Assets (Energy), Safety, Engineering and Design, Capital and Operational Cost, Sustainability
Planning	Planning Policy
People	Tourism, Population, Human Health

The Specialists, in completing the MCA, also incorporated feedback from the POAR consultation process, primarily to establish if the process had identified any new information which needed to be included in the

assessment process for relevant individual specialists. This was to establish if the consultation submissions contained additional information relevant to the MCA and to determine any impact on the individual assessments, or collective arrangements facilitated by the workshop setting.

1.1.1 Categories of impact

A simple classification was used for the MCA - one of five categories of impact were applied to each of the locations under consideration; colour coded for ready identification. These were:

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

1.2 Identification of Raw Water Abstraction Sites

A preliminary screening of potential Raw Water Abstraction (RWA) sites on Lough Derg and Parteen Basin was conducted as part of the preparation of the POAR. The POAR identified Parteen Basin as the preferred location for raw water abstraction.

Abstraction will constitute an open channel or intake pipe along the shoreline of the Parteen Basin. Based on the preferred location at the Parteen Basin, or the Lower Lake, a number of potential RWA areas were identified. Collectively, these areas cover the available perimeter on both sides of the Basin, and also a small area downstream of Lough Derg on the eastern bank which is not designated as a Natura 2000 site. These areas are presented in Figure 1.2 and included the following:

- Western shore of Parteen Basin (RWA1)
- Eastern shore of Parteen Basin (RWA2)
- Eastern bank of River Shannon, immediately downstream of Lough Derg (RWA3)

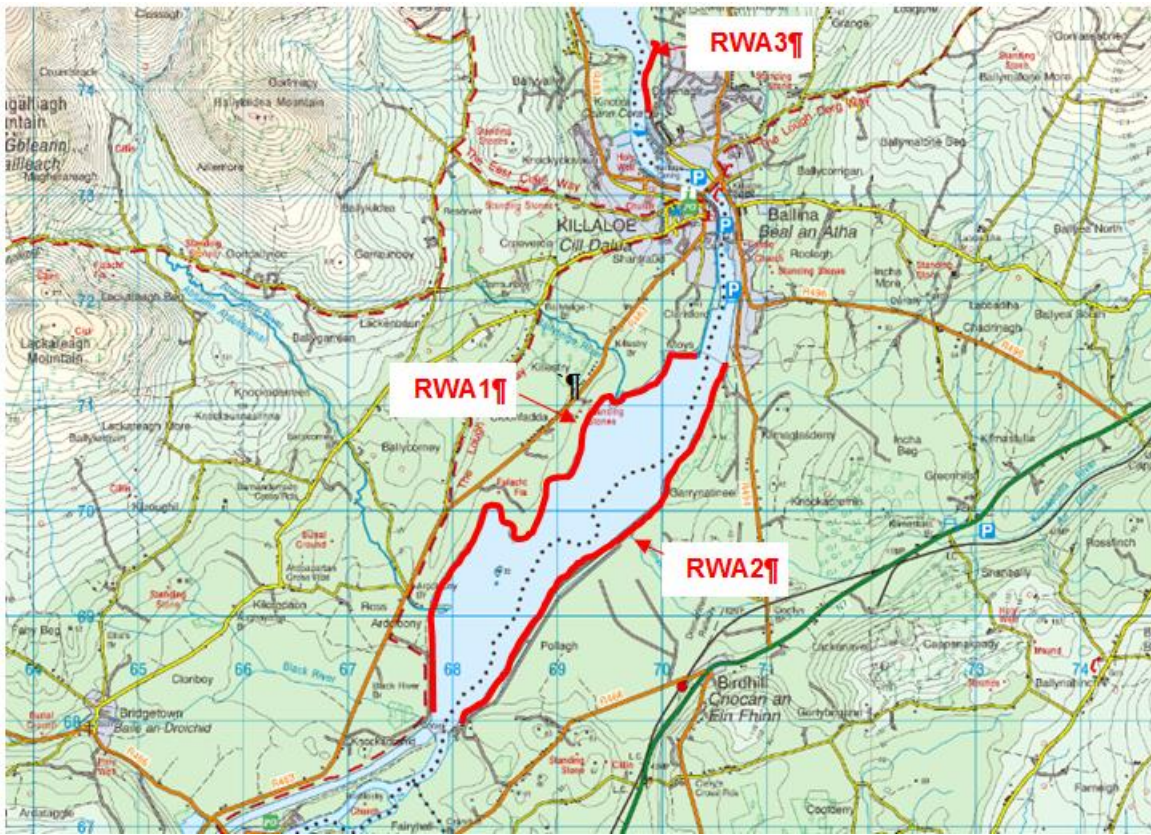


Figure 1.2 Potential Raw Water Abstraction Areas in Parteen Basin

Note: the identification of a likely suitable site within the confines of the urban areas of Killaloe and Ballina precluded these from consideration.

In broad terms, the eastern bank offers potential for siting raw water abstraction infrastructure best aligned with the treated water pipeline route; the western bank is feasible but is impacted by the additional works which would be required to convey, via tunnelling, raw water through a pipeline beneath Parteen Basin. *The disruptive impacts, of alternatively routing a large diameter pipeline from the western bank northwards to cross the river in the Ballina/ Killaloe urban area, have been taken into consideration.* RWA3 covers an area of the eastern bank which is outside the Natura site designation, and which offered some advantage in that regard, but it also has challenges in routing a pipe through Ballina and its environs. Consequently, due to the extent of the existing urban development, and steep terrain, RWA3 was discounted from any further consideration.

With regard to RWA1 and RWA2, any identified site would be constrained by the presence of the ESB embankments¹, (refer to FOAR Section 6) and the requirement to avoid potential impact on these through construction activities.

A detailed assessment was undertaken of RWA1 and RWA2 and four potential sites were identified (see Figure 1.3) which were considered potentially suitable having regard to available size, bathymetry, clearance from the engineering embankments, land topography and position with respect to environmental features and receptors; two sites on the eastern shore of Parteen Basin and a further two sites on the western shore.

The proximity to the ESB embankment along the eastern shore ruled out a number of potential locations for sites; other considerations included nearness to existing developments, the requirement to minimise the impact on designated sites and archaeological sites, local topography, access, etc. Further details are provided in Appendix F.

¹ These are linear embankments which were constructed as part of the Shannon Hydroelectric Scheme (Ardnacrusha), and are managed by the ESB.



Figure 1.3 Potential Raw Water Abstraction Sites

1.3 MCA of Preliminary Sites

The assessment of each potential site, by specialism, is presented in Section 1.3.1.

1.3.1 Matrix of Multi-Criteria Analysis

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.0	Environmental *				
1.1	Biodiversity, Flora & Fauna (Terrestrial)				
1.1.1	Potential to impact on Natura 2000 Sites	Site partially within the Lower River Shannon SAC (002165) Requires pipeline crossing of Parteen Basin, in addition to abstraction facility	Site partially within the Lower River Shannon SAC (002165) Requires pipeline crossing of Parteen Basin, in addition to abstraction facility	Site partially within the Lower River Shannon SAC (002165)	Site partially within the Lower River Shannon SAC (002165)
1.1.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	N/A	N/A	N/A	N/A
1.1.3	Potential impact Annex I listed habitats (designated)	Site not within or adjacent to habitats listed as qualifying interests of SAC	Site not within or adjacent to habitats listed as qualifying interest. of SAC	Site adjacent to but not within qualifying interest of SAC. Priority Annex I Alluvial woodland to the north	Site within SAC: high quality habitat; broadly corresponding to priority Annex I Alluvial Woodland
1.1.4	Potential impact Annex I listed habitats (non-designated)	Site surveyed. Very low likelihood of additional Annex I habitats occurring	Site surveyed. Very low likelihood of additional Annex I habitats occurring	Site surveyed. Very low likelihood of additional Annex I habitats occurring	Site surveyed. Low likelihood of additional Annex I habitats occurring that are not listed as qualifying interests of the SAC
1.1.5	Potential to impact high ecological value habitats (semi natural habitats)	Site will require direct footprint within Parteen Basin and lake shore / fringing wetland habitat	Site will require direct footprint within Parteen Basin and lake shore / fringing wetland habitat	Site will require direct footprint within Parteen Basin and alluvial / wet woodland habitat not corresponding to priority Annex I Alluvial woodland	Site will require direct footprint within Parteen Basin and priority Annex I Alluvial woodland habitat
1.1.6	Potential to impact on protected Flora - Flora Protection Order	Site surveyed, no FPO species recorded. Potential occurrence evaluated as low	Site surveyed, no FPO species recorded. Potential occurrence evaluated as low	Site surveyed, no FPO species recorded. Potential occurrence evaluated as low	Site surveyed, no FPO species recorded. Potential occurrence evaluated as low

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.1.7	Potential to impact on Annex II species	Annex II Otter, listed as qualifying interest of the SAC occur along the lakeshore within the footprint of this site, no dwellings recorded.	Annex II Otter, listed as qualifying interest of the SAC occur along the lakeshore within the footprint of this site, no dwellings recorded.	Annex II Otter, listed as qualifying interest of the SAC occur along the lakeshore within the footprint of this site, no dwellings recorded.	Annex II Otter, listed as qualifying interest of the SAC occur along the lakeshore within the footprint of this site, no dwellings recorded.
		Additional Annex II species unlikely to occur within the site. Pipeline crossing of Parteen Basin will increase potential for effects on otter.	Additional Annex II species unlikely to occur within the site. Pipeline crossing of Parteen Basin will increase potential for effects on otter.	Additional Annex II species unlikely to occur	Additional Annex II species unlikely to occur
1.1.8	Potential to Impact on Annex IV species (wherever they occur)	Otter and all bat species are listed on Annex IV. These species use and are likely to use this site	Otter and all bat species are listed on Annex IV. These species use and are likely to use this site	Otter and all bat species are listed on Annex IV. These species use and are likely to use this site; bat potential is higher within the woodland habitat.	Otter and all bat species are listed on Annex IV. These species use and are likely to use this site; bat potential is higher within the woodland habitat.
1.1.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	No SPA designation within or adjacent to this site, rank wet grassland unsuitable for wintering bird species. Low breeding bird potential	No SPA designation within or adjacent to this site, managed wet grassland suitable for wintering Annex I birds (Whooper Swan, Greylag Geese). Breeding bird potential	No SPA designation within or adjacent to this site, woodland unsuitable for wintering bird species. Low breeding bird potential, evidence of short-eared owl.	No SPA designation within or adjacent to this site, woodland unsuitable for wintering bird species. Low breeding bird potential
1.1.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	Bird species occur within this site and will be affected. No sign of badger, other WA species e.g. Common frog likely to occur	Bird species occur within this site and will be affected. No sign of badger, other WA species e.g. Common frog likely to occur	Bird species occur within this site and will be affected. Evidence of badger activity; other WA species e.g. Pine marten, Common frog likely to occur	Bird species occur within this site and will be affected. Active badger sett within site. Other WA species e.g. Pine marten, Common frog likely to occur
1.1.11	Potential to impact on salmonid habitat - protected under SI Regulations	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.
1.1.12	Potential to impact on a freshwater pearl mussel - protected under SI Regulations	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.1.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon. Protected aquatic flora may occur within littoral/benthic zone. Potential significance may decline with further project/survey details. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon. Protected aquatic flora may occur within littoral/benthic zone. Potential significance may decline with further project/survey details. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon. Protected aquatic flora may occur within littoral/benthic zone. Potential significance may decline with further project/survey details.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon. Protected aquatic flora may occur within littoral/benthic zone. Potential significance may decline with further project/survey details.
1.1.14	Potential to impact on coastal zone habitats (intertidal)	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.1.15	Potential to impact on marine habitats (e.g. Subtidal)	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.1.16	Potential to impact marine/coastal birds	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.1.17	Potential to impact marine mammals	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.2	Biodiversity, Flora & Fauna (Aquatic)				
1.2.1	Potential to impact on Natura 2000 Sites	Site within the Lower River Shannon SAC (002165)	Site within the Lower River Shannon SAC (002165)	Site within the Lower River Shannon SAC (002165)	Site within the Lower River Shannon SAC (002165)
1.2.2	Potential to impact on Natural Heritage Areas and proposed Natural Heritage Areas	N/A	N/A	N/A	N/A
1.2.3	Potential impact Annex I listed habitats (designated)	Site not within or adjacent to aquatic habitats listed as qualifying interests of SAC	Site not within or adjacent to aquatic habitats listed as qualifying interests of SAC	Site not within or adjacent to aquatic habitats listed as qualifying interests of SAC	Site not within or adjacent to aquatic habitats listed as qualifying interests of SAC

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.2.4	Potential impact Annex I listed habitats (non-designated)	Benthic survey results not analysed. Very low likelihood of additional aquatic Annex I habitats occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic Annex I habitats occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic Annex I habitats occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic Annex I habitats occurring
1.2.5	Potential to impact high ecological value habitats (semi natural habitats)	Site will require direct footprint within Parteen Basin affecting high value lacustrine littoral and benthic habitat.	Site will require direct footprint within Parteen Basin affecting high value lacustrine littoral and benthic habitat.	Site will require direct footprint within Parteen Basin affecting high value lacustrine littoral and benthic habitat.	Site will require direct footprint within Parteen Basin affecting high value lacustrine littoral and benthic habitat.
1.2.6	Potential to impact on protected Flora - Flora Protection Order	Benthic survey results not analysed. Very low likelihood of additional aquatic FPO species occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic FPO species occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic FPO species occurring	Benthic survey results not analysed. Very low likelihood of additional aquatic FPO species occurring
1.2.7	Potential to impact on Annex II species	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon and Otter. The pipeline crossing of Parteen Basin will increase the construction timeframe and footprint with an associated increase in ecological disturbance and significance.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon and Otter. The pipeline crossing of Parteen Basin will increase the construction timeframe and footprint with an associated increase in ecological disturbance and significance.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon and Otter.	Construction and operation within Parteen Basin, SAC designated for Annex II Atlantic Salmon and Otter.
1.2.8	Potential to Impact on Annex IV species (wherever they occur)	No aquatic Annex IV species potentially affected	No aquatic Annex IV species potentially affected	No aquatic Annex IV species potentially affected	No aquatic Annex IV species potentially affected
1.2.9	Potential to impact on the breeding / wintering habitat for Annex I listed and other qualifying interest bird species	Breeding and Wintering water birds recorded from the Parteen Basin waterbody in this wider study area. Pipeline crossing of Parteen Basin will increase potential for disturbance effects on the wetland habitats supporting wintering / breeding birds.	Breeding and Wintering water birds recorded from the Parteen Basin waterbody in this wider study area. Pipeline crossing of Parteen Basin will increase potential for disturbance effects on the wetland habitats supporting wintering / breeding birds.	Breeding and Wintering water birds recorded from the Parteen Basin waterbody in this wider study area	Breeding and Wintering water birds recorded from the Parteen Basin waterbody in this wider study area

