Tionscadal Soláthair Uisce
Water Supply Project

Uisce Éireann

Compulsory Purchase Order 2025

Water Supply Project Eastern and Midlands Region

Compulsory Purchase Order Routing Report

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Uisce Éireann
Irish Water

Jacobs

TOBIN

Contents

Appendices

Acronyms and Abbreviations

Acronym	Meaning
BPS	Booster Pumping Station
BPT	Break Pressure Tank
CPO	Compulsory Purchase Order
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
ESB	Electricity Supply Board
FCV	Flow Control Valve
FOAR	Final Options Appraisal Report
GDAWRZ	Greater Dublin Area Water Resource Zone
HGV	Heavy Goods Vehicle
km	Kilometres
LLO	Landowner Liaison Officer
m	Metres
mAOD	metres Above Ordnance Datum
MCA	Multi-Criteria Analysis
Mld	Million litres per day
NHA	Natural Heritage Areas
New Shannon Source	New Shannon Source
NWRP	National Water Resources Plan
OWP	Options Working Paper
pNHA	Proposed Natural Heritage Area
PNR	Project Need Report
POAR	Preliminary Options Appraisal Report
RMP	Record of Monuments and Place
RWI&PS	Raw Water Intake & Pumping Station
RWRM	Raw Water Rising Main
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
S.I.	Statutory Instrument
SPA	Special Protection Area
TPR	Termination Point Reservoir
WTP	Water Treatment Plant

1. Introduction

1.1 Overview

1. The Water Supply Project: Eastern and Midlands Region (hereafter referred to as the Proposed Project) would comprise a water supply pipeline with the abstraction and pumping of raw water from the Lower River Shannon at the Parteen Basin; treatment of the water nearby at Birdhill, County Tipperary; and pumping of the treated water to a high point near Cloughjordan, County Tipperary and on through the Midlands to a termination point at Peamount, in County Dublin (within the administrative area of South Dublin County Council), where it would connect into the existing Greater Dublin Area Water Resource Zone (GDA WRZ) network.

2. The Proposed Project has been developed to deliver a long-term, sustainable and resilient water supply for the Eastern and Midlands Region, to meet the water demand from residential, commercial and industrial development to the year 2050 and beyond. The Proposed Project infrastructure would have the capacity to deliver water to meet the projected peak deficit of 280 million litres per day (Mld) of treated water in 2050, as set out in the Regional Water Resources Plan – Eastern and Midlands (the Eastern and Midlands Plan) (Irish Water 2022). A raw water abstraction consent of 300Mld is being sought to cover the operational requirements of providing up to 280Mld of treated water in 2050, with a provision of a further 20Mld to allow for potential future sustainability reductions from existing supply volumes. Although the peak output would be 300Mld under normal conditions the Proposed Project would provide a treated water supply of typically 154Mld.

3. In total the pipeline would be approximately 172km in length and would be supported by six permanent Infrastructure Sites, of varying sizes and purposes. The pipeline would traverse the administrative areas of Tipperary County Council, Offaly County Council, Kildare County Council and South Dublin County Council. In, addition, the works needed to provide power to two of the Infrastructure Sites (referred to as the 38kV Uprate Works) would cross Clare County Council, Limerick City and County Council, (as well as Tipperary). Therefore, six Local Authorities are partly within the Planning Application Boundary.

4. The Proposed Project would be constructed and operated within predominantly open countryside and has been designed to, generally, avoid towns and villages. Farming is the primary land use along the route and the Proposed Project would cross over 400 agricultural landholdings.

5. The Proposed Project would consist of the following main features:

    - Abstraction of raw water from Parteen Basin on the Lower River Shannon downstream of Lough Derg and the towns of Ballina and Killaloe
    - A Raw Water Intake and Pumping Station (RWI&PS) on the eastern shore of Parteen Basin would facilitate a maximum abstraction of up to 300Mld, during peak demand periods from the Lower River Shannon, downstream of Lough Derg
    - Two steel pipelines, approximately 2km in length, and each 1,500mm in diameter, referred to as the Raw Water Rising Mains (RWRMs). These would transfer raw water from the RWI&PS to a Water Treatment Plant (WTP) near Birdhill, County Tipperary and each pipe would be capable of transferring raw water up to a maximum throughput of 300Mld
    - The WTP would provide the infrastructure needed to clean the water to drinking standards and the capacity to pump the water through the Treated Water Pipeline
    - Approximately 170km of 1,600mm diameter single steel pipeline, comprising:
        - A Treated Water Pipeline from the WTP to a Break Pressure Tank (BPT) near Cloughjordan, County Tipperary, approximately 37km long

- A Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR) at Peamount, County Dublin, approximately 133km in length.[1]

- The TPR would have a capacity of 75 megalitres (Ml) and would provide the location for the Proposed Project to connect into the existing drinking water network
- Pipeline infrastructure including a Break Pressure Tank (BPT) near Cloughjordan, County Tipperary; a Booster Pumping Station (BPS) east of Birr, County Offaly; and a Flow Control Valve (FCV) south of Newtown in County Kildare, approximately 5km west of the TPR
- Operational ancillary infrastructure at frequent intervals along the length of the pipeline including Line Valves, Air Valves, water discharge points (referred to as "Washouts"), access points (referred to as Manways), parking Lay-Bys for maintenance access and power connections to the Line Valves
- Power connections to the Infrastructure Sites[2] and Line Valves, including uprating of the existing Ardnacrusha – Birdhill 38 kilovolt (kV) overhead line to deliver adequate electrical power to the RWI&PS and WTP and providing a new connection from a sub-station at Birr to the BPS.

6. In addition, to this infrastructure, provision has been made for take-off points at strategic locations between the WTP and TPR. These would facilitate future potential connections to supply communities in the Midlands within the Water Supply Area[3] without disruption to the operation of the pipeline. The location of these future potential connections align with the Eastern and Midlands Plan (Irish Water 2022). The connecting pipelines and associated infrastructure would be delivered by Uisce Éireann through separate projects, yet to be designed, and would be subject to their own separate consenting processes.

7. The summary of the Proposed Project in this report includes the entirety of the works that are the subject of the Strategic Infrastructure Development planning application. However, it should be noted that powers for compulsory acquisition of land are not being sought for works associated with the provision of powers connections including:

   - 38 kV Uprate Works to supply power to two infrastructure sites (Raw Water Intake and Pumping Station and the Water Treatment Plant)
   - The power connection for the Booster Pumping Station
   - The power connections to each of the Lines Valves
   - Overhead line diversions and connections at Infrastructure Sites, Construction Compounds and Pipe Storage Depots

8. It is intended that these works would be delivered by ESBN on behalf of Uisce Éireann. The lands associated with the 38kV uprate works comprise of existing infrastructure and therefore will be subject to existing wayleaves. Where any additional lands are required to facilities new connections, these will be delivered in accordance with ESBN's existing acquisition powers.

9. This report distinguishes between different stages of the development of the project by adopting the following terminology: 'Previous iterations of the project' refers to the In-Flight Water Supply Project developed prior to the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The 'Proposed Project' refers to the project that planning permission is being sought for and that has taken account of the conclusions of the National Water Resources Plan (Irish Water 2021 and 2022) including Eastern and Midlands Plan (Irish Water

[1] A combination of pumping and gravity would be used to transfer water through the pipeline. Water would be pumped from the RWI&PS to the WTP and from the WTP to the BPT which is the high point along the pipeline. From the BPT, the water would usually flow by gravity along the remaining 133km to the TPR. However, at times when the volume of water needed is higher than approximately 165Mld, the water would be pumped through the whole length of the pipeline. The BPS provides the capacity to do this additional pumping when it is required.
[2] Infrastructure sites' is the collective term that has been used for the RWI&PS, WTP, BPT, BPS, FCV and TPR.
[3] The Water Supply Area is an area defined by the infrastructure and transfer pipeline, where the proximity of treated water supplies from the Proposed Project offers opportunities for potential future consolidation of existing smaller and more vulnerable public water supply schemes, in a resilient, well-supported configuration. Potential future connecting infrastructure would be subject to separate consenting processes.

2022). The Proposed Project aligns with the Preferred Approach for the Eastern and Midlands Region, a New Shannon Source with transfers as set out in the Eastern and Midlands Plan (Irish Water 2022).

10. This report is supported by the following appendices:
    - Appendix A: Cumulative Constraints with White Space Boundary
    - Appendix B: Least Constrained Route Corridor and Preliminary 200m Pipeline Corridor
    - Appendix C: Preliminary 200m Pipeline Corridor and Preferred 200m Pipeline Corridor
    - Appendix D: Preferred 200m Pipeline Corridor and Indicative 50m Pipeline Corridor
    - Appendix E: Re-route Request Mapbook.

1.2 Purpose and Content of this Report

11. The purpose of this report is to support the making of the proposed Uisce Éireann Compulsory Purchase Order, 2025 (Water Supply Project Eastern and Midlands).

12. The Order is required for the purposes of Uisce Éireann advancing the Water Supply Project – Eastern and Midlands ("the Proposed Project") which is included in the RC3 Capital Investment Plan 2020 to 2024.

13. This report provides the reasons for the location of the proposed infrastructure and consequently the need for land in those locations. This complements the CPO Engineer's Report (Jacobs, 2025) which explains why the infrastructure is the extent that it is and therefore, the extent of the land required in those locations.

14. As a result this report describes the process of detailed route selection employed to define a pipeline corridor of typically 50m between the RWI&PS at Parteen Basin, County Tipperary, and the TPR at Peamount, County Dublin, which covers the RWRM and the Treated Water Pipeline. It summarises the development of the pipeline corridor, which was presented during the various non-statutory consultation processes undertaken on previous iterations of the project, described in Section 4 of this report, and updates it to cover the intervening period from November 2016.

15. This report describes the iterative process, from the initial stage where the concept of 'White Space' areas, i.e. unconstrained areas, was introduced, through subsequent refinement, to the horizontal alignment defined by a 50m Construction Working Width. These stages are shown geographically in the figures contained within Appendices A - D. Following detailed mapping of existing constraints, the 'White Space' areas were identified within which infrastructure could be best positioned to help mitigate the impact of the project. This topic is discussed further in Section 4 of this report. Further, Appendix E sets out the ongoing consultation, and design development, continues to influence the route of the '50m Pipeline Corridor'.