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.2.10	Potential to impact flora and fauna protected under Wildlife Act e.g. Birds, badger	Aquatic species protected under the Wildlife Act include fish species (Brown Trout, Atlantic Salmon), water birds, Common frog all of which occur within Parteen Basin in the vicinity of this location. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Aquatic species protected under the Wildlife Act include fish species (Brown Trout, Atlantic Salmon), water birds, Common frog all of which occur within Parteen Basin in the vicinity of this location. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Aquatic species protected under the Wildlife Act include fish species (Brown Trout, Atlantic Salmon), water birds, Common frog all of which occur within Parteen Basin in the vicinity of this location	Aquatic species protected under the Wildlife Act include fish species (Brown Trout, Atlantic Salmon), water birds, Common frog all of which occur within Parteen Basin in the vicinity of this location
1.2.11	Potential to impact on salmonid habitat - protected under SI Regulations	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.	N/A - no connectivity to Salmonid watercourse. Salmonid species do occur.
1.2.12	Potential to impact on a freshwater pearl mussel - protected under SI Regulations	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse	N/A - no connectivity to Freshwater Pearl Mussel watercourse
1.2.13	Potential to impact upon high quality aquatic habitat for protected aquatic species.	Site within the Lower River Shannon SAC (002165) designated for Atlantic Salmon and Otter. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Site within the Lower River Shannon SAC (002165) designated for Atlantic Salmon and Otter. Pipeline crossing of Parteen Basin will increase potential for effects on high quality aquatic habitat supporting protected aquatic species.	Site within the Lower River Shannon SAC (002165) designated for Atlantic Salmon and Otter	Site within the Lower River Shannon SAC (002165) designated for Atlantic Salmon and Otter
1.2.14	Potential to impact on coastal zone habitats (intertidal)	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.2.15	Potential to impact on marine habitats (e.g. Subtidal)	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.2.16	Potential to impact marine/coastal birds	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.2.17	Potential to impact marine mammals	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors	N/A - No potential for effects on coastal / marine receptors
1.3	Fisheries				
1.3.1	Potential to impact on water quality and inshore fishing grounds based on regional fisheries datasets.	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on inshore fisheries (European eel) are evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on inshore fisheries (European eel) are evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on inshore fisheries (European eel) are evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on inshore fisheries (European eel) are evaluated as low. Further evaluation required based on construction and operational details
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.	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on migratory Atlantic Salmon evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on migratory Atlantic Salmon evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on migratory Atlantic Salmon evaluated as low. Further evaluation required based on construction and operational details	Based on proposed operational regime with imperceptible impact on water levels, significance of potential impact on migratory Atlantic Salmon evaluated as low. Further evaluation required based on construction and operational details

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.4	Water				
1.4.1	<p>Potential to support the objectives of the WFD water bodies.</p> <ul style="list-style-type: none"> - Potential to impact on the water quality, hydro morphology of a WFD water bodies of "good" or higher status. - Potential to impact on a WFD Annex IV - Protected Areas: <ul style="list-style-type: none"> 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 (Ecology Scope) 	<p>The constraint associated with all sites are similar:</p> <ul style="list-style-type: none"> - the lake body is a drinking water body - the lake body is nutrient sensitive - the lake body is an SAC waterbody <p>However, due to the requirement to transfer abstracted water from the western shore to the eastern shore this along with RWA 1 would be the more constrained option.</p>	<p>The constraint associated with all sites are similar:</p> <ul style="list-style-type: none"> - the lake body is a drinking water body - the lake body is nutrient sensitive - the lake body is an SAC waterbody <p>However, due to the requirement to transfer abstracted water from the western shore to the eastern shore this along with RWA 2 would be the more constrained option.</p>	<p>The constraint associated with all sites are similar:</p> <ul style="list-style-type: none"> - the lake body is a drinking water body - the lake body is nutrient sensitive - the lake body is an SAC waterbody <p>There is no requirement to transfer abstracted water from the western shore to the eastern shore therefore this location would be the least constrained option compared to RWA 1 & 2. The site is similar to RWA 4.</p>	<p>The constraint associated with all sites are similar:</p> <ul style="list-style-type: none"> - the lake body is a drinking water body - the lake body is nutrient sensitive - the lake body is an SAC waterbody <p>There is no requirement to transfer abstracted water from the western shore to the eastern shore therefore this location would be the least constrained option compared to RWA 1 & 2. The site is similar to RWA3.</p>

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.4.2	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.	Some Fluvial flooding the 1%AEP within 100m of the site	Some Fluvial flooding the 1%AEP within 100m of the site	Some Fluvial flooding the 1%AEP within 100m of the site and within the site boundary	Some Fluvial flooding the 1%AEP within 100m of the site and some within the site boundary but less than RWA 4.
1.5	Air/Climatic Factors				
	NOISE				
1.5.1	Potential for Construction phase noise impact at Sensitive receptors	Approx. 140m from site boundary to nearest residential receptor. Approx 70m to nearest non-residential building (use tbc.)	Approx. 240m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 320m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 680m from site boundary to nearest residential receptor. Approx 320m to nearest non-residential building (use tbc.)
1.5.2	Potential for Operational phase noise impact at Sensitive receptors	Approx. 140m from site boundary to nearest residential receptor. Approx 70m to nearest non-residential building (use tbc.)	Approx. 240m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 320m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 680m from site boundary to nearest residential receptor. Approx 320m to nearest non-residential building (use tbc.)
1.5.3	Existing Ambient Noise Climate in the Area (significant noise sources)	Nearest residences located along regional road. Existing ambient and background noise expected to be fairly quiet. TBC	Nearest residences located along regional road. Existing ambient and background noise expected to be fairly quiet. TBC	Nearest residences located along regional road. Existing ambient and background noise expected to be fairly quiet. TBC	Nearest residences located along regional road. Existing ambient and background noise expected to be fairly quiet. TBC
1.5.4	Construction Phase Impact rating	Mid Range	Low	Very Low	Very Low
1.5.5	Operational Phase Impact rating	Mid Range	Low	Very Low	Very Low

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
	AIR				
1.5.6	Potential for Construction phase Air Quality impact at Sensitive receptors	Approx. 140m from site boundary to nearest residential receptor. Approx 70m to nearest non-residential building (use tbc.)	Approx. 240m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 320m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 680m from site boundary to nearest residential receptor. Approx 320m to nearest non-residential building (use tbc.)
1.5.7	Potential for Operational phase Air Quality impact at Sensitive receptors	Approx. 140m from site boundary to nearest residential receptor. Approx 70m to nearest non-residential building (use tbc.)	Approx. 240m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 320m from site boundary to nearest residential receptor. Site boundary adjoins nearest non-residential building (use tbc.)	Approx. 680m from site boundary to nearest residential receptor. Approx 320m to nearest non-residential building (use tbc.)
1.5.8	Proximity to EPA Waste Licenced facility	No EPA Waste Licenced Facilities in the Area	No EPA Waste Licenced Facilities in the Area	No EPA Waste Licenced Facilities in the Area	No EPA Waste Licenced Facilities in the Area
1.5.9	Proximity to EPA IPPC Licenced Intensive Agriculture facility	No EPA IPPC Licenced Intensive Agriculture Facilities in the Area	No EPA IPPC Licenced Intensive Agriculture Facilities in the Area	No EPA IPPC Licenced Intensive Agriculture Facilities in the Area	No EPA IPPC Licenced Intensive Agriculture Facilities in the Area
1.5.10	EPA Air Quality Zone Classification	Zone D	Zone D	Zone D	Zone D
1.5.11	Wind Rose Assessment	South Westerly Prevailing Wind. Average Wind Speed of 4.7 m/s over period 1981- 2010 (Shannon Airport)	South Westerly Prevailing Wind. Average Wind Speed of 4.7 m/s over period 1981- 2010 (Shannon Airport)	South Westerly Prevailing Wind. Average Wind Speed of 4.7 m/s over period 1981- 2010 (Shannon Airport)	South Westerly Prevailing Wind. Average Wind Speed of 4.7 m/s over period 1981- 2010 (Shannon Airport)
1.5.12	Construction Phase Impact rating	Mid Range	Low	Very Low	Very Low
1.5.13	Operational Phase Impact rating	Very Low	Very Low	Very Low	Very Low
1.6	Material Assets (Energy)				
1.6.1	Potential for energy recovery	N/A	N/A	N/A	N/A

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.7	Cultural Heritage (including Architecture & Archaeology) - CH				
1.7.1	Potential to impact (direct/indirect) on National Monuments (designated sites)	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment
1.7.2	Potential to impact (direct/indirect) on RMPs (designated sites)	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment
1.7.3	Potential to impact (direct/indirect) on RPS (designated sites)	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Low - One RPS located over 700m NNE
1.7.4	Potential to impact (direct/indirect) on NIAH	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment
1.7.5	Potential to impact (direct/indirect) on historic designed landscapes	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Low - adjacent to Fort Henry demesne
1.7.6	Potential to impact on ACA	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment
1.7.7	Recorded shipwreck sites	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment	Very low - none present within the receiving environment

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.8	Landscape & Visual				
1.8.1	Potential to impact on designated areas of 'Highly Sensitive Landscape'	High - Contained within a Heritage landscape designation between R463 and shoreline	High - Contained within a Heritage landscape designation between R463 and shoreline	High - 'General sensitivity' identified in current CDP. Draft CDP indicates 'Class 4 sensitivity' (2nd highest of 6 no. categories). This LCA has 'low' capacity to accommodate industrial developments, but indicates that 'low' effects are likely to arise from 'water services' developments.	High - 'General sensitivity' identified in current CDP. Draft CDP indicates 'Class 4 sensitivity' (2nd highest of 6 no. categories). This LCA has 'low' capacity to accommodate industrial developments, but indicates that 'low' effects are likely to arise from 'water services' developments.
1.8.2	Potential to impact on rare or distinctive landscape elements (rock outcrops, water bodies etc.)	Mid-range - Largely unmodified section of Parteen shoreline	Mid-range - Largely unmodified section of Parteen shoreline	Mid-range - Loss of end section of mixed species riparian woodland	High - Loss and division of mixed species riparian woodland
1.8.3	Potential to disrupt landscape structure (treelines / hedgerows / field pattern etc.)	Low - scrubland / rough grazing and unmanaged hedgerows. Shoreline reeds and rushes	Mid-range - Mature treelined hedgerows within and around site	Mid-range - Loss of end section of mixed species riparian woodland	High - Loss and division of mixed species riparian woodland
1.8.4	Potential to impact on woodlands and significant tree groups	Low - Relatively mature tree-line sections	Low - Mature treelines within site and riparian woodland immediately south of site	Mid-range - Loss of end section of mixed species riparian woodland	High - Loss and division of mixed species riparian woodland
1.8.5	Potential to impact on historic designed landscapes	Very low - Does not appear to be a designed landscape remnant? See CH appraisal	Very low - Does not appear to be a designed landscape remnant? See CH appraisal	Very low - Appears to lie well beyond the southern end of a designed demesne landscape? See CH appraisal	Low - Appears to lie at the southern end of a designed demesne landscape? See CH appraisal
1.8.6	Potential to alter the prevailing landscape character	Mid-range - Industrial infrastructure within rural / shoreline context	Mid-range - Industrial infrastructure within rural / shoreline context	Mid-range - balance between naturalistic woodland setting and engineered embankment shoreline to south	Mid-range - balance between naturalistic woodland setting and engineered embankment shoreline to south

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.8.7	Potential to impact on designated scenic routes / views	Mid-range - Designated route along R463 above (west of site). However limited potential for visibility due to screening	Mid-range - Designated route along R463 above (west of site). However limited potential for visibility due to screening	Low - Designated route along R463 on western side of Parteen reservoir. However limited potential for visibility due to roadside screening	Low - Designated route along R463 on western side of Parteen reservoir. However limited potential for visibility due to roadside screening
1.8.8	Potential to impact on views from heritage/tourist/amenity features of national or regional importance	Low - Visitors travelling to Killaloe / Ballina and Lough Derg	Low - Visitors travelling to Killaloe / Ballina and Lough Derg	Mid-range - Visitors travelling to Killaloe / Ballina and Lough Derg on other side of reservoir (R463), from Birdhill to south and upper slopes of Ballina (north) Also from recreational area at Clarisford Park	Mid-range - Visitors travelling to Killaloe / Ballina and Lough Derg on other side of reservoir (R463), from Birdhill to south and upper slopes of Ballina (north) Also from recreational area at Clarisford Park
1.8.9	Potential to impact on views from settlements	Very low - Not visible from any settlements.	Very low - Not visible from any settlements.	Low - Potentially visible from Birdhill (to south) and from upper slopes of Ballina (North)	Low - Potentially visible from Birdhill (to south) and from upper slopes of Ballina (North)
1.8.10	Potential to impact on views from dwellings / local roads	Low - Several dwellings on R463 with limited potential for views due to screening but clear elevated views from local road further above and to the west	Low - Several dwellings on R463 with limited potential for views due to screening but clear elevated views from local road further above and to the west	Mid range - Several dwellings on R463 with views across reservoir, also clear elevated views from local road further above and to the west (of R463)	Mid range - Several dwellings on R463 with views across reservoir, also clear elevated views from local road further above and to the west (of R463)
1.8.11	Potential to impact on views from motorways	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity
1.8.12	Potential to impact on views from other major roads (national or regional roads)	Mid-range - R463 (designated route above (west of site). However limited potential for visibility due to screening	Mid-range - R463 (designated route above (west of site). However limited potential for visibility due to screening	Mid-range - R463 (designated route) above (west of Parteen Reservoir). However limited potential for visibility due to screening. Glimpses from R445 at Birdhill	Mid-range - R463 (designated route) above (west of Parteen Reservoir). However limited potential for visibility due to screening. Glimpses from R445 at Birdhill

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.8.13	Potential to impact on views from rail lines	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity
1.8.14	Potential to impact on arrival views from Airports including aerial approach and vehicular egress	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity	Very low - None in the vicinity
1.8.15	Potential to impact on views from national 'way marked' walking routes	Very low - Lough Derg Way skirts west around site beyond an intervening ridge - No views	Very low - Lough Derg Way skirts west around site beyond an intervening ridge - No views	Low - Potential glimpses from elevated sections of East Clare Way near Birdhill.	Low - Potential glimpses from elevated sections of East Clare Way near Birdhill.
1.8.16	Potential to impact on local walks	Very low - Does not appear to be any public walking routes along this section of shoreline or opposite side of Parteen Reservoir that would be affected	Very low - Does not appear to be any public walking routes along this section of shoreline or opposite side of Parteen Reservoir that would be affected	Mid-range - View from a shoreline lookout point on a walking track around Clarisford park	Mid-range - View from a shoreline lookout point on a walking track around Clarisford park
1.8.17	Potential to impact on views from angling or swimming locations (rivers, lakes, sea)	Mid range - Clear visibility afforded to water based recreationalists on Parteen Reservoir, but within modified farmland context	Mid range - Clear visibility afforded to water based recreationalists on Parteen Reservoir, but within modified farmland context	Mid range - Clear visibility afforded to water based recreationalists on Parteen Reservoir, but adjacent to constructed embankment	Mid range - Clear visibility afforded to water based recreationalists on Parteen Reservoir, but adjacent to constructed embankment
1.8.18	Potential that landscape screening measures will be ineffective or incongruous	Low - Could be substantially screened from R463, but may be difficult for more elevated local road receptors. Difficult to screen from Parteen Reservoir	Very Low - Could be substantially screened from R463 by bolstering existing mature treelines	Very Low - strong potential to use thick woodland type planting around site	Very Low - strong potential to use thick woodland type planting around site
1.9	Material Assets (Land use)				
1.9.1	Land take	5ha	5ha	5ha	5ha
1.9.2	Farming Enterprise	Not farmed scrub land with some trees dispersed through the land	Beef	Forestry	Forestry

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.9.3	Number of landowners impacted within site boundary	1	2	2	2
1.9.4	Land Quality	Poor to Medium	Medium	Medium	Medium
1.9.5	Severance based on site location within overall land holdings	Individual farm impact to be evaluated when exact site location decided	Individual farm impact to be evaluated when exact site location decided	Individual farm impact to be evaluated when exact site location decided	Individual farm impact to be evaluated when exact site location decided
1.9.6	Potential Impacts on landholdings	Loss of land, possible severance and injurious affection	Loss of land, possible severance and injurious affection	Loss of land, possible severance and injurious affection	Loss of land, possible severance and injurious affection
1.9.7	Crop rotation practiced	No	No predominately permanent pasture	No	No
1.9.8	Overall Impact	Low impact-slight at national level	Low impact-slight at national level	Low impact-slight at national level	Low impact-slight at national level
1.10	Tourism				
1.10.1	Potential to impact on known tourism amenities/facilities or Tourism Hotspots located within 1km from site boundary.	Potential disturbance to water based activities at this location given the proposed abstraction facility at the indicated site location.	Potential disturbance to water based activities at this location given the proposed abstraction facility at the indicated site location.	Potential disturbance to water based activities at this location given the proposed abstraction facility at the indicated site location.	Potential disturbance to water based activities at this location given the proposed abstraction facility at the indicated site location.
1.11	Population				
	PEOPLES & COMMUNITIES				
1.11.1	Number of residential & commercial buildings 300-500m from site boundary	A concentration of residential receptors (c.27) in a linear pattern located in close proximity to the west of this proposed abstraction site.	A concentration of residential receptors (c.27) in a linear pattern located in close proximity to the west of this proposed abstraction site.	A number of residential receptors (c.10) in a linear pattern located to the east of this proposed abstraction site.	A number of residential receptors (c.10) in a linear pattern located to the east of this proposed abstraction site.

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.11.3	Potential to impact on known community amenities and facilities within 1km from site boundary.	Site location for the proposed WSP Abstraction Facility is located away from any known community amenities or facilities.	Site location for the proposed WSP Abstraction Facility is located away from any known community amenities or facilities.	Site location for the proposed WSP Abstraction Facility is located away from any known community amenities or facilities.	Site location for the proposed WSP Abstraction Facility is located away from any known community amenities or facilities.
1.11.4	Potential to impact on areas of Significant Population Densities	Site location for the proposed WSP Abstraction Facility is located away from any significant population densities	Site location for the proposed WSP Abstraction Facility is located away from any significant population densities	Site location for the proposed WSP Abstraction Facility is located away from any significant population densities	Site location for the proposed WSP Abstraction Facility is located away from any significant population densities
1.12	Human Health				
1.12.1	Human Health	Regardless of plant siting, all plant would be operated within appropriate safeguards i.e. permissions and licences with respect to human health to ensure that there are no significant health risks to the population.	Regardless of plant siting, all plant would be operated within appropriate safeguards i.e. permissions and licences with respect to human health to ensure that there are no significant health risks to the population.	Regardless of plant siting, all plant would be operated within appropriate safeguards i.e. permissions and licences with respect to human health to ensure that there are no significant health risks to the population.	Regardless of plant siting, all plant would be operated within appropriate safeguards i.e. permissions and licences with respect to human health to ensure that there are no significant health risks to the population.
1.13	Soils, Geology and Hydrogeology				
1.13.1	Aquifer Classification - importance of the groundwater resource to a given area	LI/PI	LI/PI	Mainly LI	Mainly LI

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.13.2	Vulnerability Classification - potential for groundwater contamination	Moderate Vulnerability on specific site; impact of necessary tunnelling works under Parteen Basin could be significant	Moderate Vulnerability on specific site; impact of necessary tunnelling works under Parteen Basin could be significant	Classified as extreme however site geomorphology and soil exposes did not indicate the presence of shallow bedrock	Classified as extreme however site geomorphology and soil exposes did not indicate the presence of shallow bedrock. Former excavated pit for Parteen/Ardnacrusha scheme.
1.13.3	GSI Groundwater Protection Response matrix	N/A	N/A	N/A	N/A
1.13.4	Groundwater Supplies - identification of water supply springs and bored wells based on GSI, EPA and FCC records	None identified	None identified	None identified	None identified
1.13.5	Groundwater Source Protection Area's and Zones of Contribution as per available GSI & EPA data	None identified	None identified	None identified	None identified
1.13.6	Potential to impact on Geological Heritage Sites / County Geological Sites	None identified	None identified	None identified	None identified
1.13.7	Potential to interact with contaminated land	None identified	None identified	None identified	Former Borrow Pit
1.13.8	Potential to sterilise mineral resource	N/A	N/A	N/A	N/A
1.13.9	Potential to encounter shallow bedrock during construction (interactions with other disciplines during construction - noise, dust etc)	Soil exposures indicated DTB>3m	Soil exposures indicated DTB>3m	Soil exposures indicated DTB>3m	Soil exposures indicated DTB>3m
1.13.10	Potential impact on karst features	None identified	None identified	None identified	None identified

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
1.13.11	Potential to encounter soft ground	Soft, poorly drained soils and peaty podzols present	Soft, poorly drained soils and peaty podzols present	Well drained till, soft soils not identified	Small areas of Soft, poorly drained soils and peaty podzols present
1.13.12	Soils Types	AMinPD, surface water/ groundwater gley	AMinPD, surface water/ groundwater gley	AMinPD, surface water/ groundwater gley	AMinPD, surface water/ groundwater gley
1.13.13	Sub Soil Types	TLPSSs	TLPSSs	TLPSSs, clasts mainly of sandstone and microconglomerate identified during site visit	TLPSSs, clasts mainly of sandstone and microconglomerate identified during site visit
1.13.14	Depth to rock	estimated >3m	estimated >3m	estimated >3m	estimated >3m
2.0	Technical **				
2.1	Safety				
	TRAFFIC				
2.1.1	Length of access road required	Mid-range	Mid-range	High	Mid-range
2.1.2	Number of crossings required for access road	Very Low	Very Low	Low	Low
2.1.3	Potential Impact on landowners	Mid-range	Mid-range	Mid-range	Mid-range
2.1.4	Works required to provide safe access entrance	Low	Low	Low	Low
2.1.5	Potential impact on surrounding local road network	Mid-range	Mid-range	Low	Low
2.1.6	Frequency of accidents near entrance	Very Low	Very Low	Low	Low

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
2.1.7	Frequency of accidents on surrounding network	Very Low	Very Low	Low	Low
2.1.8	Road link impacted upon by all construction traffic	Low	Low	Low	Low
2.1.9	Construction Risk	Very High	Very High	Low	Low
2.2	Planning Policy				
2.2.1	Planning Policy	Clare County Development Plan	Clare County Development Plan	Tipperary County Development Plan (North Tipp)	Tipperary County Development Plan (North Tipp)
2.2.2	Existing Land Use	Agricultural	Agricultural	Forestry	Forestry
2.2.3	Zoning	No Zoning	No Zoning	No Zoning	No Zoning
2.2.4	Local Objectives	N/A	N/A	N/A	N/A
2.2.5	Other local objectives	Lough Derg Study	Lough Derg Study	Lough Derg Study	Lough Derg Study
2.2.6	Land Uses present in the vicinity	Village of Killaloe 2.6km distance	Village of Killaloe 2.7km distance	Village of Birdhill 1.6km distance	Village of Birdhill 1.7km distance
2.2.7	Zoning present in the vicinity	Killaloe Municipal District Plan	Killaloe Municipal District Plan	Birdhill Settlement Plan	Birdhill Settlement Plan
2.2.8	Local objectives in the vicinity	Protection of vistas to Lough Derg	Protection of vistas to Lough Derg	Protection of vistas to Lough Derg	Protection of vistas to Lough Derg
2.2.9	Other local objectives in the vicinity	Scenic Route Killaloe Municipal District Plan	Scenic Route Killaloe Municipal District Plan	Birdhill Settlement Plan	Birdhill Settlement Plan
2.3	Engineering and Design				

Ref	Criteria	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
2.3.1	Proximity to effluent discharges	2.2km downstream of Ballina/Killaloe treated effluent outfall	2.2km downstream of Ballina/Killaloe treated effluent outfall	2.2km downstream of Ballina/Killaloe treated effluent outfall	2.2km downstream of Ballina/Killaloe treated effluent outfall
2.3.2	Constructability	Deep excavations adjacent to water body; likely to be strict environmental constraints; tunnelling under Parteen Basin required to reach pipeline corridor	Deep excavations adjacent to water body; likely to be strict environmental constraints; tunnelling under Parteen Basin required to reach pipeline corridor	Deep excavations adjacent to water body; likely to be strict environmental constraints	Deep excavations adjacent to water body; likely to be strict environmental constraints
2.3.3	Process waste arising's	Occasional cleaning of screens; debris from lake returned to lake	Occasional cleaning of screens; debris from lake returned to lake	Occasional cleaning of screens; debris from lake returned to lake	Occasional cleaning of screens; debris from lake returned to lake
2.3.4	Power availability	No power connection in immediate vicinity	No power connection in immediate vicinity	38kV line in area; capacity needs to be confirmed	38kV line in area; capacity needs to be confirmed
2.4	Capital and Operational Costs				
2.4.1	CAPEX	€13.5m + €10.5m tunnelling costs	€13.5m + €10.5m tunnelling costs	€13.2m	€13.2m
2.4.2	OPEX	€366,000/annum (Labour, pumping and capital replacement costs)	€366,000/annum (Labour, pumping and capital replacement costs)	€333,000/annum (Labour, pumping and capital replacement costs)	€333,000/annum (Labour, pumping and capital replacement costs)

1.4 Preferred Site

A comparison of the four RWA site locations is presented in Table 1-2. For ease of reference the colour legend is repeated as follows:-

Impact Category	Colour Code
Very high	Dark blue
High	Blue
Mid-range	Green
Low	Light Green
Very low	Cream

Table 1-2 – MCA – Comparison between RWA Sites

Constraint	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
Terrestrial Ecology	Dark blue	Dark blue	Blue	Blue
Aquatic Ecology	Dark blue	Dark blue	Blue	Blue
Surface Water	Dark blue	Dark blue	Green	Light Green
Air Quality	Green	Light Green	Cream	Cream
Noise	Green	Light Green	Cream	Cream
Cultural Heritage	Green	Light Green	Light Green	Green
Landscape and Visual	Green	Light Green	Green	Blue
Agronomy	Light Green	Light Green	Light Green	Light Green
People	Light Green	Light Green	Cream	Cream
Soils, Geology & Hydrogeology	Green	Green	Light Green	Light Green
Planning Policy	Blue	Blue	Blue	Blue
Traffic	Dark blue	Dark blue	Blue	Green
Engineering & Design	Dark blue	Dark blue	Light Green	Light Green
Overall Ranking	4	3	1	2

With reference to the appraisal criteria presented in Table 1-2, where the sites are ranked in order of preference and least constraint, RWA Site 3 represents the preferred location for the siting of a raw water abstraction facility for the following reasons:

- RWA Site 1 and 2 require additional pipeline construction through Parteen Basin which will incur higher potential for ecological/archaeological and technical constraints; while haulage routes to the M7 during construction would be forced through residential, commercial and industrial developments in Limerick city.
- RWA Site 4 is located within a wetter woodland broadly corresponding to the priority Annex I habitat, 'Alluvial forest'.
- RWA site 3 is well screened, south of the Fort Henry demesne lands and provides no obstruction to views of Parteen Basin from the western bank.

2. Abstraction Location from POAR

The Parteen Basin emerged from the POAR as the preferred location for the abstraction of raw water to serve the Eastern and Midlands Region; see Figure 2.1 below.



Figure 2.1 Parteen Basin –Potential Abstraction Area

3. Screening to Identify Preliminary Sites

The screening for preliminary sites for raw water abstraction works at Parteen Basin is set out in this Section.

3.1 Technical Considerations

3.1.1 Rate of Abstraction

Raw water will be abstracted from Parteen Basin up to an ultimate rate of 330 Ml/day ($3.82\text{m}^3/\text{s}$). Raw water will be pumped from the abstraction location, via twin 1,500mm diameter rising mains, to the water treatment plant site. The raw water rising mains will be cross connected to allow them to operate at first on a duty/standby arrangement. However, as the abstraction rate grows, both rising mains will be required to convey raw water to the treatment plant, each carrying an average $1.91\text{m}^3/\text{s}$.

3.1.2 Intake Screens

Parteen Basin itself forms part of the Lower River Shannon SAC. It will therefore be necessary to minimise, as far as possible, the work required in the SAC to construct and operate a raw water abstraction facility. Water abstraction through either a submerged pipeline or open channels, extending a relatively short distance out into the basin, has been considered. In either case, protective screens will have to be fitted to the intakes to prevent debris and/or juvenile fish or eels being taken up into the raw water pumps.