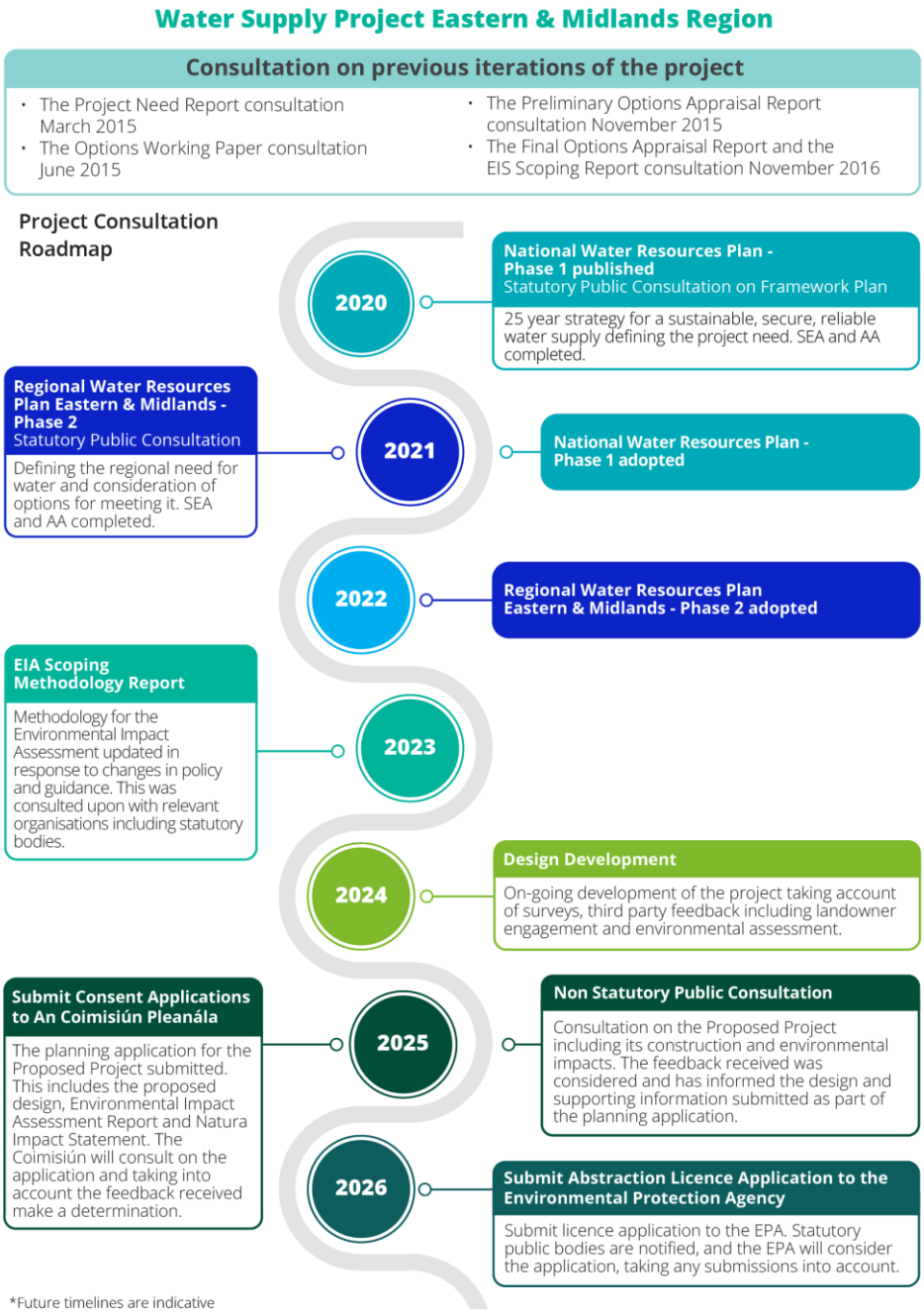
16. This report also sets out the reasons for selecting the location of the Infrastructure Sites and Construction Compounds along the route of the pipeline.

17. Unless indicated otherwise, this report relies on and adopts the content of the Compulsory Purchase Order Engineering Report ("the CPO Engineering Report") (JacobsTobin, 2025) and the Compulsory Purchase Order Planning Report ("the CPO Planning Report") (Tom Phillips Associates, 2025), both dated December 2025.

1.3 Background of the Proposed Project

1.3.1 Project History

18. The development of the Proposed Project has been the result of an iterative process, over an extended period. The reasonable options to deliver a long-term sustainable water supply source, for the Dublin



Region and the wider Eastern and Midlands Region, were examined through the Eastern and Midlands Plan (Irish Water 2022) to meet long-term water demand from residential and commercial development. This demand is described in the CPO Engineer's Report (Jacobs Tobin 2025). Image 1.1 summarises the history of the project.

Image 1.1: Project Roadmap

1.3.2 National Water Resources Plan

19. The National Water Resources Plan (Irish Water 2021 and 2022) sets out how Uisce Éireann will balance the supply and demand for drinking water over the short, medium and long term. The 25-year strategy aims to ensure the supply of safe, sustainable, secure and reliable drinking water in Ireland.

20. The National Water Resources Plan (Irish Water 2021 and 2022) consists of:

    - Phase 1: the National Water Resources Plan Framework Plan (the 'Framework Plan') (Irish Water 2021) which set out the approach to identifying water supply needs and quantifying those needs up to the year 2044 which, following public consultation, was finalised and adopted in Spring 2021
    - Phase 2: comprising the development of four Regional Water Resources Plans to identify the optimal technical solutions (the 'Preferred Approaches') required to address the needs outlined in the Framework Plan (Irish Water 2021).

21. The Framework Plan (Irish Water 2021) identifies how Uisce Éireann assesses needs across water supplies and the process Uisce Éireann will use to find solutions to address those needs.

22. The Framework Plan (Irish Water 2021) identified, at a national level, that a new sustainable source of water is necessary to augment supplies in the Eastern and Midlands Region to address deficits in supply, increase the reliability of the current water supply system, and support future growth now and into the future.

23. The Eastern and Midlands Plan (Irish Water 2022) is the Regional Water Resources Plan relevant to the Proposed Project. The Eastern and Midlands Plan (Irish Water 2022) was adopted by Uisce Éireann in Autumn 2022 following public consultation, and applied the methodologies set out in the National Water Resources Plan Framework Plan (Irish Water 2021) to identify the water supply needs of the Eastern and Midlands region and develop the preferred approaches to resolve them.

24. The Eastern and Midlands Plan (Irish Water 2022) identified that a New Shannon Source with transfers was the Preferred Approach to address the need of the GDA WRZ. Having identified the New Shannon Source as the Preferred Approach to meet the deficit in the GDA WRZ, the Eastern and Midlands Plan (Irish Water 2022) identified a 'Water Supply Area' consisting of additional WRZs along the length of the pipeline and also adjacent to the GDA WRZ which had a deficit that could also be met from the New Shannon Source.

25. This establishes the need for the Proposed Project as it in would deliver a New Shannon Source to meet the deficit in the GDA WRZ and provide potential future connection points along its length allowing for potential future connections into 18 other WRZs in the Eastern and Midlands Region. This would allow those 18 WRZs to be consolidated into four new WRZs. It would also facilitate the potential future supply to 17 other WRZs adjacent to the GDA WRZ through the re-distribution of supply within the GDA WRZ and an expansion of the GDA WRZ by incorporating these WRZs into the GDA Regional WRZ. As a result, the Proposed Project is a significant step towards delivering the Preferred Approach set out the Eastern and Midlands Plan (Irish Water 2022) (see the CPO Engineer's Report (Jacobs Tobin, 2025) for further information).

1.3.3 Previous Iterations of the Project

26. The emergence of a long term solution to the water supply needs of Dublin and surrounding areas has been underway since the mid-1990s, originally under Dublin City Council acting on behalf of the four Dublin local authorities along with Kildare and Wicklow County Councils. The development of previous iterations of the project to deliver water to Dublin from the River Shannon were the result of a design process, over an extended period, which examined the options that existed at the time to deliver a long-

term sustainable water supply source, initially for the Dublin Region and latterly for the Dublin Region and an additional Benefiting Corridor.

27. An initial Strategic Environmental Assessment (SEA) (Phase 1) was published in 2006, (Dublin City Council 2006) following a Feasibility Study of three water supply options which commenced in 2004, as part of 'The Plan – Water Supply Project Dublin Region' (Dublin City Council 2008). Feasibility Studies on 10 options were completed in 2007/08, in conjunction with the Plan ('The Plan – Water Supply Project Dublin Region') (Dublin City Council 2008) and SEA (Phase 2) process.

28. On taking responsibility for the project, but prior to the development of the National Water Resources Plan (Irish Water 2021 and 2022), Uisce Éireann carried out four key stages of assessment and four non-statutory public consultation processes between 2015 and 2017. In addition to the consultations, the technical and environmental assessments, ground investigations and computer modelling simulations, were also used to identify a preferred scheme for a new water supply for the Eastern and Midlands Region.

29. The consultations were undertaken on the Project Need Report – February 2015 (PNR) (Irish Water 2015a), Options Working Paper – June 2015 (OWP) (Irish Water 2015b), Preliminary Options Appraisal Report – November 2015 (POAR) (Irish Water 2015c), and Final Options Appraisal Report – November 2016 (FOAR) / Environmental Impact Statement – Scoping Report[4] (Irish Water 2016).

30. Table 1. summarises the timeline in the development of previous iterations of the project.

31. The final preferred option, prior to the Eastern and Midlands Plan (Irish Water 2022) was set out in the FOAR (Irish Water 2016).

Table 1.1: Timeline for Previous Iterations of the Project

Stage	Date	Description
'The Plan – Water Supply Project Dublin Region' Draft (Dublin City Council 2006)	2006	An initial SEA (Phase 1) was published in 2006, following a Feasibility Study of three water supply options which commenced in 2004. The three options comprised: • Liffey / Barrow Conjunctive Use • Lough Ree on the River Shannon • Desalination in North County Dublin.
'The Plan – Water Supply Project Dublin Region' Final (Dublin City Council 2008)	2008	Feasibility Studies on the ten options were completed in 2007/08, in conjunction with the Plan ('The Plan – Water Supply Project Dublin Region') and SEA (Phase 2) process which commenced in early 2008. The SEA (Phase 2) and Appropriate Assessment (AA) processes were carried out in respect of The Plan, thus ensuring that consultation and the environmental significance of the ten options were considered and informed certain changes to the Plan.
Project Need Report (PNR) (Irish Water 2015a)	February 2015	The PNR confirmed the need for a new water supply source for the Dublin Water Supply Zone and a Benefiting Corridor[5], based on demographic projections, economic assessment of water supply in the regional and national economy, water demand projections and on considerations of resilience of supply.
Options Working Paper (OWP) (Irish Water 2015b)	June 2015	The ten water supply options, initially considered in The Plan, and subject to SEA and AA, were subsequently reviewed in the OWP. It determined that four of the options identified in The Plan, were technically viable and therefore appropriate to be brought forward for further consideration.

[4] The FOAR and Environmental Impact Statement – Scoping Report were incorporated into a single public consultation.

[5] The Benefiting Corridor was an area defined by the infrastructure and transfer pipeline, where the proximity of treated water supplies from the in-flight project offered opportunities for future consolidation of existing smaller and more vulnerable public water supply schemes, in a resilient, well-supported configuration. Future connecting infrastructure would be subject to separate consenting processes. This has subsequently been replaced by the Water Supply Area as set out in Section 3.4.

Stage	Date	Description
Preliminary Options Appraisal Report (POAR) (Irish Water 2015c)	November 2015	The POAR set out the detail of the assessment process for the four technically viable options and considered and evaluated them, taking into account preliminary results of investigative surveys and modelling at the time, which had been continuing over the interim period. This consultative assessment was done to identify an Emerging Preferred Option from the four water supply options determined as technically viable in the OWP. The consultative assessment incorporated: • A review of the submissions from the public consultation on the OWP • Investigative studies recommended by the SEA, including a water quality survey and model of Lough Derg and a full geophysical survey of the soil and bedrock conditions at the potential raw water storage site at Garryhinch, County Offaly • A multi-criteria analysis (MCA) of each of the options, based on published criteria reviewed following consultation. The POAR determined that, following investigative surveys, options involving abstraction from the north-east quadrant of Lough Derg, (Option B and F2) did not meet environmental and technical requirements.
Final Options Appraisal Report (FOAR) (Irish Water 2016)	November 2016	The FOAR examined the two remaining options, (abstraction from the River Shannon at the Parteen Basin, and desalination of seawater at the coast in Fingal), providing more detailed assessment of the distribution of impact on residence times under a range of scenarios, and Cost Benefit Analysis of both options.

32. As part of the development of previous iterations of the project, the methodology for the initial development of pipeline route corridors was published for public consultation in the OWP in June 2015 (Irish Water 2015b). It was subsequently confirmed in the FOAR (Irish Water 2016) and is summarised in Image 1.2. This illustrates a five step approach which sought to progressively refine the pipeline route corridor from an initial, unconstrained broad search area between the abstraction point at Parteen Basin and the termination point at Peamount (Step 1), through the identification of route based on 2km wide corridors which were the least constrained (Steps 2 and 3), selection of a 200m wide preferred corridor (Step 4) to a highly refined 50m pipeline corridor (Step 5).