Migratory diadromous fish species are historically recognised as being at risk from raw water abstraction works as they often have to pass numerous such water abstractions, as well as weirs and other hazards, on their journeys between rivers and the sea. A primary constraint in the sizing and configuration of the intake and protective screens will be the need to limit water velocities through the intake screens to 0.15m/s or less to avoid fish entrapment.

Passive wedge-wire cylinder (PWWC) intake screens are a tried and tested solution and are widely regarded as the best available technology for juvenile and larval fish protection at water intakes. In its most basic form, a PWWC screen comprises a cylinder, formed of the wedge-wire material around its circumference, one end being blanked off and flow being drawn off through the opposite end. The screen is then fitted as a tee-piece at the head of the intake pipe.

PWWC screens have a number of features that make them suitable for prevention of fish entrainment. These include a low through-slot velocity, allowing fish to swim away, the relatively smooth external presentation of the screen, which reduces the risk of fish abrasion, and the narrow slot widths available, making it possible to prevent entrainment of fish even down to egg or larval sizes. Also, the profile of the wedge wire forming the screen surface is V-shaped, which offers low hydraulic resistance and reduces the risk of blockages building up on the screen.

The screens are usually cleaned with an air blast backwash system in which a perforated pipe attached to the screen is fed by an air compressor which can produce a turbulent burst of air, blowing off any debris on the screen. Cleaning of the screen can be triggered automatically when a certain pressure differential is measured between the inside and outside of the screen. Bio-fouling of screens, in particular with zebra mussel, which are known to be present in Lough Derg/ Parteen Basin, can be greatly reduced through the use of a copper nickel alloy rather than stainless steel in the manufacture of the screens.

3.1.3 Required Depth of Raw Water Abstraction Intake

Water levels in Parteen Basin are controlled by ESB within an operating band, measured on Lough Derg, from 30.40m OD to 30.86m OD (Malin Head); under certain conditions water levels can be up to 0.4m lower than those recorded in Lough Derg. A raw water abstraction intake in Parteen Basin therefore will need to be set at an invert level sufficiently lower than the minimum operating water level, taken to be 30.00m OD, to ensure that water can be abstracted at the required rates even when water levels are at the lower end of the operating

band. There is no evidence in the available raw water quality data to suggest that there would be any benefit from locating an intake at greater than the minimum depth required to physically abstract water, nor is there any evidence that varying the depth of the intake in the water column would be necessary.

In the case of a submerged pipeline intake, passive intake screens which would be fitted at the head of the pipe can be selected so that intake velocities through the screen slots are limited to the required 0.15m/s. In an open channel intake the depth of water within the channel and the width of the channel itself will dictate the velocity generated for a given abstraction rate.

Considering firstly the submerged pipeline option, three 1,500mm diameter pipes would be provided, any two of which would have the capacity to abstract the required 330 MI/day. The head of each of the intake pipes would be fitted with a passive surface water intake screen.

Abstracting water at a rate of 330MI/day over 20 hours per day through any two screens would require each screen to be capable of catering for flows up to 8,250m³/hour. The screens would be approximately 2,000 mm in diameter and would need to be placed in the Basin such that there is a depth of at least half the diameter of the screen (1,000 mm) above and below the screen. Taking the lowest operating level in Parteen Basin at 30.0m OD, then the crown of the intake screen would need to be at 29.0 m OD. The invert level of a 2,000 mm diameter screen would therefore be at 27.0 m OD and, allowing for a 1,000 mm depth of water below the invert, the screen would have to be placed at a location where the bed level is 26.0 m OD or lower.

An open channel intake would have to be sized on the basis that the flow generated in the channels by the proposed abstraction of 330 MI/day (3.82m³/s) would not exceed an average velocity of 0.15m/s. Twin 14,500mm wide rectangular channels, each capable of taking 50% of the required flow when the water level in Parteen Basin is at the bottom of the ESB operating band, i.e. 30.0mOD, can fulfil this requirement at a water depth in the channels of at least 1.6m. The invert of the channels would therefore have to be at 1.6m below 30.0m OD (28.4m OD) or lower. Vertical band screens could be used to prevent debris entering the raw water pumping station but maintaining the required low velocities to prevent fish impingement on the screens would be difficult. Minimum velocity through a fine mesh band screen would be in the order of 0.25m/s. Some screens of this type incorporate a fish trap and return system where fish that come close to the screens are scooped up in fish trays and deposited into channels flowing back into the source water.

An alternative would be to provide passive intake screens, such as those proposed for the pipe intake configuration, in a sump on the head of the raw water pump suction pipes. In this configuration four screens would be provided, each in a sump that can be isolated from the others to facilitate cleaning. The screens would be cleaned in the same manner but dirt and debris from the cleaning operation could be drained from the isolated sump and pumped to a lagoon or settling tank before being returned, if necessary through a filter, to Parteen Basin.

3.1.4 Raw Water Abstraction Site Requirements

The raw water abstraction works will consist of the intake pipework or channels and a raw water pumping station. It is expected that the raw water pumping station would be set back approximately 50m from the shore line in order to minimise visual impacts.

The raw water pumping station itself will have a footprint of approximately 35m x 45m on plan and is likely to have an overall height of 8m. The raw water pump house would incorporate the following:

- Entrance Lobby
- Pump Room
- Control Room and Office
- Workshop and Store

- Control Panel Room
- Surge Vessel Room
- MV Switch Room
- ESB Substation
- Kitchen & welfare facilities

Allowing for access roads and circulation and, in the case of an open channel intake, for lagoons or settlement tanks for screen wash water returns, it is estimated that a site of approximately 2 ha will be required.

3.1.5 Feasibility of Abstraction from Ardnacrusha Headrace

The entrance area to the Ardnacrusha Headrace is an engineered channel between high engineering embankments and is the western outlet of Parteen Basin. It is excluded from the designated footprint of the Lower Shannon SAC. While water abstracted there would be visually more 'identifiable' as coming from water associated with hydropower generation, it is not a substantive differential. It must be emphasized that water abstracted from the Ardnacrusha Headrace is hydraulically equivalent to water abstracted at any of the other locations within the lake, as discussed below. It draws from the normal operating water level range in just the same way, and does so whether Ardnacrusha is operating, or not.

Construction of an intake downstream of the entrance gates to the headrace would also prejudice the ability of ESB to isolate the headrace if it was ever necessary for maintenance, inspection, or engineering works.

In discussions with ESB, it has been emphasized that any engineering works proposed within the footprint of the headrace canal and involving tunnelling works through or beneath the adjacent embankments or the dam structure would have implications for the safety of the embankments and would not be acceptable to them. For these reasons, the construction of an intake in the headrace has not been pursued.

3.1.6 Feasibility of Abstraction from Ardnacrusha Tailrace

The tailrace from Ardnacrusha station is tidal, and freshwater availability there is also variable, depending on whether the station is generating, or not.

Continuous abstraction of approximately 4m³/s from the tailrace would require adaptation of generating practice to continuously provide this amount of water into an area which would have to be partitioned against saline intrusion. Such a discharge would be significantly at variance with the 100 m³/s rated output of one generator at Ardnacrusha, and would not be feasible as a continuous flow.

A separate raw water storage which might be filled at times when Ardnacrusha was generating, and then drawn from when generation had ceased, would have to be capable of balancing a daily water requirement of approximately 0.33 million cubic metres, against intermittent inflows from generation, which during summer months can be over short periods of the day. Such storage downstream of the Ardnacrusha power station would be very substantial in scale and it would not be possible to locate and empty it within the tailrace itself. If it were sited at higher level and adjacent, then any pumps and pipework to fill it would have to match the 100 m³/s rated flow from a single generator, or else the pattern of generation would have to be adapted to accommodate a smaller storage.

Such considerations underline why Ardnacrusha operations are balanced by the extensive area of the normal operating water level band upstream in Parteen Basin/ Lough Derg, and why the operating band is of the volume scale that it is.

In energy terms, allowing water to pass through the generators, and then pumping it from a lower level for water supply, will always be less energy-efficient than abstracting the same water from the upstream side.

It is concluded that abstraction from the tailrace is not practical or favoured as an option.

3.1.7 Feasibility of Co-Location with Clareville WTP

Co-location of the Water Treatment Plant for the WSP at the existing Clareville Water Treatment Plant, which serves Limerick City and large areas of the county, would add an additional 13 - 15 km to the proposed treated water pipeline length.

Abstraction of an additional 4 m³/s at Clareville could be achieved by increasing the minimum compensation flow at the Parteen Weir to 14 m³/s, and allowing the water to flow to the Clareville intake, where the WSP requirement would be abstracted, leaving the statutory compensation flow to progress past the intake.

Such an approach would involve a change to the flow management regime in the River Shannon section of the Lower Shannon SAC, a change that is not required under direct abstraction from Parteen Basin. As a matter of legal detail, it would also most likely require the abstraction to be progressed under the Water Supplies Act 1942, whereas abstraction from Parteen Basin would be progressed under the Local Government (Sanitary Services) Act 1964. Where abstraction of a daily volume over 20 hours to avoid peak pumping tariffs be envisaged at Clareville, this approach would necessarily use more water than direct abstraction from storage, since river flow could not be flexibly varied to match changing abstraction rate over the day. It would have to be released at the higher 20-hour abstraction rate, and over 4 hours in each day, this water would pass by the intake.

In energy terms, allowing water to spill over Parteen Weir, and then pumping it from a lower level into Clareville for water supply, followed by pumping through a higher elevation difference and longer pipeline to the Break Pressure Tank will always be less energy-efficient than abstracting the same water from the upstream side of the Weir.

3.2 Preliminary Screening of the Raw Water Abstraction Locations in Parteen Basin

Based on the preferred location at the Lower Lake, or Parteen Basin, a number of potential RWA areas were initially identified, as presented in Figure 1.2, namely:

- Western shore of Parteen Basin (RWA1)
- Eastern shore of Parteen Basin (RWA2)
- Eastern bank of River Shannon, immediately downstream of Lough Derg (RWA3)

A desktop consideration of each of these locations was carried out against the following criteria:

1. Topography: *the surrounding topography should be low lying so as not to restrict the pipeline route and minimise tunnelling*
2. Proximity to environmentally sensitive designated sites: *the abstraction location should avoid or minimise impacts on designated sites, and avoid adverse effects on the qualifying interests and conservation objectives of these sites.*
3. Proximity to public roads: *the abstraction location should preferably be in close proximity to an access road*
4. Proximity to existing residential development
5. Proximity to treated water route corridors: *the abstraction location should be sited so as to afford relatively easy access to the least constrained route corridor for the treated water transmission pipeline*

Table 3.1 summarises the initial assessment of the potential RWA areas.

Table 3-1 Summary Comparison of Potential Raw Water Abstraction Locations

	Location RWA1 Western Shore	Location RWA2 Eastern Shore	Location RWA3 u/s Killaloe Bridge
Topography	ESB embankment extends approximately 1,100m upstream from Parteen Weir. Natural shore north of embankment at 30-31mOD contour	ESB embankment extends approximately 3,200m upstream from Parteen Weir. Natural shore north of embankment at 30-31mOD contour	Shore at 30mOD contour, but rising relatively steeply to public road at 45m OD.
Proximity to Designated Sites	Entire shoreline within Lower River Shannon SAC	Entire shoreline within Lower River Shannon SAC	Not within designated site; extends 150m to 400m downstream of Lough Derg NHA boundary; approx. 1,200m upstream of Lower River Shannon SAC boundary.
Proximity to Public Roads	R463 runs parallel to and generally within 1km of shoreline	R494 runs parallel to and generally within 1km of shoreline	Local residential roads run adjacent to the location
Proximity to existing residential development	Some ribbon development along R463; low density along shoreline	Some ribbon development along R494; low density along shoreline	Surrounded by residential development
Proximity to Emerging Preferred Corridor	Abstraction from western shore would require a raw water rising main tunnelled beneath the river Shannon; any site would need to be north of ESB embankments on both eastern and western shores	Within 0.5km of least constrained corridor	Approximately 3km north of least constrained corridor; routing of raw water rising main would be very difficult through Ballina and outskirts

3.2.1 Potential Raw Water Abstraction Sites on Parteen Basin Western Shoreline

In consideration of location RWA1 on the western shore of Parteen Basin, there are lands available that could accommodate a raw water abstraction facility. However, crossing the river Shannon with a rising main from an abstraction point on the western shore of the lake to the least constrained pipeline corridor, east of the basin, would require tunnelling beneath the Parteen Basin which would be difficult and costly. The eastern shoreline is heavily constrained (see assessment below) and any tunnelling operation from the western shore would need to run north of the ESB embankments and south of residential properties along the eastern shore. There are lands potentially available for abstraction works along the north western shore, circled in 'red' in Figure 3.1. These are the two areas that are (a) sufficiently far north to allow tunnelling to the eastern shore and avoid the ESB embankment and (b) are a reasonable distance (more than 150m) from existing housing.



Figure 3.1 Possible Raw Water Abstraction Locations on Parteen Basin Western Shore

Both locations are within the boundary of the Lower Shannon SAC, which incorporates Parteen Basin itself. Based on the discussion set out in Section 3.1.3, and on bathymetric surveys of the lake, a submerged pipeline from the northernmost location would extend over 340m into the basin (below the 30.0m OD contour) to reach water of sufficient depth to allow abstraction when levels are close to the minimum ESB operating level. An open channel intake with an invert level of 28.4m OD would have to extend approximately 210m into the water to achieve the depths required to maintain abstraction while also keeping to below the allowable velocity of 0.15m/s in the intake channel.

Taking the 30.0m OD contour as the shoreline, at the southern location a submerged pipe intake would extend approximately 170m into the basin to reach the required water depth while an open channel intake would be approximately 60m long.

Given the extent of the works that would be required in the SAC to construct an intake at the northern location the southern location is considered to be less constrained and therefore more suitable for a raw water abstraction site. Two sites of the required area are available at the southern location as shown in Figure 3.2.



Figure 3.2 Possible Raw Water Abstraction Sites on Parteen Basin Western Shore

3.2.2 Raw Water Abstraction Sites on Parteen Basin Eastern Shoreline

The ESB will not permit works that require a pipeline to be constructed through or under the embankments that were constructed in the 1920's in the formation of Parteen Basin. Therefore, abstraction works cannot be located along the shore line where ESB embankments are in place and an abstraction point along the eastern shoreline of the basin would need to be located to the north of the ESB embankment.

The outskirts of the town of Ballina extend to the very north eastern corner of Parteen Basin, with residential properties occupying the shoreline northward from a point approximately 1,100m upstream of the extent of the ESB embankment. Figure 3.3 shows the extent of eastern shoreline, north of the ESB embankment and south of Ballina that may provide a feasible location for abstraction works.



Figure 3.3 Possible Raw Water Abstraction Location on Parteen Basin Eastern Shore

From an initial examination of aerial photography of the possible abstraction location site shown in Figure 3.4, it was recognised that the wooded eastern shoreline extending north of the ESB embankment comprised semi-natural woodland designated within the SAC. A site visit conducted in December 2015, and subsequent ecological surveys, took cognisance of the potential for alignment with the priority Annex I habitat Alluvial Woodland for which the SAC is designated. This would have implications for the siting of raw water abstraction works within such habitat. It is noted that the Killaloe/ Ballina road by-pass project has not yet received planning permission due to a disputed area of alluvial woodland. It is considered that any proposals to site the abstraction works in this area, whether the woodlands are categorically classified as comprising priority Annex I Alluvial Woodland or not, will run a high risk of being challenged. Based on the December 2015 walkover survey by engineering and ecology specialists, followed by the additional ecological surveys during May and June 2016, it was noted that the woodland along the shoreline extending approximately 120m immediately north of the embankment, is in fact predominantly coniferous plantation and mixed-broadleaved woodland, not corresponding to priority Annex I Alluvial Woodland habitat. Provision of additional expert opinion on the classification of this habitat area has been recommended by NPWS divisional ecologists and this is in process.

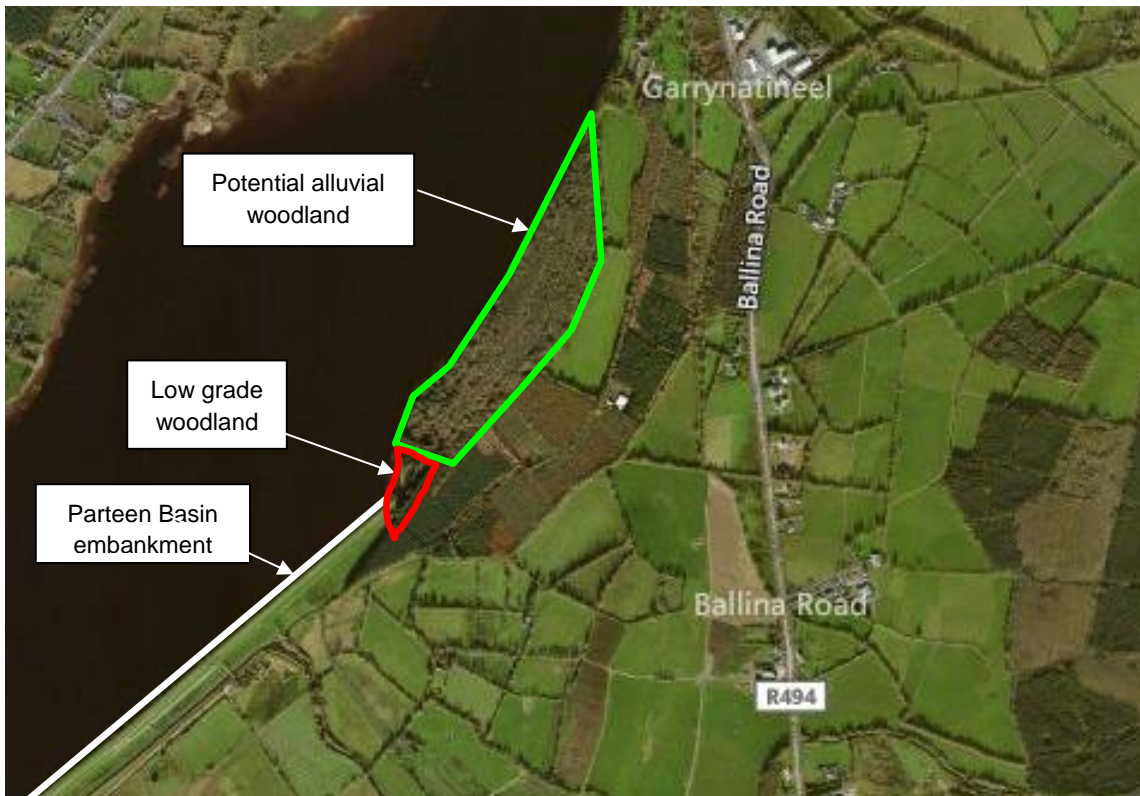


Figure 3.4 Classification of Woodlands on Parteen Basin Eastern Shore

Given the constraints of the ESB embankments, the potential for disputes regarding alluvial woodland habitat classification and the development north of the woodlands associated with the outskirts of Ballina, the preferred location for an abstraction point on the eastern shore of Parteen Basin is the 120m shoreline between the northern extents of the embankment at the southern extent of the natural woodlands.

This site is at an elevation of slightly greater than 31m OD along the shoreline; ground levels between the site and the R494 public road to the east are relatively flat, estimated to be between 31m and 33m OD. It is proposed at this stage that the raw water pumping station required to deliver water to a water treatment plant should be sited adjacent to the abstraction point. An access road to the site would have to be constructed from the R494, a distance of between 900m and 980m, depending upon the route taken. There are however no local roads to be crossed between the site and the R494, nor are there any buildings or significant developments that would make an access road route difficult.

Two potential sites of the required area were identified on the eastern shore, as shown in Figure 3.5.



Figure 3.5 Potential Raw Water Abstraction Sites on Parteen Basin Eastern Shore

3.2.3 Raw Water Abstraction Site North of Killaloe Bridge

Location RWA3 in Figure 1.2, while avoiding works within a designated site, is essentially locked in by existing development. A feasible pipe route to transfer water from this location to the emerging preferred corridor is not available unless existing properties were acquired and housing demolished to accommodate the construction. Therefore, this option was not considered further.

3.3 Screening Conclusion

The consideration of local constraints along the shoreline of the Parteen Basin area has identified four preliminary sites that are conducive to the siting and effective operation of the Raw Water Abstraction Works.

These have been subject to MCA analysis; discussed in the following sections of this report.

4. RWA Site 1 (Western Shore)

RWA Site 1 is located on the western shore of the Parteen Basin, due east of the village of Bellisle and regional road R463; see Figure 4.1.



Figure 4.1 – RWA Site 1

The analysis undertaken by each of the project specialists is presented below.

(i) Ecology

The RWA Site 1 is located partially within the Lower River Shannon SAC (002165) and would require construction works within the designation along the lake shore and fringing wetland habitat. Selection of this site for raw water abstraction would also require the construction of a raw water pipeline crossing of Parteen Basin, resulting in additional works within the SAC. This site is located on extensively managed grassland habitat and has a very low likelihood of additional Annex I habitats occurring.

No protected flora species were recorded and the potential of occurrence was evaluated as 'low'; therefore, no species listed on the Flora Protection Order are expected to occur. The Annex II Otter, listed as a qualifying interest of the SAC, occurs along the lakeshore within the footprint of this site, but no dwellings were recorded during site visits. The proposed pipeline crossing of Parteen Basin, required of this site, would likely increase the potential for effects on Otter. Additional Annex II species are unlikely to occur within this site. Otter and all bat species are also listed as Annex IV species. These species use and are likely to use this site.

No SPA designations were recorded within or adjacent to this site. The wet grassland habitat at RWA Site 1 is unsuitable for wintering bird species and has low breeding bird potential. Bird species that occur within this site, will however be potentially affected. No flora or fauna protected under the Wildlife Act 1979 (Amendment 2000) were found to occur at this site but the Common Frog is likely to occur.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon. Protected aquatic flora may occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction works within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. In addition, a proposed pipeline crossing of the lake will increase potential for effects on high quality aquatic habitat supporting protected aquatic species. Further project and survey information may help reduce the significance of these impacts.

(ii) Aquatic Ecology

The use of this site, where a raw water pipeline is tunnelled under the lake from the western shore to the east, would result in increased potential for significant impacts on the high value lacustrine littoral and benthic habitat within the SAC.

No aquatic Annex IV species are likely to be affected by the proposed RWA Site 1. Benthic survey results have not yet been analysed but there is a very low likelihood of additional Annex I habitats occurring. There is also a very low likelihood of additional protected aquatic flora species occurring.

Breeding and wintering water birds were recorded in the lake waterbody and wider study area. A pipeline crossing of the lake would increase potential for disturbance effects on the wetland habitats supporting these breeding and wintering water birds.

Aquatic species protected under the Wildlife Act 1979 (Amendment 2000) include fish species (Brown Trout, Atlantic Salmon), water birds and the Common Frog, all of which occur within the lake and in the vicinity of RWA Site 1. A pipeline crossing of the lake would increase potential for effects on high quality aquatic habitat supporting protected aquatic species.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon and Otter. Protected aquatic flora may occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction facility within Parteen Basin may potentially impact upon high quality aquatic habitat for protected aquatic species. In addition, the requirement to construct a raw water pipeline in the lake also increases the potential for effects on high quality aquatic habitat supporting protected aquatic species. The potential for significant impacts affecting aquatic ecological receptors is evaluated as 'very high'. The potential for significant impacts on coastal and marine aquatic ecological receptors is identified as 'very low'. Further project and survey information may help reduce the significance of these impacts.

(iii) Surface Water

Table 4-1 details the Water Framework Directive (WFD) water bodies within the area of RWA Site 1.

Table 4-1 RWA Site 1 WFD Watercourses

Waterbody Name	Waterbody Type	EU WFD Code	WFD Status (2010-2012)
Lough Derg pHMWB	Lake	IE_SH_25_191b	High

There are a number of WFD related protected areas within and adjacent to the location as follows:

- The entirety of Lough Derg (including Parteen Basin) is classified under the WFD as being Drinking Water and a Nutrient Sensitive Area; and
- The Lower River Shannon SAC [002165].

The sensitivity of the Parteen Basin location is rated as 'High' due to the number of WFD related protected areas.

There is also the possibility of some fluvial flooding to 1% Annual Exceedance Probability (AEP)² within 100m of the site.

(iv) Air Quality

The focus of the assessment consisted of determining the potential for dust emissions to occur during the construction phase of the proposed development as there is unlikely to be any significant impacts to occur during the operational phase. The potential for dust emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing dust impacts during the construction phase. The proposed site is approximately 140m from the nearest sensitive receptor, with the longer the distance being the most preferable from an air quality point of view.

(v) Noise

The focus of the assessment consisted of determining the potential for noise/vibration emissions to occur during the construction and operational phase of the proposed development. The potential for noise/vibration emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing noise/vibration impacts during the construction/operational development phases. The proposed site is approximately 140m from the nearest sensitive receptor, with the longer the distance being the most preferable from a noise point of view.

(vi) Cultural Heritage

There is no recorded archaeological, built heritage or cultural heritage sites located within the vicinity of this site. As such the impact has been defined as very low. However, when considering the fact that a pipeline will have to be tunnelled from the site to the eastern shore of Parteen Basin, this has more potential to impact on previously unrecorded archaeological remains and has to be considered as part of the assessment of the options.

(vii) Landscape and Visual

The site is in an area of marginal grassland and scrub. The R463 runs parallel to Parteen Basin a short distance uphill to the west of RWA1 and it is designated as a scenic route along this section. There is also a more elevated local road further upslope that is lined by dwellings that take advantage of elevated panoramic views over the lake. The popular tourist settlements of Killaloe/ Ballina lie just over 2km to the north on either side of the River Shannon. Clarisford Park recreational area lies between this site and the settlement of Killaloe and also occupies the shores of the lake. It is contained within a sensitive 'Heritage Landscape' area designation in the Clare County Development Plan (2011-2017).

(viii) Agronomy

Farm Enterprise

The subject site is not currently in agricultural production. The site is in grassland and it is currently in an overgrown condition; encroached by scrub. Some native trees are dispersed throughout the site. There are no farm buildings located within the site boundary.

Number of Landowners impacted within the site boundary

According to folio data supplied by the land registry there is one land owner within the site boundary.

² The AEP is the estimated likelihood of a particular magnitude flood occurring or being exceeded in any given year. Thus, a 1% AEP event represents an estimated flood event which has a 1% (or 1 in 100) chance of occurring or being exceeded in any given year.

Land Quality

According to the Environmental Protection Agencies (EPAs) Soil Classification of Ireland, the soils in the region consist in the main of a fine loamy drift with siliceous stones. The soils are particularly suited to grassland. In addition the land is adjacent to the western bank of the lake and would be prone to flooding which could restrict its use. The land quality is considered to be poor to medium quality land.

Crop Rotation Practised

The land is in grassland and is not currently in agricultural production. Crop rotation is not practised.

(ix) People

There are a significant number of residential receptors (approximately 10) in a linear pattern, located on the western side of the R463. There is also a residential receptor located on the eastern side of the R463 in close proximity to the site (approximately 120m) as well as a commercial receptor to the immediate south-west in the form of agricultural sheds/facilities. There are no tourism amenities/hotspots within 500m of this proposed abstraction site. An access track from the R463 would be required to provide access to the site.

(x) Soils, Geology and Hydrogeology

The site is mapped³ as deep, poorly drained, mineral soil, derived mainly from non-calcareous parent materials and belonging to the soil groups Surface water/Groundwater gleys (AminPD). An area of lacustrine deposits is mapped along the lake shoreline. The vulnerability of the site is classified as 'moderate' vulnerability based on GSI data.

A site visit was undertaken in July 2016. Soils on site comprise soft to firm, moist, light brown, sandy gravelly Clay with occasional siltstone, sandstone and micro conglomerate cobbles. Peat is located to the north and east of the site. Along part of the foreshore minor shore protection berms are in place. The berms are less than 0.4m and constructed of soil and timber to prevent erosion. The site is classified as 'moderate' vulnerability based on the GSI data.

The bedrock map indicates that the site is underlain by Dinantian (early) Sandstones, Shales and Limestones. Dinantian Lower Impure Limestones are mapped to the south of the site. No outcrops of these rocks within the site.

There are no geological heritage sites or source protection zones located within 1 km of the site. It is a green field site with negligible potential for encountering soil contamination. There are no active quarries or pits on or immediately adjacent to the site.

(xi) Planning Policy

Land Use Zoning

The site is located within the functional area of Clare County Council. The lands are currently unzoned.

Local objectives

There are no specific local objectives for the site.

Other Objectives

It is noted that there is a scenic route identified to the north west of the site.