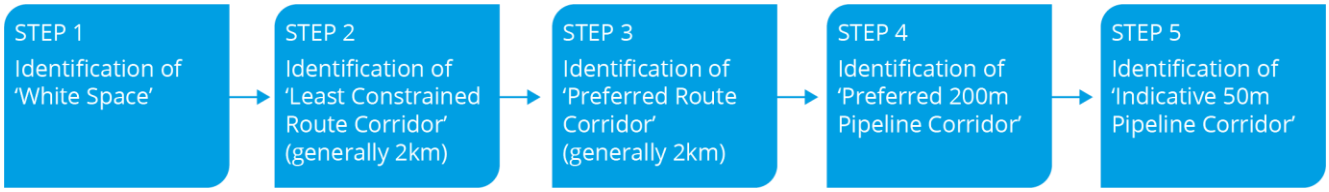


Image 1.2: Pipeline Route Selection Methodology

33. Since the completion of stage 5 further route refinement has been undertaken through direct engagement with landowners and as part of the design development.

2. Outline Description of Proposed Project

2.1 The Location of the Proposed Project

34. Image 2.1 provides an overview of the location of the Proposed Project including the principal water infrastructure and different sections of the pipeline.

35. A summary of the Proposed Project is provided in Table 2.1. The justification for the location of each of the required elements of the Proposed Project is then provided in the remaining sections of this report.

36. As set out in Section 1 although the works for power connections including specifically the 38 kV Uprate Works are described in this section powers for compulsory acquisition of land are not being sought for these works.

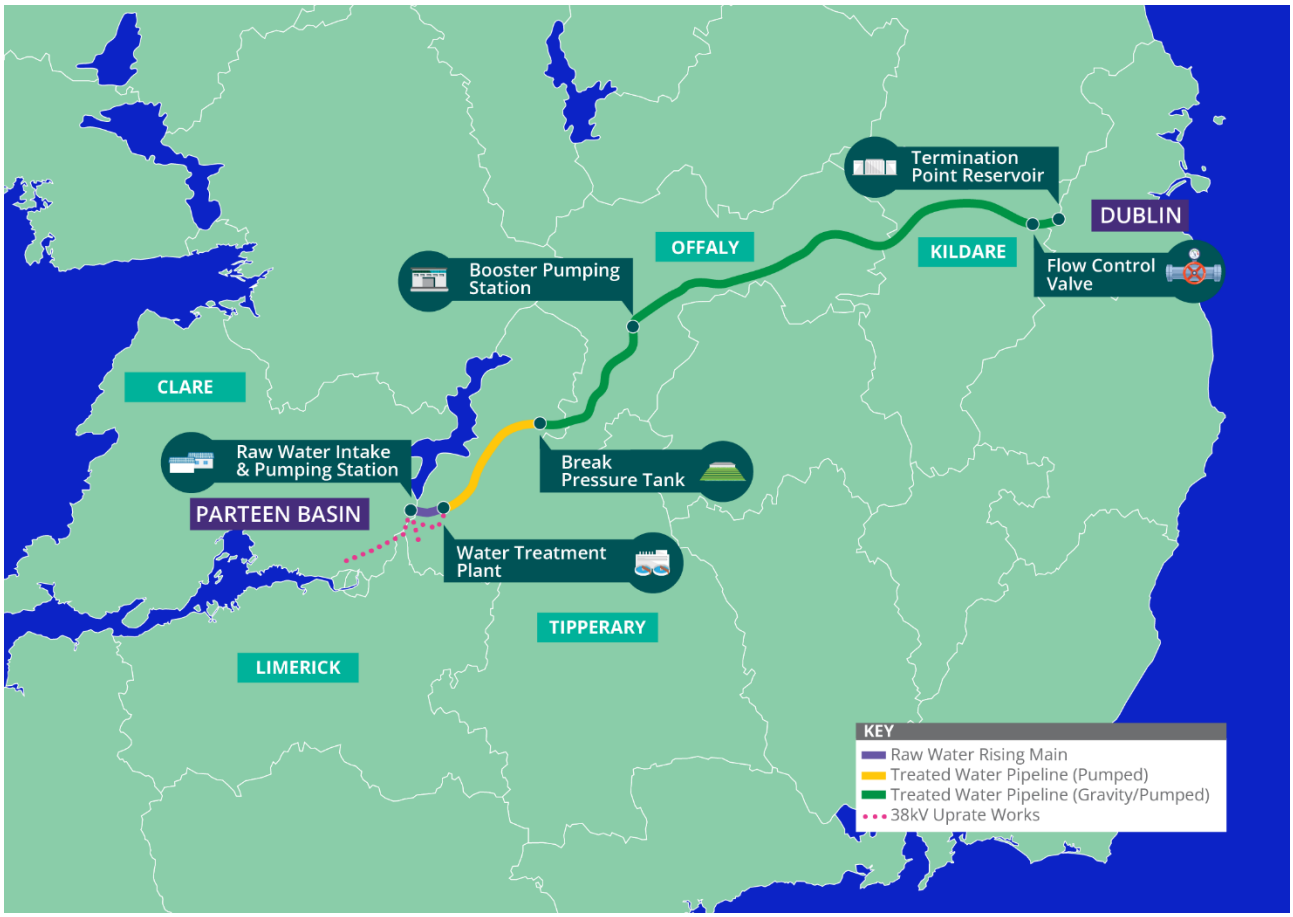


Image 2.1: Graphical Overview of Proposed Project

2.2 Principal Water Infrastructure and Pipeline Elements

37. The principal elements are summarised in Table 2.1.

Table 2.1: Outline Description of Principle Proposed Project Elements

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Permanent Infrastructure	
Raw Water Intake and Pumping Station (RWI&PS) (Infrastructure Site) County Tipperary	• The RWI&PS would be located on a permanent site of approximately 4ha on the eastern shore of Parteen Basin in the townland of Garrynatineel, County Tipperary. In addition, approximately 1ha of land would be required on a temporary basis during construction. • The RWI&PS has been designed to abstract enough raw water from the River Shannon at Parteen Basin to provide up to 300Mld of treated water by 2050. • The RWI&PS site would include a bankside Inlet Chamber, the Raw Water Pumping Station Building, two Microfiltration Buildings, an Electricity Substation and Power Distribution Building, and Dewatering Settlement Basins. The tallest building on the RWI&PS site would be the Microfiltration Buildings which would be 10.9m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power for the RWI&PS would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. • A new permanent access road from the R494 would be constructed to access the proposed RWI&PS site. This access road would be 5m in width and 670m in length. • The RWI&PS site boundary would be fenced with a stock proof fence and a 2.4m high paladin security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
Raw Water Rising Mains (RWRMs) (Pipeline) County Tipperary	• The RWRMs would consist of two 1,500mm underground pipelines made from steel that would carry the raw water approximately 2km from the RWI&PS to the Water Treatment Plant (WTP) at Incha Beg, County Tipperary. The water would be pumped from the pumping station at the RWI&PS to the WTP. • Twin RWRMs have been proposed so that one RWRM can be taken out of service for cleaning and maintenance while still providing an uninterrupted flow of raw water through the other RWRM. • The RWRMs would include Line Valves, a Lay-By, Air Valves and Cathodic Protection. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the RWRMs.
Water Treatment Plant (WTP) (Infrastructure Site) County Tipperary	• The WTP would be located on a permanent site of approximately 31ha at Incha Beg, County Tipperary, 2.6km north-east of the village of Birdhill, and 2km east of the proposed RWI&PS. In addition, approximately 2.5ha of land would be required on a temporary basis during construction. • The WTP would treat the raw water received from the RWI&PS via the RWRMs. Once treated, the High Lift Pumping Station (HLPS) would deliver the treated water onwards from the WTP to the Break Pressure Tank (BPT) at Knockanacree, County Tipperary, via the Treated Water Pipeline. • The WTP would comprise of a series of tanks and buildings including the Raw Water Balancing Tanks, Water Treatment Module Buildings, Sludge Dewatering Buildings, Sludge Storage Buildings, Clear Water Storage Tanks and HLPS, an Electricity Substation and Power Distribution Building, and the Control Building. The tallest building on the WTP site would be the Water Treatment Module Buildings which would be up to 15.6m above finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • There would also be a potential future water supply connection point at the junction between the permanent access road and the R445. • Power for the WTP would be supplied via an underground connection to the existing Birdhill 38 kV electricity substation. Solar panels would be placed on the roofs of the Chemical Dosing Manifold Building, the Water Treatment Module Buildings, Clear Water Storage Tanks and Sludge Storage Buildings, and at a number of locations on the ground to supplement the mains power supply. • A new permanent access road from the R445 would be constructed and would be 6m in width and 640m in length. • The WTP site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary. The site would be landscaped in line with the surrounding environment to reduce its visual impact.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Treated Water Pipeline from the WTP to the BPT (Pipeline) County Tipperary	• The Treated Water Pipeline from the WTP to the BPT would consist of a single 1,600mm underground steel pipeline which would be approximately 37km long. The water would be pumped through this section of the Treated Water Pipeline by the HLPS. • The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection and Lay-Bys. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
Break Pressure Tank (BPT) (Infrastructure Site) County Tipperary	• The BPT would be located on a permanent site of approximately 7ha in the townland of Knockanacree, County Tipperary. In addition, approximately 0.8ha of land would be required on a temporary basis during construction. • The BPT would be located at the highest point of the pipeline. It marks the end of the Treated Water Pipeline from the WTP to the BPT and the start of the Treated Water Pipeline from the BPT to the Termination Point Reservoir (TPR) in the townland of Loughtown Upper, at Peamount, County Dublin. It would act as a balancing tank and would be required to manage the water pressures in the entire Treated Water Pipeline during flow changes, particularly during start-up and shut-down. • The BPT site would include the BPT and a Control Building. The BPT would be a concrete tank divided into three cells covered with an earth embankment. The BPT tanks would be 5m in height and partially buried below finished ground levels. The Control Building would be 7.5m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Access to the BPT site would be via a new permanent access road from the L1064 which would be 5m wide and 794m in length. • Power for the BPT would be supplied via an underground connection from the existing overhead power line. Solar panels would be placed on the south facing side of the control building roof, on the BPT and at ground level to the south of the site to supplement the mains power supply. • The BPT site boundary would be bounded by the existing hedgerow / tree line with a 2.4m high palisade security fence around the permanent infrastructure. The site would be landscaped in line with the surrounding environment to reduce its visual impact.
Treated Water Pipeline from the BPT to the TPR (Pipeline) Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	• The Treated Water Pipeline from the BPT to the TPR would consist of a single 1,600mm underground steel pipeline, approximately 133km long. • The water would normally travel through the Treated Water Pipeline by gravity; however, flows greater than approximately 165Mld would require additional pumping from the Booster Pumping Station (BPS) in the townland of Coagh Upper, County Offaly. • The Treated Water Pipeline would include Line Valves, Washout Valves, Air Valves, Manways, Cathodic Protection, Lay-Bys and potential future connection points. • A 20m wide Permanent Wayleave would provide Uisce Éireann with operational access to the pipeline (this Wayleave has been extended to approximately 30m at some Line Valves to provide access between the Lay-Bys and Line Valves). There would be an additional 10m wide Permanent Wayleave at certain locations for operational access to smaller pipes connecting Washout Valves with permanent discharge locations.
Booster Pumping Station (BPS) (Infrastructure Site) County Offaly	• The BPS would be located on a permanent site of approximately 2.6ha in the townland of Coagh Upper, County Offaly. It would be located approximately 30km downstream from the BPT. In addition, approximately 3ha of land would be required on a temporary basis during construction. • The BPS would be required when the demand for water causes the flow through the pipeline to exceed approximately 165Mld. • The BPS site would consist of a single-storey Control Building with a basement below. It would have a finished height of 7.6m above finished ground level. There would also be a separate Electricity Substation and Power Distribution Building. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power to the BPS would be supplied from an existing 38 kV electricity substation at Birr, through cable ducting laid within the public road network. There would be ground mounted solar panels on the southern side of the BPS site to supplement the mains power supply. • The site would be accessed directly from the L3003. • The BPS site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence between 5m -12m inside the boundary. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Flow Control Valve (FCV) (Infrastructure Site) County Kildare	• The FCV controls the flows in the Treated Water Pipeline from the BPT to the TPR. It would be a small permanent site of approximately 0.5ha in the townland of Commons Upper in County Kildare. In addition, approximately 0.6ha of land would be required on a temporary basis during construction. • It would consist of three 700mm diameter FCVs and three flow meters installed in parallel with the Line Valve and housed within an underground chamber. • Access to the FCV site would be directly off the L1016 Commons Road Upper. • Power supply to the FCV site would be provided from the existing low voltage network via a combination of overhead lines and buried cables. There would be ground mounted solar panels on the north-eastern side of the site to supplement the mains power supply. • Kiosks at the FCV site would house the Programmable Logic Controller, telemetry and power supply for the Line Valve. There would also be a telemetry mast, the top of which would be 14m above finished ground level. • The site boundary would be fenced with a stock proof fence and a 2.4m high palisade security fence 5m inside the boundary.
Termination Point Reservoir (TPR) (Infrastructure Site) County Dublin (within the administrative area of South Dublin County Council)	• The TPR would be located on a permanent site of approximately 8.3ha adjacent to an existing treated water reservoir in the townland of Loughtown Upper, at Peamount, County Dublin (within the administrative area of South Dublin County Council) and would have capacity for 75Ml of treated water supply. In addition, approximately 1.1ha of land would be required on a temporary basis during construction. • It would be located at the downstream end of the Treated Water Pipeline from the BPT to the TPR and would be the termination point for the Proposed Project. It would be at this location that the Proposed Project would connect to the existing water supply network of the Greater Dublin Area Water Resource Zone (GDA WRZ). • The TPR would consist of an above-ground storage structure, associated underground Scour Water and Overflow Water tanks and a Chlorine Dosing Control Building. The TPR would be a concrete tank divided into three cells and covered with an earth embankment. The top of the TPR would be 11.2m above finished ground level. The Chlorine Dosing Control Building would be 8.4m over finished ground level. Additionally, there would be a telemetry mast, the top of which would be 14m above finished ground level. • Power for the TPR would be supplied via an underground connection to the existing electricity substation at Peamount Reservoir. There would be solar panels on top of a portion of the northern cell of the TPR to supplement the mains power supply. • A new permanent access road from the R120 would be constructed and would be 5m wide and 342m in length. • The TPR site would be bounded by the existing hedgerow to the west and existing fence to the east with a 2.4m high palisade security fence around the permanent infrastructure. The site itself would be landscaped in line with the surrounding environment to reduce its visual impact.
Proposed 38 kV Uprate Works – Power Supply to RWI&PS and WTP	
Proposed 38 kV Uprate Works Ardnacrusha – Birdhill (Power Supply) Counties Clare, Limerick and Tipperary	• The proposed 38 kV Uprate Works would be necessary to deliver adequate electrical power to the RWI&PS and WTP. • The proposed works would include the uprating of the existing Ardnacrusha – Birdhill Line and the replacement of polesets/structures with an underground cable along a section of the Ardnacrusha – Birdhill – Nenagh Line. • There would also be works at the existing Birdhill 38 kV electricity substation including the provision of a new 38 kV modular Gas Insulated Switchgear Modular Building, new electrical equipment and lighting, together with new fencing and associated works.
Temporary Infrastructure – Required for Construction Phase Only	
Construction Working Width Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	• A Construction Working Width would be temporarily required for the construction of the RWRMs and the Treated Water Pipeline, and the subsequent reinstatement of the land. • The Construction Working Width would generally be 50m in width but would be locally wider near features such as crossings, access and egress points from the public road network, Construction Compounds and Pipe Storage Depots.