³ Information regarding the soil classifications was obtained from the EPA web-mapping site, containing soil information from the Teagasc/EPA soil & subsoil mapping project.

Overview of Potential Planning Issues

The site is located in an area of unzoned lands. There are no specific local objectives pertaining to the site itself or within the immediate vicinity of the site. The site is located outside of the environs of the settlements in the area. There is a recognised scenic route running to the north east of the site; care must be taken with any potential siting of any infrastructure within this site.

(xii) Traffic, Engineering and Design

The site is accessed via a series of regional routes with connectivity to the M7 Motorway to the east and the N18 national route to the south.

While the M7 motorway is situated to the east of Lough Derg, access to the motorway via Killaloe/ Ballina is restricted due to the requirement for vehicles to travel through Killaloe village and onto the R494 in Ballina via a narrow bridge (with signalised traffic control to facilitate vehicular movements across the bridge which is limited to one traffic lane).

The alternative route to the M7, along the R463 road will result in travel southwards to Ardnacrusha, through Limerick City, via the Corbally, Garryowen and Galvone areas, and onto the M7 at Junction 30. This would require all traffic to travel through Limerick City and negotiate 90 degree bends, and residential, commercial and industrial development areas. Travel distance from the site to Junction 30 on the M7 Motorway is approximately 29km.

The R463 regional route comprises a carriageway cross section of two 3.0m wide traffic lanes with a 250mm hard strip to both sides. Pavement and road marking conditions along the R463 are fair with some evidence of pavement degradation in the form of surface cracks.

A total of six domestic properties are situated within the immediate vicinity of the proposed site access junction. The proposed access is sited within the existing 60km/h urban transition zone.

The Road Safety Authorities Collision Statistics database has no recorded collisions in the vicinity of the proposed access location.

5. RWA Site 2 (Western Shore)

RWA Site 2 is located on the western shore of Parteen Basin, near the village of Bellisle and connecting regional road R463; see Figure 5.1.



Figure 5.1 – RWA Site 2

(i) Ecology

The RWA Site 2 is located partially within the Lower River Shannon SAC (002165) and would require construction works within the designation along the lake shore and fringing wetland habitat. As with RWA Site 1, selection of this site would also require a raw water pipeline crossing of Parteen Basin, resulting in additional works within the SAC. This site is located on extensively managed grassland habitat and has a very low likelihood of additional Annex I habitats occurring.

No protected flora species were recorded and the potential of occurrence was evaluated as 'low'; therefore, no species listed on the Flora Protection Order are expected to occur. The Annex II Otter, listed as a qualifying interest of the SAC, occurs along the lakeshore within the footprint of this site; however, during site visits, no dwellings were recorded on the site. A proposed pipeline crossing of the lake would likely increase the potential for effects on Otter. Additional Annex II species are unlikely to occur within this site. Otter and all bat species are also listed as Annex IV species. These species use and are likely to use this site.

No SPA designations were recorded within or adjacent to this site. The managed wet grassland habitat is suitable for wintering Annex I birds (e.g. Whooper Swan, Greylag Geese) and has breeding bird potential. Bird species that occur within this site will likely be affected. No flora or fauna protected under the Wildlife Act 1979 (Amendment 2000) were found to occur at this site, but the Common Frog is likely to occur.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon. Protected

aquatic flora may occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction works within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. In addition, the proposed pipeline crossing of the lake will increase potential for effects on high quality aquatic habitat supporting protected aquatic species. Further project and survey information may help reduce the significance of these impacts.

(ii) Aquatic Ecology

The site is also located partially within the Lower River Shannon SAC (002165) site boundary and would require construction works within the designation. As with RWA Site 1, the use of this site would require a raw water pipeline to be tunnelled under the lake from the western shore to the east, resulting in increased potential for significant impacts on the high value lacustrine littoral and benthic habitat within the SAC.

No aquatic Annex IV species are likely to be affected by the proposed site. Benthic survey results have not yet been analysed but there is a very low likelihood of additional Annex I habitats occurring. There is also a very low likelihood of additional protected aquatic flora species occurring.

Breeding and wintering water birds were recorded in the lake waterbody and wider study area. A pipeline crossing of Parteen Basin would increase potential for disturbance effects on the wetland habitats supporting these breeding and wintering water birds.

Aquatic species protected under the Wildlife Act 1979 (Amendment 2000) include fish species (Brown Trout, Atlantic Salmon), water birds, and the Common Frog all of which occur within the lake and in the vicinity of the site. A raw water pipeline crossing underneath the lake would increase potential for effects on high quality aquatic habitat supporting protected aquatic species.

There is no connectivity to salmonid or freshwater pearl mussel watercourses, nor are there any potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon and Otter. Protected aquatic flora may occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction facility within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. In addition, a raw water pipeline crossing underneath the lake will also increase potential for effects on high quality aquatic habitat supporting protected aquatic species. The potential for significant impacts affecting aquatic ecological receptors is evaluated as 'very high'. The potential for significant impacts on coastal and marine aquatic ecological receptors is identified as 'very low'. Further project and survey information may help reduce the significance of these impacts.

(iii) Surface Water

Table 5-1 details the WFD water bodies within the area of RWA Site 2.

Table 5-1 RWA Site 2 WFD Watercourses

Waterbody Name	Waterbody Type	EU WFD Code	WFD Status (2010-2012)
Lough Derg pHMWB	Lake	IE_SH_25_191b	High

There are a number of WFD related protected areas within and adjacent to the location as follows:

- The entirety of Lough Derg (including Parteen Basin) is classified under the WFD as being Drinking Water and a Nutrient Sensitive Area; and
- The Lower River Shannon SAC [002165].

The sensitivity of the location is rated as 'High' due to the number of WFD related protected areas.

There is also the possibility of some fluvial flooding to 1% AEP within 100m of the site.

(iv) Air Quality

The focus of the assessment consisted of determining the potential for dust emissions to occur during the construction phase of the proposed development as there is unlikely to be any significant impacts to occur during the operational phase. The potential for dust emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing dust impacts during the construction phase. The proposed site is approximately 240m from the nearest sensitive receptor, with the longer the distance being the most preferable from an air quality point of view.

(v) Noise

The focus of the assessment consisted of determining the potential for noise/vibration emissions to occur during the construction and operational phase of the proposed development. The potential for noise/vibration emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing noise/vibration impacts during the construction/operational development phases. The proposed site is approximately 240m from the nearest sensitive receptor, with the longer the distance being the most preferable from a noise perspective.

(vi) Cultural Heritage

There is no recorded archaeological, built heritage or cultural heritage sites located within the vicinity of this site. As such the impact potential has been defined as very low. However, when considering the fact that a pipeline will have to be tunnelled from the site to the eastern shore of the lake, this has more potential to impact on previously unrecorded archaeological remains and has to be considered as part of the assessment of the options. On this basis, this site and RWA 1 are considered to be least preferable when compared to sites that do require a lake crossing.

(vii) Landscape and Visual

The land cover of the site is rough grazing lakeside farmland. A number of tree-lined hedgerows are contained within and around the site. The R463 runs parallel to the lake a short distance uphill to the west of RWA2 and it is designated as a scenic route along this section. There is also a more elevated local road further upslope that is lined by dwellings that take advantage of elevated panoramic views over the lake. The popular tourist settlements of Killaloe/ Ballina lie just over 2km to the north of the site on either side of the River Shannon. Clarisford Park recreational area lies between this site and the settlement of Killaloe and also occupies the shores of Parteen Basin. The site is also contained within the sensitive 'Heritage Landscape' area designation in the Clare County Development Plan (2011-2017)

(viii) Agronomy

Farm Enterprise

The site is currently in grassland and is used for a beef enterprise. There are no farm buildings located within the site boundary. The site area encompasses a number of fields with varying sizes separated by mature hedgerows.

Number of Landowners impacted within the site boundary

According to folio data supplied by the land registry there are two land owners within the site boundary.

Land Quality

According to the EPAs Soil Classification of Ireland, the soils in the region consist in the main of a fine loamy drift with siliceous stones. The soils are particularly suited to grassland. In addition the land is adjacent to the Western bank of Parteen Basin and would be prone to flooding which could restrict its use none the less the land is suitable for agricultural production and is used for grazing. The land quality is considered to be medium quality land.

Crop Rotation Practised

The land is in grassland and it is likely that crop rotation is not practised and that the land is in permanent pasture.

(ix) People

The site is located adjacent to a commercial farm and its associated building, and is approximately 220m south-east of linear patterned residential receptors. An access to the site would be expected to be located away from these residential receptors along the linear treeline and southern boundary of the site.

(x) Soils, Geology and Hydrogeology

The site is mapped⁴ as deep, poorly drained, mineral soil, derived mainly from non-calcareous parent materials and belonging to the soil groups Surface water/ Groundwater gleys (AminPD). Lacustrine soil is mapped along the lake shoreline.

A site visit was undertaken in July 2016. Soils at the site are comprised of soft to moderately firm, moist, grey to light brown, sandy gravelly Clay. Occasional sand and sandy silt horizons were noted towards the shoreline. A small area of peat (>1m) is located along the foreshore. Shore protection measures (<0.4m) were constructed of soil and timber to prevent erosion. Large sandstone erratic was noted to the east of the site. The site is classified as 'moderate' vulnerability based on the GSI data.

The bedrock map indicates that the site is underlain by Dinantian (early) Sandstones, Shales and Limestones and Dinantian Lower Impure Limestones. No bedrock outcrops were noted on the site.

There are no geological heritage sites or source protection zones located within 1 km of the site. The site is a green field site with negligible potential for encountering soil contamination. There are no active quarries or pits on or immediately adjacent to the site.

(xi) Planning Policy

Land Use Zoning

The site is located within the functional area of Clare County Council. The lands are currently unzoned.

Local objectives

There are no specific local objectives for the site.

Other Objectives

It is noted that there is a scenic route identified to the north west of the site.

Overview of Potential Planning Issues

The site is located in an area of unzoned lands. It is currently in agricultural use and is surrounded by other agricultural lands. There are no specific local objectives pertaining to the site itself or within the immediate

⁴ Information regarding the soil classifications was obtained from the EPA web-mapping site, containing soil information from the Teagasc/EPA soil & subsoil mapping project.

vicinity of the site. The site is located outside of the environs of the settlements in the area. There is a recognised scenic route running to the north east of the site; care must be taken with potential siting of any infrastructure within this site.

(xii) Traffic, Engineering and Design

The site area is accessed via a series of regional routes within connectivity to the M7 Motorway to the east and the N18 national route to the south.

As with RWA Site 1, access to the M7 motorway via Killaloe/Ballina and the R494 regional road is restricted by the narrow bridge across the Shannon at Killaloe which is signalised and restricted to one lane traffic.

Again, the alternative route from the site, south along the R463 regional road will result in travel through the Corbally, Garryowen and Galvone areas of Limerick City, to access the M7 at Junction 30, some 23km travel distance from RWA Site 2.

The R463 regional road comprises a carriageway cross section of two 3.0m wide traffic lanes with a 250mm hard strip to both sides. Pavement and road marking conditions along the R463 are fair with some evidence of pavement degradation in the form of surface cracks.

Site access would be within the existing 80km/h rural speed limit zone. Visibility at the site can be improved. However, due to the physical constraints resulting from the dip in the carriageway alignment, visibility splays in accordance with the development plan may not be achievable.

The Road Safety Authorities Collision Statistics database has no recorded collisions in the vicinity of the proposed access location.

6. RWA Site 3 (Eastern Shore)

RWA Site 3 is located on the eastern shore of Parteen Basin, west of the R494 and just north of the existing ESB embankments within a considerable forest and agricultural land bank; see Figure 6.1.



Figure 6.1 – RWA Site 3

(i) Ecology

The RWA Site 3 is within a mixed broadleaved woodland and coniferous plantation and is partially located within the Lower River Shannon SAC boundary. The mixed broadleaved woodland within the site does not correspond to Annex I habitat. The site would require construction works within the SAC designation.

No protected flora species were recorded and the potential of occurrence was evaluated as 'low'; therefore, no species listed on the Flora Protection Order are expected to occur. The Annex II Otter, listed as a qualifying interest of the SAC, occurs along the lakeshore within the footprint of this site, but no dwellings were recorded at this location during site visits. Additional Annex II species are unlikely to occur within this site. Otter and all bat species are also listed as Annex IV species. These species use and are likely to use this site. The bat potential at this site is higher within the woodland habitat.

No SPA designations were recorded within or adjacent to this site. The woodland habitat is unsuitable for wintering bird species and has low breeding bird potential; however, evidence of short-eared owl was recorded. Bird species that occur within this site will likely be affected. Evidence of badger activity was also recorded within this site. Other flora or fauna protected under the Wildlife Act 1979 (Amendment 2000) that are likely to occur include the Pine Marten and Common Frog.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon. Protected

aquatic flora may occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction works within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. Further project and survey information may help reduce the significance of these impacts.

(ii) Aquatic Ecology

The site is located partially within the Lower River Shannon SAC (002165) site boundary. This site would require construction works within the designation which will potentially affect the high value lacustrine littoral and benthic habitat within the SAC.

No aquatic Annex IV species are likely to be affected by the proposed site. Benthic survey results have not yet been analysed but there is a very low likelihood of additional Annex I habitats occurring. There is also a very low likelihood of additional protected aquatic flora species occurring.

Breeding and wintering water birds were recorded in the lake waterbody and wider study area. Aquatic species protected under the Wildlife Act 1979 (Amendment 2000) include fish species (Brown Trout, Atlantic Salmon), water birds, and the Common Frog all of which occur within the lake and vicinity of the site.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, the Parteen Basin is designated as an SAC for Annex II Atlantic Salmon and Otter. Protected aquatic flora may also occur within the littoral and/or benthic zone(s). Construction and operation of a raw water abstraction within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. The potential for significant impacts affecting aquatic ecological receptors is identified as 'very low'.

(iii) Surface Water

Table 6-1 details the WFD water bodies within the area of RWA Site 3.

Table 6-1 RWA Site 3 WFD Watercourses

Waterbody Name	Waterbody Type	EU WFD Code	WFD Status (2010-2012)
Lough Derg pHMWB	Lake	IE_SH_25_191b	High

There are a number of WFD related protected areas within and adjacent to the location as follows:

- The entirety of Lough Derg (including Parteen Basin) is classified under the WFD as being Drinking Water and a Nutrient Sensitive Area; and
- The Lower River Shannon SAC [002165].

The sensitivity of the Parteen Basin location is rated as 'High' due to the number of WFD related protected areas.