Proposed Project Infrastructure	Outline Description of Proposed Project Infrastructure*
Construction Compounds Counties Tipperary, Offaly, Kildare and Dublin (within the administrative area of South Dublin County Council)	• Eight Construction Compounds would be temporarily required to facilitate the works to construct the Proposed Project. Five Construction Compounds would be located along the route of the Treated Water Pipeline at the following Infrastructure Sites: RWI&PS, WTP, BPT, BPS and TPR, with an additional three Construction Compounds located at Lisgarriff (County Tipperary), Killananny (County Offaly) and Drummond (County Kildare). Construction Compounds would act as a hub for managing the works including plant/material/worker movement, general storage, administration and logistical support. • The Principal Construction Compound at the WTP would require 30ha of land during construction. • The other three Principal Construction Compounds would require land temporarily during construction ranging between approximately 12ha and 16ha. • The four Satellite Construction Compounds at the other permanent Infrastructure Sites (excluding the FCV) would require land during construction ranging between approximately 3ha and 12ha.
Pipe Storage Depots Counties Tipperary, Offaly and Kildare	• Nine Pipe Storage Depots would be temporarily required to supplement the Construction Compounds and would serve the installation of pipe between the WTP and the TPR. • Pipe Storage Depots would take direct delivery of the pipe for storage before onward journey to the required location along the Construction Working Width. • The Pipe Storage Depots would vary in size and require land temporarily during construction generally ranging between approximately 2ha and 7ha but with one site being larger at 11ha.

* Note all land take numbers in this table are affected by rounding to one decimal place.

2.3 Geographical Location of the Proposed Project

38. The Proposed Project will be constructed and operated within predominantly open countryside, generally avoiding towns and villages. Farming is the predominant land use in the area, with the Proposed Project crossing approximately 400 agricultural landholdings.

39. The proposed site for the new RWI&PS is located on the eastern shore of Parteen Basin, in the townland of Garrynatineel; immediately north and adjacent to the linear reservoir embankment (Fort Henry embankment).

40. Abstracted raw water will be pumped from the RWI&PS through approximately 2km length of twin parallel 1,500mm nominal diameter RWRMs (with 5m separation distance). The RWRMs will extend in a generally east-south-easterly direction from the RWI&PS for approximately 830m through local forestry and open agricultural grassland within the townland of Coolnadornory as far as the R494. The sections of RWRMs under the R494 will be constructed using a trenchless technique. From the R494, the RWRMs will continue in an east-north-easterly direction, through further agricultural grassland and forestry in the townlands of Kilmaglasderry and Knockadromin before entering the WTP at Incha Beg.

41. The proposed WTP site is located in the townland of Incha Beg in County Tipperary, approximately 2.6km north-east of the village of Birdhill, and approximately 2km east of the proposed RWI&PS. The WTP site is located within a sparsely populated rural area which is broadly bounded within a triangle formed by the R496, R445 and R494 regional roads. The proposed permanent WTP site is located immediately north of dense woodland, but is itself made up of open fields.

42. The Treated Water Pipeline between the WTP and the BPT is located within County Tipperary. This section of the pipeline is approximately 37km long, and is a single pressurised 1,600mm nominal diameter underground pipeline designed to transfer treated water from the WTP at Incha Beg to the BPT, located at a high point near Cloughjordan, County Tipperary. The pipeline will extend from the WTP in an east to north-east direction generally through open agricultural grassland. It will also cross a number of local, regional and national roads and a number of watercourses.

43. Generally, the Treated Water Pipeline from the WTP will extend in a north-easterly direction through County Tipperary, north of, and parallel to, the Kilmastulla River and the Dublin–Limerick Railway, until the first of two trenchless crossings of the M7 Motorway in the townland of Kilnacranna. From the M7 the proposed pipeline will then continue in a north-easterly direction, south of the M7 Motorway, and north of

the Slievefelim to Silvermines Mountains Special Protection Area (SPA) and Silvermines Mountains SPA (approximately 1.5km and 1.8km distant respectively), prior to continuing north of the tailings pond at Gortmore towards Carrigatogher Bog.

44. The route of the Treated Water Pipeline then continues north of Carrigatogher Bog, crossing the M7 Motorway for a second time, by trenchless construction, approximately 13.1km from the WTP before extending north past the town of Nenagh and a trenchless crossing of the Nenagh River.

45. The proposed pipeline continues north, passing within 700m of Lough Ourna Proposed Natural Heritage Area (pNHA), before a trenchless crossing of the N52 north-east of Ardcrony village from where it extends in a more easterly direction.

46. From the trenchless crossing of the N52, the pipeline will continue for a further 8km before discharging into the BPT at Knockanacree Hill, adjacent to Knockanacree Wood and due north of Cloughjordan.

47. The BPT is the highest elevation of the pipeline and is required to manage the water pressures generated in the operation of the Treated Water Pipeline. It is designed to provide operational storage, to ensure that both sections of the Treated Water Pipeline remain full. The BPT is the point at which the pipeline changes from the pumped pressure to the gravity-fed pipeline (up to flows of approximately 165mld).

48. The site for the proposed BPT is located in the townland of Knockanacree in County Tipperary, approximately 1.8km north of the town centre of Cloughjordan and south of the Scohaboy (Sopwell) Bog SAC and Scohaboy Bog NHA.

49. The site is currently predominantly in agricultural use, as pasture land, and is accessed from the L1064 road via an unpaved farm track, which also provides access to facilitate maintenance and inspection of the existing telecoms mast to the north-east of the proposed BPT site. The adjacent Knockanacree Woods has three looped walks (Oak Walk, Ash Loop and Beech Trail), and viewing points to the north in the direction of the proposed site, and eastwards.

50. The proposed Treated Water Pipeline from the BPT to the TPR is approximately 133km long and consists of a single 1,600mm nominal diameter underground steel pipeline. It will transfer treated water from the proposed BPT at Knockanacree in County Tipperary to the proposed TPR adjacent to, and immediately west of, Peamount Hospital in County Dublin.

51. From the BPT and the TPR, the Treated Water Pipeline extends in an east to north-east direction through northern County Tipperary and Counties Offaly and Kildare before terminating in County Dublin. This section of the pipeline is primarily routed through agricultural grassland but there are extensive areas of peatland in County Offaly and eastern County Kildare through which the pipeline will be constructed.

52. From the BPT, the pipeline extends in an easterly direction before crossing the minor road L5020 and then the R491, approximately 2km from the BPT, in Garraun-Newtown area. The proposed pipeline then turns north-eastwards towards the County Tipperary/County Offaly border, in the townland of Behamore (Hawkshaw), where it diverts northwards, following the county boundary for a short distance before crossing into County Offaly in the townland of Derrinclare.

53. From the townland of Derrinclare, the pipeline crosses the R491 regional road for a second time and continues in a north-easterly direction for approximately 3km before again passing into County Tipperary in the townland of Quakerstown, approximately 90m north-west of Cangort Bog NHA. The Treated Water Pipeline extends for a further 1km prior to re-entering County Offaly in the townland of Ballaghboy, approximately 900m north of Sharavogue Bog SAC.

54. From the county boundary at Ballaghboy, the route of the pipeline generally follows a north-easterly to easterly route for approximately 82km through County Offaly.

55. From Ballaghboy the route of the pipeline extends through the townland of Galbally, before crossing the R492, approximately 2.5km north of Shinrone, in the townland of Curralanty, the Little Brosna River in the townland of Tubbrid, and then the N62 national secondary road at Boveen. From the N62, the pipeline continues in a north-easterly direction, crossing over an unnamed local road in the townland of Ballyatty. From here, it continues in a northern and then a north-eastern direction, passing within 500m of the Lisduff Fen SAC, through Castletown which is approximately 5.5km south-east of Birr. The Treated Water Pipeline then proceeds to cross the Clareen Stream in the townland of Kilmaine, before also crossing and being routed parallel to the Breaghmore River in the townland of Breaghmore and Killinure. The pipeline then meets and crosses the Camcor River, by trenchless construction, in the townland of Cloughanmore, which is approximately 9km due east of Birr.

56. The proposed BPS site is located to the east of Birr, in the townland of Coagh Upper, County Offaly, approximately 25km north-east of the proposed BPT. The BPS site is located within a rural area of agricultural land adjacent to the L3003.

57. The Treated Water Pipeline is then routed in a north-easterly direction, reaching the northern perimeter of Derrinboy Bog. It continues through open countryside crossing the Silver River in the townland of Ballynacarrig and taking a route that is approximately 1km south of the village of Mountbolus. From this position it veers eastwards, crossing the R421 regional road in the townland of Killananny, and continuing east to just south of Gorteen. At Gorteen, the pipeline crosses the Clodiagh River, by trenchless construction, before proceeding north-east through open agricultural land, between Monettia Bog (southside) and the L2002 (northside) before passing to the south of Killeigh village and crossing the N80 national secondary road and the nearby L5035 local road. The latter two roads are on the south-eastern village limits and converge within Killeigh. The Treated Water Pipeline continues north-eastwards for another 4.5km before meeting the first of two railway crossings (Portarlington to Galway).

58. Progressing onwards toward Ballinagar, the Treated Water Pipeline crosses the R420 regional road in the townland of Curragh before a further trenchless crossing is required of the L1020 in Lugmore townland. The crossing of the L1020 is located 2.5km south of Ballinagar village and approximately 1km north of Geashill village.

59. There are three crossings of the L5034 local road before the pipeline enters Clonad Bog. In this part of east County Offaly Bord na Móna has a significant extent of land that was subject to historic in peat harvesting, and the pipeline will traverse a large part of it. In addition to Clonad Bog, the pipeline is routed through Mountlucas Bog, passing south of Bord na Móna's Croughan facility, and crossing the R402 and R400 regional roads in the townland of Esker Beg.

60. The pipeline is then routed along the southern perimeter of Esker Bog before crossing the R402 again in Rathvilla townland, approximately 7.5km south-west of Edenderry, and continuing eastwards, passing through the north-east corner of Cloncreen Bog. Edenderry power station is 1km south of this location. The R401 regional road is crossed in the townland of Shean, at a point 6km south-west of Edenderry and 1km north-east of Edenderry power station. A further 0.5km east of the R401, the first of two trenchless crossings of the Figile River will be required; the second is 2.5km beyond the adjacent crossing of the R401. From the first crossing of the Figile River, and for the next 10km, the pipeline is routed through the extensive Ballydermot Bog. The Ballydermot Bog straddles the County Offaly/County Kildare border at Ticknevin townland.

61. The next length of the pipeline traverses County Kildare for approximately 38km in a north-easterly to easterly direction, generally. The pipeline continues through Ballydermot Bog before exiting in the townland of Kilpatrick where the first of the two trenchless crossings of the Grand Canal is required,. A further short distance onwards, the R403 is crossed, approximately 6km north-west of Allenwood.

62. The Treated Water Pipeline dissects Timahoe South Bog (which contains the Drehid Waste Management Facility) and Timahoe North Bog exiting at the L5013 local road, approximately 4km north-east of the

waste management facility. A further 2km eastwards, the last of the large historic peat harvesting areas is traversed, i.e. Gilltown Bog.

63. The pipeline continues eastwards, crossing the Blackwater River in the townland of Newtownmoneenluggagh, routing north and eastwards of Ballagh Wood, before crossing the R407 regional road at a point 5km south-west of Kilcock. It then continues east and south-eastwards through the townlands of Baltracey (where is crosses the R408 regional road at a point 2km north-west of Rathcoffey village) and Raheen.

64. A short distance further east the R406 and R403 regional roads are crossed in the townland of Barberstown Upper and Lower, 0.5km north and east, of the Barberstown roundabout respectively. The nearby River Liffey, in the townland of Castledillon Upper, will be crossed by a trenchless construction technique.

65. The Treated Water Pipeline continues eastwards on the south side of the River Liffey, before crossing the Celbridge to Ardclough road and then the Dublin–Newbridge railway line in Kearneystown Upper townland. The railway crossing will be carried out by trenchless construction. The pipeline enters County Dublin in the townland of Ringwood, near Hazelhatch.

66. Immediately upon passing the Kildare-Dublin county boundary, the second of two crossings of the Grand Canal will be carried out. Thereafter, the pipeline is routed parallel to the canal until the townland of Commons. From here it is routed south-east under the R405, travelling through primarily farmland until it approaches the R120. The pipeline route then travels parallel to the R120 until it reaches the existing Peamount Reservoir access road and then follows the route of the access road to the proposed TPR site at Peamount.

67. The length of the pipeline in County Dublin is approximately 3.7km.

68. The proposed TPR is located adjacent to the existing treated water reservoir site at Peamount in County Dublin. A pumping station has recently been constructed on the site. The TPR is of a similar shape and form to the existing treated water reservoir i.e. a concrete structure in earthen embankment. The supply from the TPR will then be integrated with that from the existing reservoir.

69. To construct the pipeline a Construction Working Width of approximately 50m has been allowed for. The Construction Working Width will be required for the construction of the pipeline and a permanent wayleave will be required for access to the pipeline for the future operation and maintenance of the asset. The widths that will be acquired along the pipeline corridor include the following:

    - A 20m permanent wayleave, to afford protection to the pipe once it is constructed, and to allow access for maintenance and, if necessary, repair work along the pipeline route; and
    - A Construction Working Width of typically 50m.

70. The 20m wide permanent wayleave is required to:

    - Provide adequate clear distances (10m either side of the centre line of the pipe) between the pipe and future building/construction works, that will allow such works to be carried out safely and without impacting the structural integrity of the pipe;
    - Allow access to the pipeline for inspections and maintenance work; and
    - Provide adequate room for repair work to be carried out on the pipe should this be necessary. The 20m width allows access for plant to carry out excavations safely and for stockpiling of excavated material within the wayleave adjacent to the trench. It also allows working room to bring in replacement sections of pipe should this be necessary.

3. Selection of Infrastructure Sites

3.1 Introduction

71. Prior to the process of identifying the pipeline route for the Proposed Project, it was necessary to identify key fixed points, namely the preferred abstraction point and the point of connectivity to the Greater Dublin Area WRZ. These then formed inputs to the pipeline route as the start and end points.

72. The other fixed infrastructure sites along the pipeline corridor, i.e. the WPT, BPT, BPS, FCV and TPR, were selected based on their technical requirements, set in the context of Step 1 – Identification of "White Space" and Step 2 – Identification of "Least Constrained Route Corridor" of the Pipeline Selection Process, as set out in Section 4. Noting that the site selection for the BPS and FCV came later in the process.

73. Therefore, the site selection for the fixed start and finish points are described in Section 3.2 and 3.3 in order to provide the context for the pipeline routing in Section 4. Section 5 provides a route development example and Section 6 then details the selection of the remaining Infrastructure Sites.

3.2 Abstraction Point and Connection into Greater Dublin Area Water Resource Zone

3.2.1 Raw Water Intake & Pumping Station Site Selection

74. The optimum location for the RWI&PS was considered when planning the previous iteration of the project. As originally set out in the POAR (Irish Water, 2015c) five broad locations along Lough Derg and Parteen Basin were considered. These areas are shown in Image 3.1.

75. An MCA analysis was undertaken using the classification shown in Table 3.1.

Table 3.1: MCA Impact Classifications

Impact	Colour Coding
Very High	
High	
Moderate	
Low	
Very Low	

76. The outcome of the assessment is shown in Table 3.2.

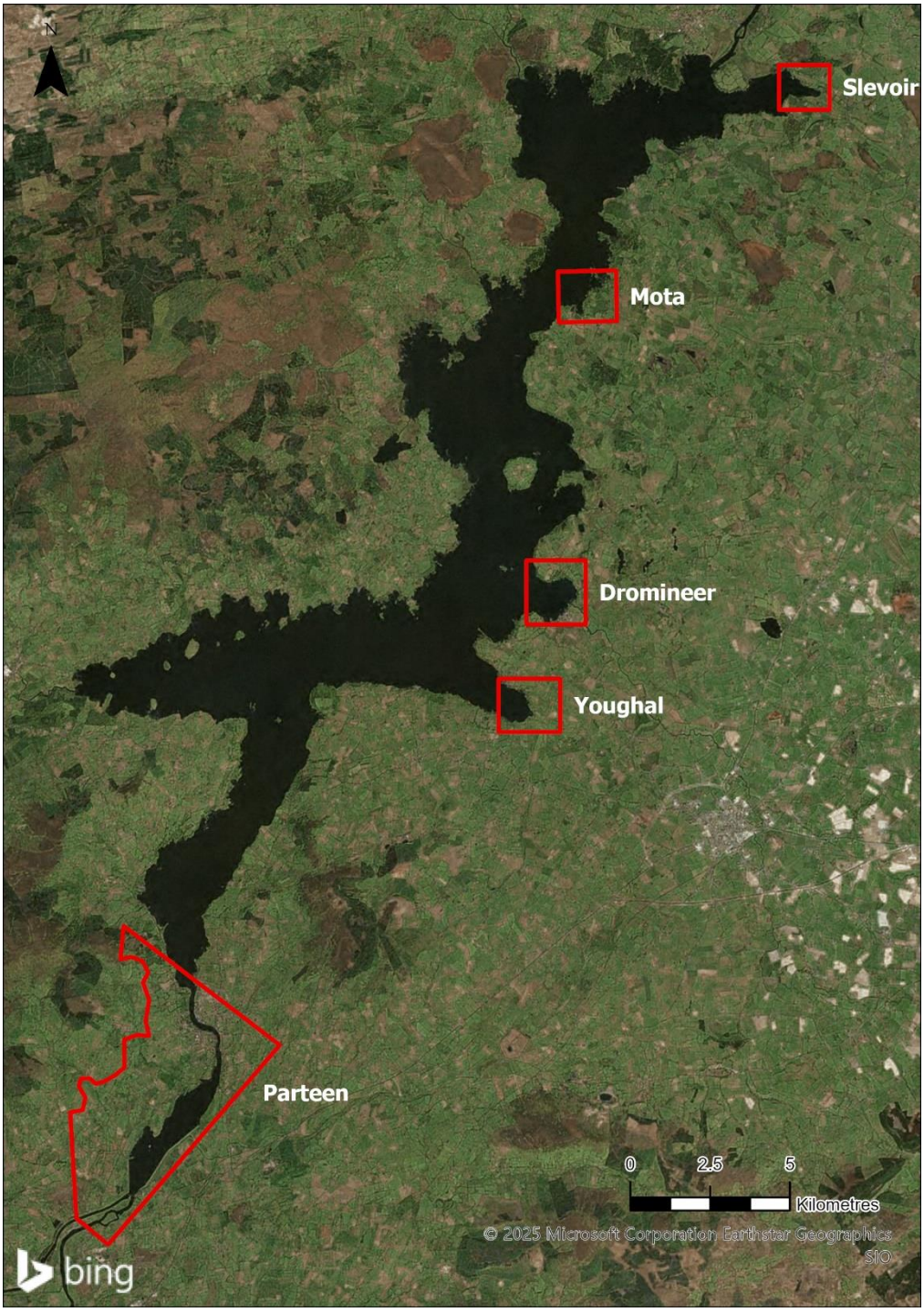


Image 3.1: Alternative Abstraction Locations on Lough Derg and Parteen Basin

Table 3.2 MCA Outcomes for Alternative Water Abstraction Locations

Impact	Slevoir	Mota	Dromineer	Youghal	Parteen
Ecology					
Aquatic Ecology					
Surface Water					
Air Quality					
Noise					
Cultural Heritage					
Landscape and Visual					
Agronomy					
People					
Soils, Geology & Hydrogeology					
Planning Policy					
Traffic, Engineering & Design					
Risk					
Overall	2	4	5	3	1

77. Although a number of potentially significant constraints were identified in relation to the Parteen Basin Reservoir option, it was highlighted that the study area for this water body was much larger than the relatively confined sites considered in Lough Derg and therefore, was not a direct 'like-for-like' comparison.