There is also some potential fluvial flooding to 1% AEP within 100m of the site and within the site boundary.

(iv) Air Quality

The focus of the assessment consisted of determining the potential for dust emissions to occur during the construction phase of the proposed development as there is unlikely to be any significant impacts to occur during the operational phase. The potential for dust emissions is directly related to the distance between the site

and the nearest residential receptors. The proposed site is approximately 680m from the nearest sensitive receptor, with the site with the longer the distance being the most preferable from an air quality point of view.

(v) Noise

The focus of the assessment consisted of determining the potential for noise/vibration emissions to occur during the construction and operational phase of the proposed development. The potential for noise/vibration emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing noise/vibration impacts during the construction/operational development phases. The proposed site is approximately 680m from the nearest sensitive receptor, with the longer the distance being the most preferable from a noise perspective.

(vi) Cultural Heritage

There is no recorded archaeological, built heritage or cultural heritage sites located within the vicinity of this site. As such the impact potential has been defined as very low. The site is well screened and south of the Fort Henry demesne lands. As such, this is deemed to be the preferred site for abstraction from an archaeological, architectural and cultural heritage perspective.

(vii) Landscape and Visual

The site is at the southern end of a strip of riparian woodland that continues northward towards the settlement of Ballina. The eastern half of the site encompasses a dense conifer forest plantation. Across the lake to the west is the R463 regional road, which is designated as a scenic route along this section. There is also a more elevated local road further upslope that is lined by dwellings that take advantage of elevated panoramic views over the lake. Clarisford Park recreational area lies on the opposite shore of Parteen Basin and contains a small waterside picnic area that affords clear views across the basin. To the south, a linear, man-made embankment contains Parteen Basin above surrounding farmland and forestry. The settlement of Birdhill occupies elevated ground approximately 2km to the south. The site is identified in the Draft Tipperary Landscape Character Assessment as being in a landscape area of 'class 4' sensitivity (the second highest of 6 possible categories).

(viii) Agronomy

Farm Enterprise

The site is currently planted in forestry and is planted with a mixture of conifers and broadleaves.

Number of Landowners impacted within the site boundary

According to folio data supplied by the land registry two land owners are impacted within the site boundary.

Land Quality

According to the EPAs Soil Classification of Ireland, the soils in the region consist in the main of a fine loamy over sandstone bedrock. The soils are particularly suited to grassland. In addition the land is adjacent to the eastern bank of Parteen Basin and would be prone to flooding which could restrict its use, but none the less it is suitable for agricultural production. The land is currently planted in forestry. The land quality is considered to be medium quality land.

Crop Rotation Practised

The land is planted in forestry which is a long term crop. Crop rotation is not practised.

(ix) People

The site is located approximately 660m west of the R494 (and adjacent residential receptors) and just north of the existing Electricity Supply Board (ESB) embankment within a considerable forest and agricultural land bank. There is a possible existing access road in close proximity but would be required to be extended south from its current position.

(x) Soils, Geology and Hydrogeology

The site has been mapped⁵ as shallow well drained, mineral soil, derived mainly from calcareous parent materials and (BminSW). A site visit was undertaken in June 2016. Based on the site visit, soils comprise of firm, dry, mid brown, sandy gravelly Silt/ Clay with occasional coarse sandstone boulders and cobbles. Along the lake foreshore, a 0.5 to 1m wave cut bank is present. The land rises gently to the east away from the shore line. To the south of the site, an ESB embankment forms the shoreline (partial) of Parteen Basin. The vulnerability for the site is classified as 'extreme' vulnerability based on the GSI data, however no bedrock exposure was recorded in the drainage ditches or in the former borrow pit to the north.

The bedrock map indicates that the site is underlain by Dinantian Lower Impure Limestones. There are no outcrops of these rocks within the site or in the drainage ditches.

There are no geological heritage sites or source protection zones located within 1 km of the site. The site is a green field site with negligible potential for encountering soil contamination. There are no active quarries or pits on or immediately adjacent to the site.

(xi) Planning Policy

Land Use Zoning

The site is located within the functional area of Tipperary County Council. The lands are currently unzoned.

Local objectives

There are no specific local objectives for the subject site.

Overview of Potential Planning Issues

The site is located in an area of unzoned lands. There are no specific local objectives pertaining to the site itself or within the immediate vicinity of the site. The site is located outside of the environs of the settlements in the area; care must be taken with any potential siting of any infrastructure within this site.

(xii) Traffic, Engineering and Design

The site is situated along the R494, approximately 3km south of Ballina, Co. Tipperary, on the eastern bank of Parteen Basin, north of Parteen Weir. The area is accessed via a series of regional routes with connectivity to the M7 Motorway to the south.

Access to and from the M7 Motorway can be facilitated via junction 27 (Birdhill Junction) to the R445 (former N7 National route) and then onto the R494. Travel distance from the M7 Motorway is approximately 4km.

The R494 regional route runs in a north-south orientation between Ballina Co. Tipperary and the M7 Motorway. The regional route comprises a carriageway cross section of two 3.0m wide traffic lanes with no hard shoulders/strips. Pavement and road marking conditions along the R494 regional road are poor with evidence of pavement degradation in the form of surface cracks.

⁵ Information regarding the soil classifications was obtained from the EPA web-mapping site, containing soil information from the Teagasc/EPA soil & subsoil mapping project.

The site is situated to the east of the R494 carriageway approximately 3km south of Ballina.

Visibility splays would be restricted in both directions due to existing landscaping elements along the closest stretch of road. Visibility at the site can be improved with respect to the set-back distance, by trimming and cutting back of the existing landscaping and boundary treatments. Additional lands may be required in order to provide sufficient set back of landscaping behind visibility splays at the proposed site entrance.

The Road Safety Authorities Collision Statistics database has recorded three number minor collisions (2 in 2007 and 1 in 2005) within the vicinity of the proposed access.

7. RWA Site 4 (East Shore)

RWA Site 4 is located on the eastern shore of Parteen Basin, west of the R494 and just north of the existing ESB embankments within a considerable forest and agricultural land bank; see Figure 7.1.



Figure 7.1 – RWA Site 4

(i) Ecology

The RWA Site 4 is partially located within the Lower River Shannon SAC boundary. This site is located within a wetter woodland broadly corresponding to the priority Annex I habitat, 'Alluvial forest'. The site would require construction works within the SAC designation.

No protected flora species were recorded and the potential of occurrence was evaluated as 'low'; therefore, no species listed on the Flora Protection Order are expected to occur. The Annex II Otter, listed as a qualifying interest of the SAC, occurs along the lakeshore within the footprint of this site, however no dwellings were recorded. Additional Annex II species are unlikely to occur within this site. Otter and all bat species are also listed as Annex IV species. These species use and are likely to use this site. The bat potential at this site is higher within the woodland habitat.

No SPA designations were recorded within or adjacent to this site. The woodland habitat is unsuitable for wintering bird species. Bird species that occur within this site, will however be potentially affected. An active badger sett was recorded at this site. Other flora or fauna protected under the Wildlife Act 1979 (Amendment 2000) that are likely to occur include the Pine Marten and Common Frog.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon. Protected aquatic flora may occur within the littoral and/ or benthic zone(s). Construction and operation of a raw water

abstraction facility within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. Further project and survey information may help reduce the significance of these impacts.

(ii) Aquatic Ecology

The site is located partially within the Lower River Shannon SAC (002165) site boundary. This site would require construction works within the designation which will potentially affect the high value lacustrine littoral and benthic habitat within the SAC.

No aquatic Annex IV species are likely to be affected by the proposed site. Benthic survey results have not yet been analysed but there is a very low likelihood of additional Annex I habitats occurring. There is also a very low likelihood of additional protected aquatic flora species occurring.

Breeding and wintering water birds were recorded in the lake waterbody in this wider study area. Aquatic species protected under the Wildlife Act 1979 (Amendment 2000) include fish species (Brown Trout, Atlantic Salmon), water birds, and the Common Frog all of which occur within Parteen Basin and in the vicinity of the site.

There is no connectivity to salmonid or freshwater pearl mussel watercourses or no potential effects on coastal or marine receptors; however, Parteen Basin is designated as an SAC for Annex II Atlantic Salmon and Otter. Protected aquatic flora may also occur within the littoral and/ or benthic zone(s). Construction and operation of a raw water abstraction facility within the lake may potentially impact upon high quality aquatic habitat for protected aquatic species. The potential for significant impacts affecting aquatic ecological receptors is identified as 'very low'.

(iii) Surface Water

Table 7-1 details the WFD water bodies within the area of RWA Site 4.

Table 7-1 RWA Site 4 WFD Watercourses

Waterbody Name	Waterbody Type	EU WFD Code	WFD Status (2010-2012)
Lough Derg pHMWB	Lake	IE_SH_25_191b	High

There are a number of WFD related protected areas within and adjacent to the location as follows:

- The entirety of Lough Derg (including Parteen Basin) is classified under the WFD as being Drinking Water and a Nutrient Sensitive Area; and
- The Lower River Shannon SAC [002165].

The sensitivity of the Parteen Basin location is rated as 'High' due to the number of WFD related protected areas.

There is also some potential fluvial flooding to 1% AEP within 100m of the site and some within the site boundary but less than RWA 3.

(iv) Air Quality

The focus of the assessment consisted of determining the potential for dust emissions to occur during the construction phase of the proposed development as there is unlikely to be any significant impacts to occur during the operational phase. The potential for dust emissions is directly related to the distance between the site

and the nearest residential receptors. The proposed site is approximately 320m from the nearest sensitive receptor, with the site with the longer the distance being the most preferable from an air quality point of view.

(v) Noise

The focus of the assessment consisted of determining the potential for noise/vibration emissions to occur during the construction and operational phase of the proposed development. The potential for noise/vibration emissions is directly related to the distance between the site and the nearest residential receptors. Receptors which are closer to the site have a higher risk of experiencing noise/vibration impacts during the construction/operational development phases. The proposed site is approximately 320m from the nearest sensitive receptor, with the longer the distance being the most preferable from a noise perspective.

(vi) Cultural Heritage

There are no recorded archaeological sites located within the vicinity of this site. As such the impact potential has been defined as very low. The northern boundary to the site is formed by the demesne landscape originally associated with Fort Henry, which is a protected structure located over 700m to the north. Whilst the site is outside of the demesne lands, which have been impacted upon by modern planting, the potential for an impact on this landscape and its associated principal structure has been defined as low.

(vii) Landscape and Visual

The site is contained near the southern end of a strip of riparian woodland that continues northward towards the settlement of Ballina. The eastern half of the site encompasses an area of commercial forestry. Immediately north of this portion of forest plantation is the southern end of a designed landscape associated with a stately house and demesne that lies further to the north. Across the lake to the west is the R463 regional road, which is designated as a scenic route along this section. There is also a more elevated local road further upslope that is lined by dwellings that take advantage of elevated panoramic views over Parteen Basin. Clarisford Park recreational area lies on the opposite shore of the lake and contains a small waterside picnic area that affords clear views across the reservoir. Beyond the woodland and forest plantation to the south is a linear, manmade embankment that contains Parteen Basin above surrounding farmland and forestry. The settlement of Birdhill occupies elevated ground approximately 2km to the south. The site is also identified in the Draft Tipperary Landscape Character Assessment as being in a landscape area of 'class 4' sensitivity (the second highest of 6 possible categories).

(viii) Agronomy

Farm Enterprise

The site is currently planted forestry and is planted with a mixture of conifers and broadleaves.

Number of Landowners impacted within the site boundary

According to folio data supplied by the land registry two land owners are impacted within the site boundary.

Land Quality

According to the EPAs Soil Classification of Ireland, the soils in the region consist in the main of a fine loamy over sandstone bedrock. The soils are particularly suited to grassland. In addition the land is adjacent to the eastern bank of Parteen Basin and could be prone to flooding which would restrict its use, but none the less is suitable for agricultural production. The land is currently planted in forestry. The land quality is considered to be medium quality land.

Crop Rotation Practised

The land is planted in forestry which is a long term crop. Crop rotation is not practised.

Overall Impact

It is deemed that the overall impact of the location of an abstraction facility within the site identified would be low.

(ix) People

The site is located approximately 430m west of the R494, adjacent to Fort Henry Demesne and within a considerable forest amenity. There is possible disruption to the visual amenity of the demesne particularly to the north of the proposed site as a possible access road could be located here. The site is a considerable distance away from residential receptors (325m).

(x) Soils, Geology and Hydrogeology

The site has been mapped⁶ as shallow well drained, mineral soil, derived mainly from calcareous parent materials and (BminSW). A site visit and site investigation was undertaken in June 2016. Soils comprised of firm, moist, yellow brown, sandy gravelly Silt/Clay with occasional coarse sandstone boulders and cobbles. A large excavation runs north south, possibly a former borrow pit utilised in the construction of Parteen Basin and its embankments. The pit is approximately 100m wide and 0.6 km long and marked on the 25" OSI maps. The extensive afforestation indicates the borrow pit has not operated for a significant period of time. The western pit face is approximately 3m high and >6m high on the eastern bank. The site is considered to have low to moderate potential for encountering soil contamination. In the base of the borrow pit, shallow areas of alluvial/organic soils are present indicating some restricted drainage issues or occasional flooding of the borrow pit area. The depth of organic soil is <0.3m.

Along Parteen Basin foreshore, a 0.5m to 2m wave cut bank is present. The land rises steeply to the east away from the borrow pit. The vulnerability for the site is classified as 'extreme' vulnerability based on the GSI data, however no bedrock exposure was recorded in the drainage ditches or in the former borrow pit.

The bedrock map indicates that it is underlain by Dinantian Lower Impure Limestones. No outcrops of these rocks were encountered within the site or in drainage ditches. There are no geological heritage sites or source protection zones located within 1 km of RWA Site 4; and there are no active quarries or pits on or immediately adjacent to the site.

(xi) Planning Policy

Land Use Zoning

The site is located within the functional area of Tipperary County Council. The lands are currently unzoned.

Local objectives

There are no specific local objectives for the site.

Overview of Potential Planning Issues

The site is located in an area of unzoned lands. There are no specific local objectives pertaining to the site itself or within the immediate vicinity of the site. The site is located outside of the environs of the settlements in the area; care must be taken with any potential siting of any infrastructure within this site.

⁶ Information regarding the soil classifications was obtained from the EPA web-mapping site, containing soil information from the Teagasc/EPA soil & subsoil mapping project.