78. The Parteen Basin Reservoir location was considered, overall, to be the least constrained of the Shannon abstraction options for the following reasons:

- Modelling studies of the Lough Derg abstraction locations showed a measurable impact on flushing time in the lake and this would be likely to have a negative impact on the conservation objectives of Lough Derg SAC and of the entire lake aquatic ecosystem. The level of impact predicted [at the time of the assessment] at Parteen Basin Reservoir was considered too low to affect its ecological status
- Parteen Basin Reservoir is a reservoir formed by the creation of Ardnacrusha dam, hence it was not as sensitive a lake habitat as Lough Derg, with low fisheries value, less developed wetlands habitat and with areas of more modified (non-qualifying habitat) occurring on the eastern shore
- The limited relative impact on flushing times (generated at the time of the assessment) in Parteen Basin Reservoir supported the consideration of a lower potential impact on the objectives of the Water Framework Directive relative to abstraction from Lough Derg
- It is likely that due to the scale of the location of the Parteen Basin Reservoir there would be a possibility of finding a suitable site for the location of the necessary infrastructure which would significantly mitigate impact on known Planning, cultural heritage, landscape and visual constraints.

79. As a result, Parteen Basin was selected for the abstraction point for the previous iteration of the project.

80. The Eastern and Midlands Plan (Irish Water 2022) confirmed that the Preferred Approach was a New Shannon Source from the Parteen Basin and the Parteen Basin remained the preferred option for the location of the RWI&PS site for the Proposed Project.

81. Based on the preferred abstraction location at Parteen Basin, County Tipperary, three potential areas for the RWI&PS in the vicinity of Parteen Basin were identified during the previous iteration of the project. This was previously presented in the FOAR (Irish Water, 2016). Collectively these areas cover the available perimeter on both sides of the Basin located within the Lower River Shannon Special Area of Conservation (SAC) and also a small area downstream of Lough Derg on the eastern bank, not part of any European Site. The raw water abstraction locations that were considered are as follows:

- Western shore of Parteen Basin (RWA-W) shown as RWA1 in Image 3.2
- Eastern shore of Parteen Basin (RWA-E) shown as RWA2 in Image 3.2
- Eastern bank of River Shannon, immediately downstream of Lough Derg (RWA-N) shown as RWA3 in Image 3.2.

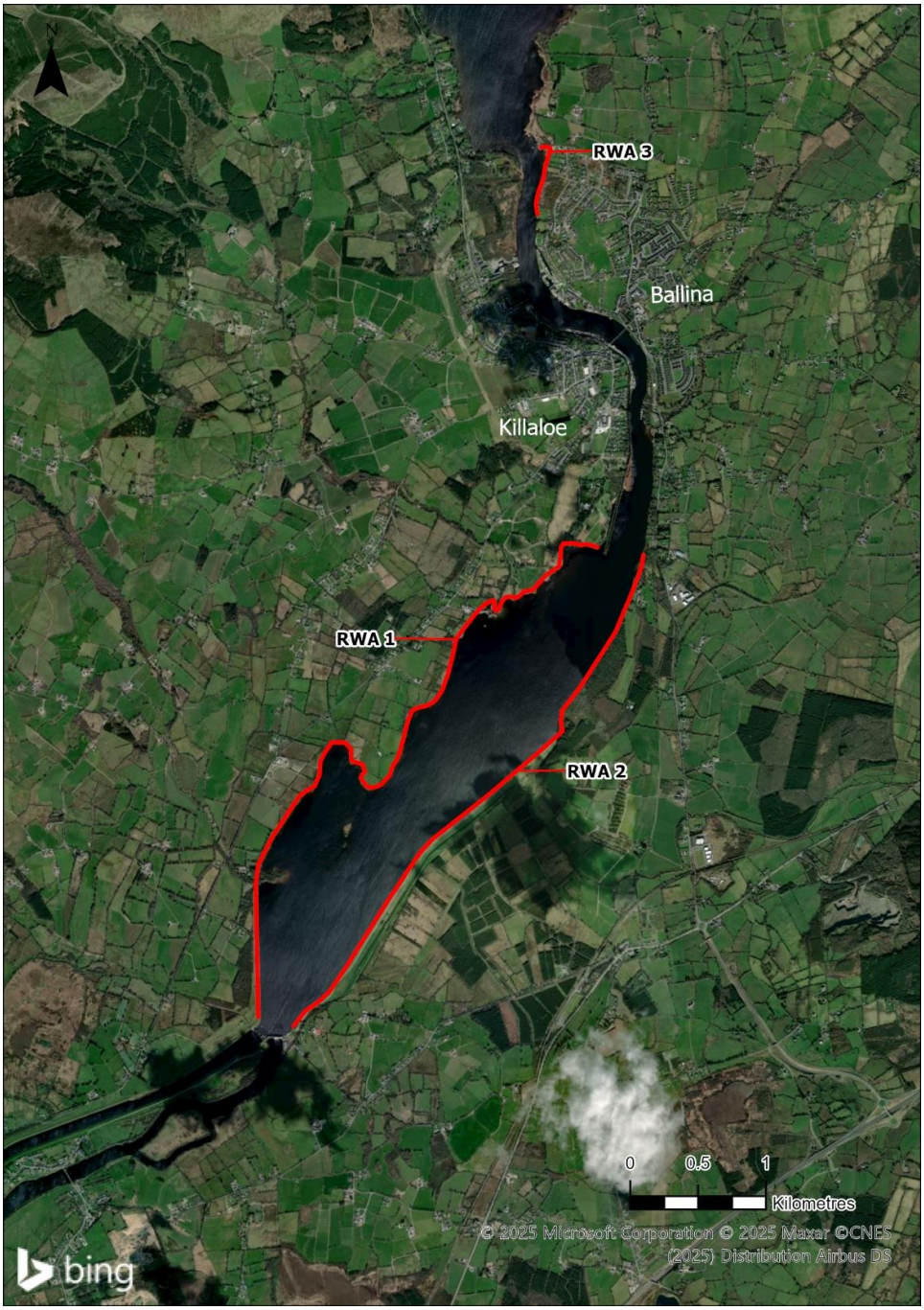


Image 3.2: Potential Raw Water Abstraction Areas in Parteen Basin

82. While RWA-N was not within a European Site, it was heavily constrained in its ability to act as a potential raw water abstraction point. This was because its proximity to the existing urban area of Ballina meant there would be disturbance of the population during the construction period and, further, the steep terrain made it technically less suited from a construction perspective. In addition, a pipe route transfer would only be feasible if existing properties were acquired and demolished to accommodate construction. It was therefore discounted from further consideration.

83. In areas RWA-W and RWA-E, the availability of potential raw water abstraction sites was constrained by the presence of Electricity Supply Board (ESB) embankments. These embankments form part of the engineering infrastructure facilitating the impoundment of water that serves the hydroelectric power generation at Ardnacrusha. As a result, it was necessary to minimise or avoid potential adverse effects on these structures as part of the site selection process.

84. A detailed assessment (by MCA) was undertaken for areas RWA-W and RWA-E to assess potential site locations for the RWI&PS and to allow an environmental comparison of the alternatives. Table 3.3 shows the colour coding used for each of the MCA impact assessment classifications.

Table 3.3: MCA Impact Classifications

Impact	Colour Coding
Very High	
High	
Moderate	
Low	
Very Low	

85. Four sub-options at Parteen Basin were identified, two on the western shore of Parteen Basin (RWA Site 1W and RWA Site 2W) and a further two sites on the eastern shore, RWA Site 3E and Raw Site 4E as shown in Image 3.3. The summary of the MCA process for the four sites and the level of impact being indicated through the colour coding is presented in Table 3.4.

Table 3.4: MCA Outcomes for Alternative Water Abstraction Sites

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

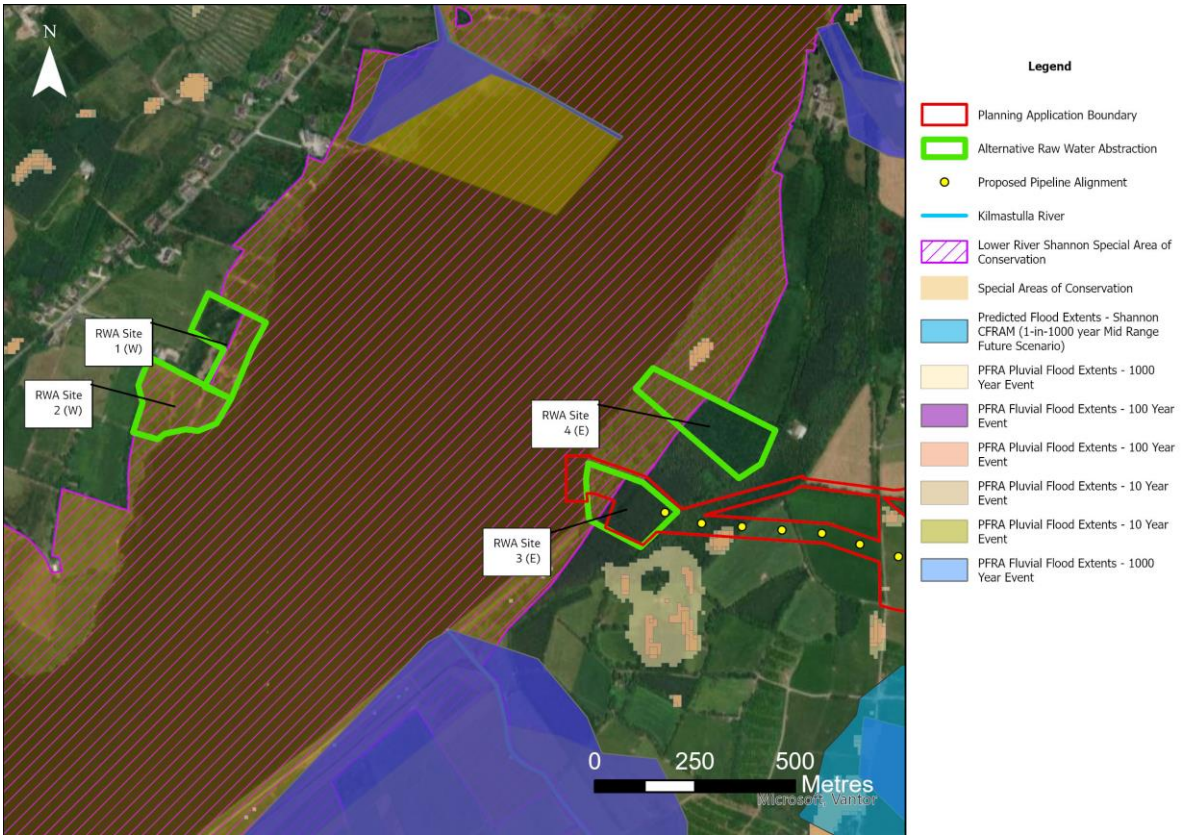


Image 3.3: Potential RWI&PS Sites at Parteen Basin

87. The site selection process, as reported in the FOAR (Irish Water 2016) identified that sites RWA Sites 1W and 2W would 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 were considered to be more constrained than those on the eastern shore for ecology, aquatic ecology and surface water. The potential for significant effects on the Lower River Shannon SAC were evaluated as broadly equal between RWA Site 3E and RWA Site 4E. Overall, the RWA Site 3E was considered least constrained from an ecology perspective as it would be located within, and connected to, lower value terrestrial habitats.

88. RWA Site 3E was also least constrained in terms of human receptors and potential effects upon them, such as noise, due to the distance from residential receptors and the land use surrounding the proposed site.

89. On completion of the MCA process, RWA Site 3E became the preferred location for the site of a raw water abstraction for the following reasons:

- RWA Sites 1W and 2W would require additional pipeline construction through Parteen Basin which would have a higher potential for ecological, archaeological and technical risks. Furthermore, construction phase haul routes to the M7 Dublin-Limerick Road would be required to route through residential, commercial and industrial areas in Limerick City
- RWA Site 4E would be located within a woodland of higher value than RWA Site 3E
- RWA Site 3E would be well screened, south of the Fort Henry demesne lands and provides no obstruction to views of Parteen Basin from the western bank.

3.2.1.1 Alternative Access Options for the Raw Water Intake & Pumping Station

90. On identification of the preferred RWI&PS location as RWA Site 3E, three potential access roads to the site were also evaluated. Options 1 and 2 were via the R494. A third option, Option 3, which would involve routing along the existing ESB-owned track, was considered for feasibility at the initial stage. The track stops approximately 450m south of the proposed site and access to it is controlled by ESB via locked gates at their Parteen Weir site. Entrance to the site, via a narrow bridge spanning the Kilmastulla River channel, can be accessed only with the permission of ESB. This road passes through the Lower River Shannon SAC and was therefore, considered to be less favourable.

91. Both of the remaining potential access roads from the R494 to the proposed RWI&PS site crossed open farmland and areas of forestry. The level of environmental constraints within this area was generally low as shown in Image 3.4.

Image 3.4: Environmental Constraints Map at RWI&PS Site Access Roads

92. It was identified that the alignment of Access Option 1 would conflict with the proposed surface water attenuation ponds at the side of the proposed Killaloe bypass works on the R494. The alignment of Option 2 would be unaffected by the proposed bypass works.

93. Ground levels for both Option 1 and 2 did not vary greatly and the options differed little in terms of length. Option 1 would connect with the R494 at a point where safe sight lines would be available on the existing R494 alignment, albeit with some clearance of existing roadside hedges/trees being needed to achieve this. Option 2 would follow the route of the proposed raw water rising mains. The junction that would be created with the R494 by this access road would not, however, have safe sight lines on the existing R494 alignment, due to a crest in the road to the south of such a junction.

94. It was concluded, therefore, that access to the selected raw water abstraction site should be made by way of Option 1 which was the shortest and most direct connection to the regional road network. This

route offered the required safe visibility splays at its junction with the R494 and reduced the impact on landowners along its route.

3.2.1.2 Conclusion of the Site Selection for the Abstraction Location and Access to the Raw Water Intake & Pumping Station

95. In summary, the Parteen Basin was identified as the preferred abstraction point on the River Shannon and then the RWA Site 3E was identified as the preferred option among the reasonable alternatives considered for the location of the RWI&PS. This was because it would give rise to fewer adverse environmental effects and its design, construction and operation would pose fewer technical challenges. The site is notably of lower ecological value than RWA Site 4E, and it is well screened south of the Fort Henry demesne lands and provides no obstruction to views of Parteen Basin from the eastern bank. As a result, the RWA Site 3E site was selected as the location for the RWI&PS for the Proposed Project and safe access could be achieved using Access Option 1.

96. The design decisions for the RWI&PS and the options evaluation undertaken in respect of them were made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and the preferred options for the intake remain valid and continue to be the preferred options for the design of the Proposed Project.

3.2.2 Termination Point Reservoir

97. The existing Peamount Reservoir in County Dublin is a key nodal point for water distribution within Dublin, particularly to Leixlip and Saggart, both of which are very important elements of the water supply infrastructure.

98. During previous iterations of the project there had been consideration of an alternative termination point that would allow for a different connection into the existing water distribution network. The potential sites were:

- Peamount, County Dublin
- Clonaghlis, County Kildare
- Lyons, County Kildare
- Athgoe, County Dublin
- Baldonnel, County Dublin.

99. It was quickly determined that because of the existing infrastructure, including the existing 40Ml reservoir, at Peamount which facilitates a connection between the supply from Ballymore Eustace, and Leixlip supply the Peamount location was the key nodal point for the end of the pipeline and the only site that would provide the required technical and strategic connection point and further site selection was not undertaken.

100. An MCA was undertaken to confirm that the site was suitable and this was reported in the FOAR (Irish Water, 2016). This is replicated in Table 3.5. The conclusion of the MCA assessment was that the proposed TPR site was a suitable location. The colour coding used for each of the MCA impact assessment classifications is as defined in Table 3.3.

Table 3.5: MCA Impact Classifications

Constraint	Colour Coding
Ecology	
Surface Water	
Air Quality	

Constraint	Colour Coding
Noise	
Cultural Heritage	
Landscape and Visual	
Agronomy	
People	
Soils, Geology & Hydrogeology	
Planning Policy	
Traffic	
Engineering & Design	
Overall Ranking	**N/A**

101. This process also identified the following additional benefits of this site being selected for the TPR:

- A supply to Peamount maximises the natural topography to bring water from the WTP; limiting the requirement for boosting of flows through other means, i.e. pumping plant
- The topography of Peamount allows a TPR site at this location to be readily integrated into its environs
- A site at Peamount facilitates integration with both the existing water distribution system, and future proposals within the Dublin Water Supply Area.

102. Therefore, the termination point at Peamount had already been identified as an essential element of previous iterations of the project for technical and operational reasons prior to the work on the routing of the pipeline which is described in Section 4.

3.2.2.1 Alternative Access to the Termination Point Reservoir

103. Two alternative access points to the TPR site were considered, namely the existing access to the east and a proposed new access from the western side, as shown in Image 3.5. While the level of operational traffic would be relatively low following construction, the following considerations were relevant:

- Suitability of access road to accommodate construction traffic
- The management of traffic through an existing, and operational, storage facility.

104. Option 1 would provide a new and permanent access from the R120 regional road following the western perimeter of Peamount Hospital to enter the TPR site from the south-west. Option 2 was the access used for the existing Uisce Éireann storage facility, which is accessed from the R120 via the L60322 local road. This is a narrow road, approximately 3m in width.

105. Option 1 had the following advantages:

- Interaction with residential, amenity and other local traffic would be segregated from traffic to the TPR
- The route included an existing wayleave maintained by Uisce Éireann from the R120, as far as Uisce Éireann's existing storage facility
- It permitted a single-purpose access for the sole use of Uisce Éireann to an important nodal point on the Dublin water supply network.

106. Option 2 had the additional disadvantage that during construction, there would be the potential conflict between construction traffic and residential vehicle movements. This would be compounded by traffic turning onto the L60322 from the R120 as there would be potentially consequential delays along the Regional Road. Inevitably, this would disrupt residents and commercial premises along this road as there

would be no alternative means of access to their properties for a period of up to 18 months, together with the associated construction related environmental effects of air and noise emissions.

107. For these reasons Option 1 was selected as the access route to the TPR.

Image 3.5: TPR Location Local Road Network Options

3.2.2.2 Conclusion of the Site Selection for the Termination Point Reservoir Location and Access

108. To facilitate integration with the existing network, and maintain system performance and operational flexibility, a TPR at Peamount would be integrated with the existing adjacent reservoir. Facilities adjacent

to each other, or in close proximity, would benefit from less complex control systems in operation, and minimise the extent of the likely construction impacts.

109. On this basis the TPR site adjacent to the existing reservoir at Peamount was the optimum site identified for the connection point of the Proposed Project into the existing distribution network.

110. The design decisions for the TPR and the options evaluation undertaken in respect of them were made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and the preferred options for the TPR remain valid and continue to be the preferred options for the design of the Proposed Project.

4. The Pipeline Route Selection Process

4.1 Pipeline Routing Five Step Approach

111. Image 1.2 in Section 1 illustrates a five step approach which sought to progressively refine the pipeline route corridor from an initial, unconstrained broad search area between the abstraction point at Parteen Basin and the termination point at Peamount in the Greater Dublin Area (Step 1), through the identification of route based on 2km wide corridors which were the least constrained (Steps 2 and 3), selection of a 200m wide preferred corridor (Step 4) to an indicative 50m pipeline corridor (Step 5).

112. As development of each step of the Pipeline Corridor – Route Selection Methodology proceeded, they were presented for non-statutory consultation on previous iterations of the project:

- Step 1, OWP (June 2015), (Irish Water 2015b), was a desktop-based assessment and involved a high-level screening and mapping exercise of initial constraints which were categorised as having a high impact. The 'White Space' represented those areas which avoided these high impact constraints
- Step 1 also included the evaluation of the Strategic Environmental Assessment (SEA) water supply options, considered alternatives and provided recommendations
- Step 2, POAR (November 2015), (Irish Water 2015c) was a desktop-based assessment to identify 'Preliminary Route Corridors' (approximately 2km wide) and a 'Least Constrained Route Corridor' from those identified. The Preliminary Route Corridors were determined from within the 'White Space' identified in Step 1
- Step 3, FOAR (November 2016), (Irish Water 2016) was primarily a desktop assessment which followed the POAR non-statutory consultation. In conjunction with feedback from the POAR non-statutory consultation and supported with limited/focused windscreen surveys (i.e. from the public road), the 'Least Constrained Route Corridor' (approximately 2km wide) was confirmed from the 'Preliminary Route Corridors' identified in Step 2.
- Step 4, FOAR (November 2016), (Irish Water 2016) involved further desktop assessment supported by localised windscreen surveys, and site visits, to identify a 'Preliminary Pipeline Corridor' (200m wide) from within the 'Least Constrained Route Corridor' confirmed in Step 3. Subsequently the 'Preferred 200m Pipeline Corridor,' was identified.
- Step 5, FOAR (November 2016), (Irish Water 2016) was a further refinement of Step 4 and involved further constraint mapping and field surveys to determine an 'Indicative 50m Pipeline Corridor'.

113. From the outset the methodology was based on constraint mapping, a process that relied on consideration of predetermined 'constraints' that directly influenced the pipeline corridor. The constraints for consideration were originally presented in the OWP(Irish Water 2015b).

114. The siting of a potential pipeline corridor mitigated the impact of these constraints and represented the least constrained route. The methodology for siting the pipeline corridor was outlined in Volume 2 of the POAR.

115. Steps 1 and 2 were presented in the POAR (Irish Water 2015c) non-statutory consultation process while Steps 3, 4 and 5 were presented in the FOAR (Irish Water 2016) non-statutory consultation process in November 2016.

116. All published documents can be located on the main website: https://www.water.ie/projects/national-projects/water-supply-project-east-1. This report, which includes the alternative route options considered, sets out in detail, with reasons, the development of the route selection process and the determination of this '50m Pipeline Corridor' final route.

4.2 Post Step 5 Route Development

117. Subsequent to feedback from FOAR (Irish Water 2016) non-statutory consultation process, further surveys, a review and update to datasets informing the constraint mapping, geotechnical investigation, and extensive landowner engagement the 'Indicative 50m Pipeline Corridor' has been confirmed.

118. Following Step 5/post FOAR (Irish Water 2016), further design development has taken place, namely:

- Consolidation of a preferred 50m pipeline corridor, in consultation with landowners.

119. This has resulted in the pipeline route contained within the Strategic Infrastructure Development planning application and Compulsory Purchase Order application.

120. This step is described in further detail in Section 4.8.

4.3 Routing Process

121. This report, which includes the alternative route options considered, sets out in detail, with reasons, the development of the route selection process, the determination of the 'Indicative 50m Pipeline Corridor' and its subsequent development into the Proposed Project pipeline alignment.

122. Each stage of the routing process is described in further detail in the following sections:

- Section 4.5 – Step 1 as presented in the OWP (Irish Water 2015b)
- Section 4.6 – Step 2 as presented in the POAR (Irish Water 2015c)
- Section 4.7.1 – Step 3 as presented in the FOAR (Irish Water 2016)
- Section 4.7.2 – Step 4 as presented in the FOAR (Irish Water 2016)
- Section 4.7.3 – Step 5 as presented in the FOAR (Irish Water 2016)
- Section 4.8 – Post step 5 - Route refinement.

4.4 Route Corridor start and finish points

123. The following defined the size and extent of the proposed pipeline infrastructure:

- The peak deficit of water to be met by the Proposed Project, (as defined by the Eastern and Midlands Plan (Irish Water 2022) and set out in the CPO Engineering Report, (Jacobs Tobin 2025))
- The abstraction location
- The location of the termination point.