(xii) Traffic, Engineering and Design

The site is accessed via a series of regional routes with connectivity to the M7 Motorway to the south. Access to and from the M7 Motorway can be facilitated via junction 27 (Birdhill Junction) to the R445 (former N7 National route) and then onto the R494. Travel distance from the M7 Motorway is approximately 4km.

The R494 regional route comprises a carriageway cross section of two 3.0m wide traffic lanes with no hard shoulders/strips. Pavement and road marking conditions along the R494 regional road are poor with evidence of pavement degradation in the form of surface cracks.

Access is likely to be situated opposite an existing domestic property access, within the existing 80km/h rural speed limit zone.

The Road Safety Authorities Collision Statistics database has recorded three number minor collisions (2 in 2007 and 1 in 2005) within the vicinity of the proposed access.

8. RWA Sites – MCA Comparison

(i) Ecology

All four potential Raw Water Abstraction Sites are partially within the Lower River Shannon SAC site boundary and would require construction works within the designation. The potential for significant impacts affecting ecological receptors is evaluated as ranging from ‘very high’ to ‘very low’ for all four sites. The two sites on the western shore of Parteen Basin (RWA Site 1 and RWA Site 2) are located within extensively managed agricultural grassland. Selection of these sites would, however, require the construction of a raw water pipeline, tunnelled under Parteen basin, resulting in additional works within the SAC. For this reason the sites on the western shore of the lake are considered to be more constrained than those on the eastern shore.

The RWA Site 3 is considered least constrained from an Ecology Perspective as it is located within and connected to lower value terrestrial habitats. The construction and operational access at this site is preferable, where the potential for significant effects on the Lower River Shannon SAC are evaluated as broadly equal between RWA Site 3 and RWA Site 4.

(ii) Aquatic Ecology

All potential raw water abstraction sites are partially within the Lower River Shannon SAC site boundary and would require construction works within the designation. However, RWA Site 1 and RWA Site 2 would require a pipeline to be tunnelled under Parteen Basin from the western shore to the east, resulting in increased potential for significant impacts on the aquatic ecology within the SAC. The potential for significant impacts on coastal and marine aquatic ecological receptors is identified as ‘very low’. All sites are evaluated as equal in terms of potential for significant effects on fisheries and anadromous species. The potential for significant impacts affecting aquatic ecological receptors is evaluated as ranging from ‘very high’ to ‘very low’ for all four sites. The RWA Sites 3 and 4 are evaluated as equal in terms of potential for significant effects on aquatic ecological receptors. These sites are, however, less constrained compared to the sites on the western shore.

(iii) Surface Water

The table below summarises the key constraints for the site locations within the abstraction areas near Parteen Basin:

Table 8-1 Comparison of RWA Sites - Surface Water Constraints

Study Area	Rivers/ Streams	Lakes	WFD good or higher status	Drinking water	Shellfish Area	Recreational Waters	Nutrient Sensitive	CSAC & SPA
RWA 1		√√	√√	√√			√√	√√
RWA 1		√√	√√	√√			√√	√√
RWA 3		√√	√√	√√			√√	√√
RWA 4		√√	√√	√√			√√	√√

√ - Within close proximity

√√ - Within location

All the site locations that were subject to this surface water assessment were found to be highly constrained. Of all the locations, the two western shoreline options are considered to be the most constrained as any Raw Water Abstraction Facility located on the western shoreline will require further infrastructure to bring the resource back to the eastern shoreline and interconnect with the transmission pipeline resulting in potential for further impacts.

However, with regard to the foregoing, the RWA Site 4 was considered the least constrained of the four sites from a surface water perspective.

(iv) Air Quality

With regards to air quality, the potential sites are equal in terms of their air quality zone, prevailing wind direction and proximity to intensive agriculture and waste licence facilities. It is expected that there will be no significant air quality and climate impacts during the operational phase of the raw water abstraction. The main potential for air quality impacts arise from dust emissions during the construction phase of the proposed development. Construction dust has the potential to cause local impacts through dust nuisance at the nearest houses. Construction activities such as excavation, earth moving and backfilling may generate quantities of dust, particularly in dry and windy weather conditions. While dust from construction activities tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. As a result, the main differentiating criteria applied were the distance of the proposed location to nearby sensitive receptors. Considering this, RWA Site 3 is the preferred location from an air quality perspective as it is at a greater distance from nearby sensitive receptors.

(v) Noise

With regards to noise, RWA Site 3 is least constrained from a noise/vibration point of view as it is at the greatest distance from nearby residential and non-residential receptors. However, it is considered that all of the site options could be feasible, without generating noise/vibration at nuisance levels, with the provision of suitable construction/operational phase noise/vibration mitigation measures.

(vi) Cultural Heritage

All of the sites are very similar when viewed initially. There are no recorded archaeological sites located within the vicinity of the sites and only one protected structure is located in the wider environment (over 700m north of RWA 4). However, the two sites on the western side of Parteen Basin will require pipelines to transport water to the eastern bank. This will require a large construction effort, which in turn has a greater potential to impact on previously unrecorded sites of significance. As such, these sites are the least preferred. Of the two sites on the eastern shore of the lake, RWA 3 is preferable from an archaeological, architectural and cultural heritage perspective as it is well screened and, unlike RWA 4, it does not abut the demesne landscape associated with Fort Henry. Fort Henry itself is a protected structure and whilst the demesne has been impacted upon by modern planting, it retains some of its original characteristics.

(vii) Landscape and Visual

With regard to landscape designations in the relevant county development plans, there is little to differentiate the four RWA sites as they are all contained within sensitive landscape units. In the case of the Clare County Development plan 2011-2017, the western shore of Parteen Basin (RWA 1 and RWA 2) is contained within a 'heritage landscape' designation. The heritage landscape designation is used to differentiate sensitive landscape areas of the county from less sensitive areas. As part of the preparation of a consolidated Tipperary County Development Plan, the 2010 North Tipperary Development Plan remains in force, but is referred to as the North Tipperary County Development Plan (2010 as varied). An updated Landscape Character Assessment has been prepared for Tipperary as part of this process and this is currently in draft form. Whereas, the previous landscape character assessment did not attribute specific sensitivity ratings to particular landscape units, the draft document identifies that RWA 3 and RWA 4 are contained within 'LCA12, River Shannon – Newport', which in turn is contained within the 'Lakeland Enclosure' landscape type. This unit has been attributed 'class 4'

sensitivity, which is the second highest rating of 6 possible categories and is described as having “very low capacity for change without detriment”.

The main differentiation between the RWA sites in relation to potential landscape impacts is that the RWA 4 site would divide and, therefore fragment, existing, mature riparian woodland. The nearby RWA 3 site would only affect the tapering southern end of this woodland where it meets the constructed eastern embankment of Parteen basin. By comparison, the two sites on the western side of the lake (RWA 1 and RWA 2) are both contained within fairly typical farmland. The RWA 4 site is also immediately adjacent to the southern end of a designed demesne landscape, whereas its other eastern bank counterpart (RWA 3) is buffered from this heritage feature by woodland and forest.

In terms of visual impacts, the two western bank options (RWA 1 and RWA 2) are contained just below a designated scenic route from the Clare County Development Plan relating to views of Parteen Basin from the R463. Whilst this would suggest that these two infrastructure sites may block important views of the lake, in reality there are few clear views of the water body from the designated section of road and the sites in question lie well below the road elevation. Nonetheless, there is some potential for the taller elements of the proposed infrastructure to partially obstruct views towards the lake. Though the eastern bank option (RWA3 and RWA 4) may also be visible from certain sections of the road, they will be seen at a much smaller scale and would not obstruct these views. The western bank options may also partially obstruct views towards the reservoir from a number of dwellings that line a local road further uphill to the west of the R463, though to a very minor degree. Again, the eastern bank options will also be visible but at a greater distance and without causing a visual obstruction.

The eastern bank options (RWA 3 and RWA 4) will be potentially visible from dwellings on the upper slopes of the popular tourist settlement of Ballina approximately 2km to the north and also from roads and dwellings on the slopes above the opposite (western) side of Parteen Basin. They will also be visible from a small waterside amenity area associated with the larger Clarisford Park recreational area, which lies to the south of Killaloe. By comparison, the western bank options (RWA 1 and RWA 2) will not be visible from Killaloe/ Ballina or from Clarisford Park amenity area.

On balance it is considered that the least constrained Raw Water Abstraction site is RWA 3 on the eastern bank of Parteen Basin. It is understood that in the case of one of the western bank options being selected as the least constrained site, there would still need to be some reception infrastructure near the eastern bank at the commencement of the eastward bound pipeline corridor. Though this did not sway the decision making in this instance, it does reinforce the selection of an eastern bank option on the basis that there will be a need for less infrastructure overall and there will be less dispersal of landscape and visual impacts.

(viii) Agronomy

From an Agricultural perspective the four potential abstraction sites have broadly similar characteristics. A desktop study of each of the potential sites has been carried out for the purpose of establishing the least constrained abstraction location.

The study was carried out having regard to agricultural practices within the identified sites. Individual farm studies were not conducted. A roadside inspection of the sites was undertaken. The four sites outlined above have similar land quality and farming patterns. However RWA Site 2 is most constrained in terms of land use and land quality. RWA Site 1 is least constrained in terms of intensity of use; and RWA Sites 3 and 4 are currently planted in forestry.

From an agronomy point of view there is no significant difference between any of the sites.

It is concluded that the overall impact at any location would be low at farm level and local level and would be slight at national level.

(ix) People

In respect of the Shannon abstraction options, there is a strong sense of lakeside tranquillity and amenity at the four separate proposed abstraction sites. The tourism industry is quite limited in the area of Parteen Basin. Due to the operating regime of Parteen Basin by the ESB it already experiences substantial and unnatural fluctuating levels of water making it unsuitable for water-based activities such as water sports, fishing and, to a certain extent, boating.

From the MCA it is clear that the proposed abstraction sites on the western shoreline (RWA Site 1 & RWA Site 2) of Parteen Basin are more constrained than the sites on the eastern shoreline (RWA Site 3 & RWA Site 4) due to the proximity of residential receptors. There are approximately 27 residential receptors in close proximity to the sites on the western shore, and this determined its unsuitability as a location for the necessary Raw Water Abstraction Facility.

The proposed site locations on the eastern shoreline of Parteen Basin are more suitable due to the fact that they are located a considerable distance away from residential and commercial receptors (there are no sensitive receptors close to any of the proposed abstraction sites). Both sites are located in extensive woodland and therefore the forest amenity would have to be disturbed during the construction phase, although it is expected that there would be sufficient forest remaining to provide a good level of screening of the facility, thereby mitigating any impact on visual amenity.

From this assessment, it is determined that RWA Site 3 would be the least constrained site for the Raw Water Abstraction Facility due to its distance from residential receptors and its position within agricultural land and woodland.

(x) Soils, Geology and Hydrogeology

No significant geological or hydrogeological constraints were identified; the underlying aquifers in this area are described as poor to locally important aquifers.

Although there is potential for areas of High Vulnerability to be encountered during the construction phase where depth to bedrock is shallow, best practice construction methodologies will mitigate this impact. The potential for encountering shallow bedrock is described as moderate for sites RWA Site 3 and RWA Site 4 on the eastern shore and low for sites on the western shore (RWA Site 1 and RWA Site 2).

Small areas of peat and lacustrine deposits were encountered on sites RWA Site 1 and RWA Site 2 and there is therefore a high potential that soft ground will be encountered on these sites. It is unlikely, based on site walkovers, that soft ground will be encountered in the sites to the west of Parteen Basin.

There are no geological heritage sites located at or within 1 km of any of the four RWA sites. Three RWA sites are located on green field sites with low potential for encountering soil contamination. Some excavation appears to have taken place at RWA Site 4, probably associated with the construction of the embankments that form part of the lake's eastern shore. The RWA Site 4 is a former borrow pit with low to moderate potential for encountering soil contamination. There is a negligible potential of sterilisation of mineral resources at all RWA locations.

The RWA Site 3 and RWA Site 4 on the eastern shore of the Parteen Basin are preferred to the sites on the western shore (RWA Site 1 and RWA Site 2), mainly because of the additional excavation work that would be required for the proposed pipeline to be tunnelled under the lake. The RWA Site 3 is slightly more preferred than RWA Site 4 in terms of the potential for significant impacts on soils, geology and hydrogeology, as RWA Site 4 appears to have been previously excavated.

(xi) Planning Policy

All four sites are located outside of the nearest settlements of Killaloe (RWA Site 1 and RWA Site 2) and Birdhill (RWA Site 3 and RWA Site 4). Thus there are no specific zonings associated with these locations. Overall the

general County Development Plan policies and objectives will apply to areas which are ‘unzoned’, or not subject to Municipal District Plans or Settlement Plans.

The proximity of the four sites to the nearby settlements of Killaloe and Birdhill was reviewed. In both instances the settlements are located in excess of 1.5km and 2.5km of the chosen sites. The potential impact of the proposed development on these settlements is considered to be low. Rural housing is present in proximity to all four locations, in particular to RWA Site 1 and RWA Site 2. This will need to be considered in the final siting of the plant within the chosen location.

In Planning policy terms, there is little to distinguish one site from the other.

(xii) Traffic, Engineering and Design

The RWA Site 3 and RWA Site 4 on the eastern shore of Parteen Basin are less constrained compared to the sites on the western shore, due mainly to the difficulty in access to the western shore sites for both construction and operational traffic. Of the two eastern shore sites, there is little to differentiate between them from a traffic point of view.

8.1 Least Constrained Site

A summary comparison of the four RWA site locations is presented in Table 8-2.

Table 8-2 – MCA – Comparison between RWA Sites

Constraint	RWA Site 1	RWA Site 2	RWA Site 3	RWA Site 4
Ecology				
Surface Water				
Air Quality				
Noise				
Cultural Heritage				
Landscape and Visual				
Agronomy				
People				
Soils, Geology & Hydrogeology				
Planning Policy				
Traffic				
Engineering & Design				
Overall Ranking	4	3	1	2

With reference to the appraisal criteria presented in Table 8-2Table 1-2, where the sites are ranked in order of preference and least constraint, RWA Site 3 represents the preferred location for the siting of a raw water abstraction facility for the following reasons:

- RWA Site 1 and 2 require additional pipeline construction through Parteen Basin which will incur higher potential for ecological/archaeological and technical constraints; while haulage routes to the M7 during construction would be forced through residential, commercial and industrial developments in Limerick city.
- RWA Site 4 is located within a wetter woodland broadly corresponding to the priority Annex I habitat, 'Alluvial forest'.
- RWA site 3 is well screened, south of the Fort Henry demesne lands and provides no obstruction to views of Parteen Basin from the western bank.