124. As set out in Section 3.2, the Infrastructure Sites at either end of the pipeline, (the RWI&PS and TPR) form fixed nodal points. At the Parteen Basin the abstraction point forms a fixed initial starting point for the development of the pipeline routing. Similarly, the TPR location at Peamount is the connection point for water distribution within Dublin, and so connection at that specific location had therefore, already been identified as an essential element of previous iterations of the project for technical and operational reasons. From these two points, the corridor for the development of pipeline routing was established.

125. The abstraction utilises the existing assets within Parteen Basin to enable environmentally sustainable availability of drinking water at source, whilst the termination point represents the final, and preferred, location for distributing this water to where it would provide the greatest benefit for the demand, both strategically and operationally. The pipeline is the key delivery mechanism to connect the two fixed points at either end of the supply system.

4.5 Step 1: Water Supply Options Working Paper (OWP)

126. The OWP (June 2015) (Irish Water 2015b) proposed the draft assessment protocols for the identification of 'White Space,' based on constraints mapping. This was predicated on establishing 'constrained' areas within which infrastructure/proposed assets should not (as far as reasonably practicable) be located due to an excessive impact on human beings and/or the environment, or present excessive engineering challenges. The identified area endeavours to avoid such constrained areas where alternative siting and routing options are both available and reasonable.

127. The draft assessment protocols, and initial constraints identified, are contained in the OWP, (Irish Water 2015b) Section 4.3.

128. The OWP (Irish Water 2015b) was subject to a non-statutory consultation process; feedback received was incorporated into the next stage.

4.5.1 Project Study Areas

129. The OWP (Irish Water 2015b) included a Project Study Area which recognised the extent of the project, but in which the treatment and termination points were still under consideration. The Proposed Project Study Area is shown in Image 4.1.

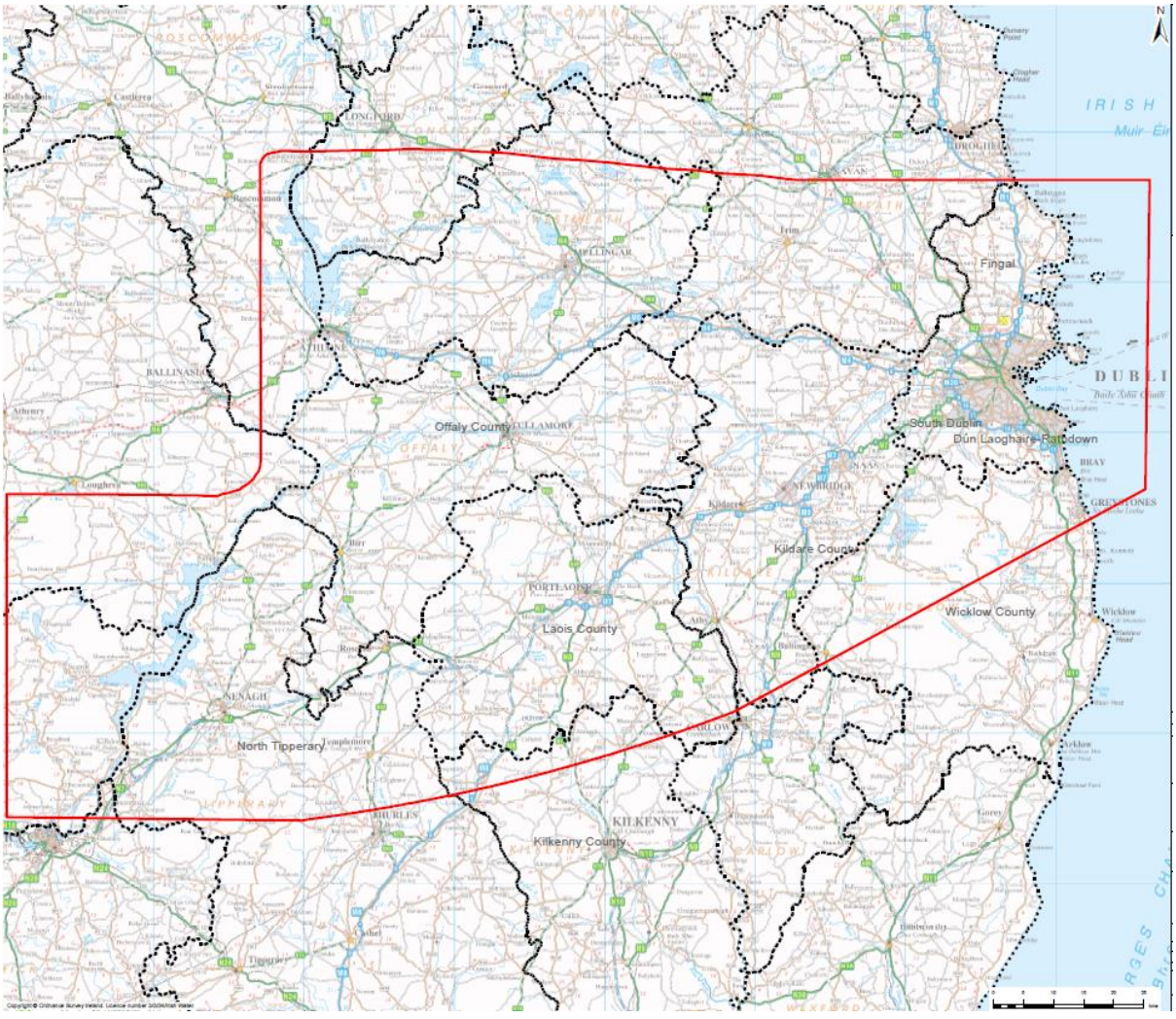


Image 4.1: Proposed Project Study Area

4.5.2 Constraints Mapping

130. The constraint mapping methodology sought to achieve impact minimisation on sensitive receptors through the avoidance of known constraints. A 'constraint' is any limiting factor on site selection for infrastructure. It can be related to human settlements, or environmental, or technical factors. The selection of the location for infrastructure sites and the routes for pipelines was therefore approached primarily through avoidance of impacts, by avoiding constraints, wherever possible. At the outset it was recognised that constraints mapping was an essential component in aligning the proposed development from an initially large area.

131. A range of project specialists were engaged to identify the constraints. These constraints were collated spatially as digital 'shape' files which could be displayed and edited as separate layers over a background map within a Geographic Information System (GIS).

132. The specialists involved included;

- Engineering
- Archaeology
- Cultural Heritage and Architectural Heritage
- Ecology
- Noise and Vibration
- Air Quality
- Traffic and Transport
- Landscape and Visual
- Agronomy
- Soils and Geology
- Water Quality – Hydrology
- Water Quality – Hydrogeology.

133. A ranking system was employed to assist in the identification of the areas best suited for new infrastructure where not all constraints could be avoided. Constraints were ranked into three categories as follows:

- High – This category of constraints is to be avoided if possible
- Medium – This category of constraints is defined as ones which should be avoided where alternative options exist, but if not, where routing could be proposed with adequate justification
- Low – This category of constraints relates primarily to technical considerations and preferences with a degree of flexibility if routing is unable to avoid them.

134. The project specialists classified each constraint within their own specialism, providing a starting position from which the process of pipeline routing commenced.

135. The project specialists engaged though a workshop and collectively agreed to an initial grouping of key, or 'high' category constraints. These constraints were collated spatially as digital 'shape' files which could be displayed and edited as separate 'layers' over a background map within a Graphical Information System (GIS). These constraints were as follows and determined the 'White Space,' through which all proposed infrastructure could be located.

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- Natural Heritage Areas (NHAs)

- Proposed Natural Heritage Areas (pNHAs)
- Ramsar Convention Sites (Wetlands)
- UNESCO Sites
- Curragh Aquifer and Pollardstown Fen
- Protected Freshwater Pearl Water Bodies (S.I. No. 355/2018 – The European Communities Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2009 to 2018).

136. The accumulation of the constraints identified a 'White Space', within which the siting and routing of infrastructure would, where possible, be best positioned with respect to remaining constraints and would help mitigate the impact of this project, both technically and on human beings and the environment.

137. The key constraints and resulting 'White Space' boundary are shown in Appendix A.

4.6 Step 2: Preliminary Options Appraisal Report (POAR)

138. Given the potential for competing constraints, a structured and informed decision-making process was implemented; the approach employed used the collective experience of subject matter specialists to arrive at a consensus.

139. In workshop forums decisions on a pipeline route were arrived at following extensive review. This was an iterative process and decisions were arrived at when it was determined that a balance, and consensus, had been achieved between competing constraints.

140. This collaboration amongst specialists' approach to pipeline route evaluation was adopted for each step of the Pipeline Corridor route selection.

141. The objective of the POAR (November 2015) (Irish Water 2015c) in relation to pipeline routing was to:

- Complete the Options Appraisal Process
- Review all consultant feedback received as part of the Water Supply OWP (Irish Water 2015b) and the PNR (Irish Water 2015a)
- Identification and appraisal of 'Preliminary (generally 2km wide) Route Corridors'
- Identification of 'Least Constrained Route Corridor'.

4.6.1 Assessment Criteria

142. To document assessment of the pipeline corridor route options and facilitate comparison and ranking by various specialisms, appraisal criteria were developed as set out in Table 4.1.

Table 4.1 Assessment Criteria

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

Environmental Criteria	Technical Criteria	Risk Criteria
Population		
Human Health		
Soils, Geology and Hydrogeology		

143. The fundamental approach in the assessment of the reasonable alternative options was to use the expertise of specialists in their fields to conduct a comparative analysis.

144. Each potential route was assessed by the relevant technical and environmental specialist under each of these criteria, with differentiating sub-criteria identified by the specialists, to distinguish the route of least constraint.

145. The relative assessment of impact under each of the sub-criteria was presented through a common impact classification as set out in Table 4.2.

Table 4.2: Impact Classification

Impact
Very High
High
Mid-range
Low
Very low

146. The relative assessment and classification of impact across the sub-criteria by the specialists provided a 'Multi-Criteria Analysis' (MCA) from which collective agreement on that of 'least constraint' was sought through the workshop forums.

4.6.2 Preliminary Route Corridors

147. A further desktop-based assessment involving a refinement of the 'White Space' by the application of further 'high', or 'medium' category of constraints within the 'White Space'; and identification of 'Preliminary Route Corridors' (approximately 2km wide). The outcome of this step is the identification of a Preliminary Route Corridor of 'least constraint'.

148. The extent of the study area between an abstraction location on the Lower River Shannon and a proposed termination point in Dublin covers almost the width of the State, generating a large number of routing options, and sub-options, for a potential pipeline corridor.

149. In routing for 2km wide corridors across the State, it was not always possible to avoid each identified constraint entirely. Consequently, comparative analysis through MCA offered a robust solution to the identification of an emerging 'Preferred Route Corridor', or a route that offered less 'medium' to 'high' category constraints than the alternatives.

150. Volume 4 of the POAR (in Appendix F of the POAR) (Irish Water 2015c) provides a comprehensive assessment into the identification of Preliminary Route Corridors including the methodology adopted, a database of the various constraints and their classification as either 'High', 'Medium', or 'Low', specialist assessments and comparative discussion on a route, and the emergence of a 'Least Constrained Route Corridor'.

151. Before a 'Preliminary Route Corridor' could be chosen it was first necessary to identify those areas of least constraint from within the existing 'White Space'. This was a more detailed screening exercise than that carried out in Step 1 and involved a more extensive and comprehensive use of constraint data sets. This reduced the available area within which a 'Preliminary Route Corridor' could be sited.

152. A number of 2km wide potential Preliminary Route Corridors were identified and assessed in the POAR (Irish Water 2015c). An MCA was completed on each Preliminary Route Corridor and the least constrained option among them identified.

153. The Preliminary Route Corridors and the 'Least Constrained Route Corridor' identified between Parteen Basin in the townland of Garrynatineel, County Tipperary, and the termination point at Peamount in Dublin are shown on Image 4.2.

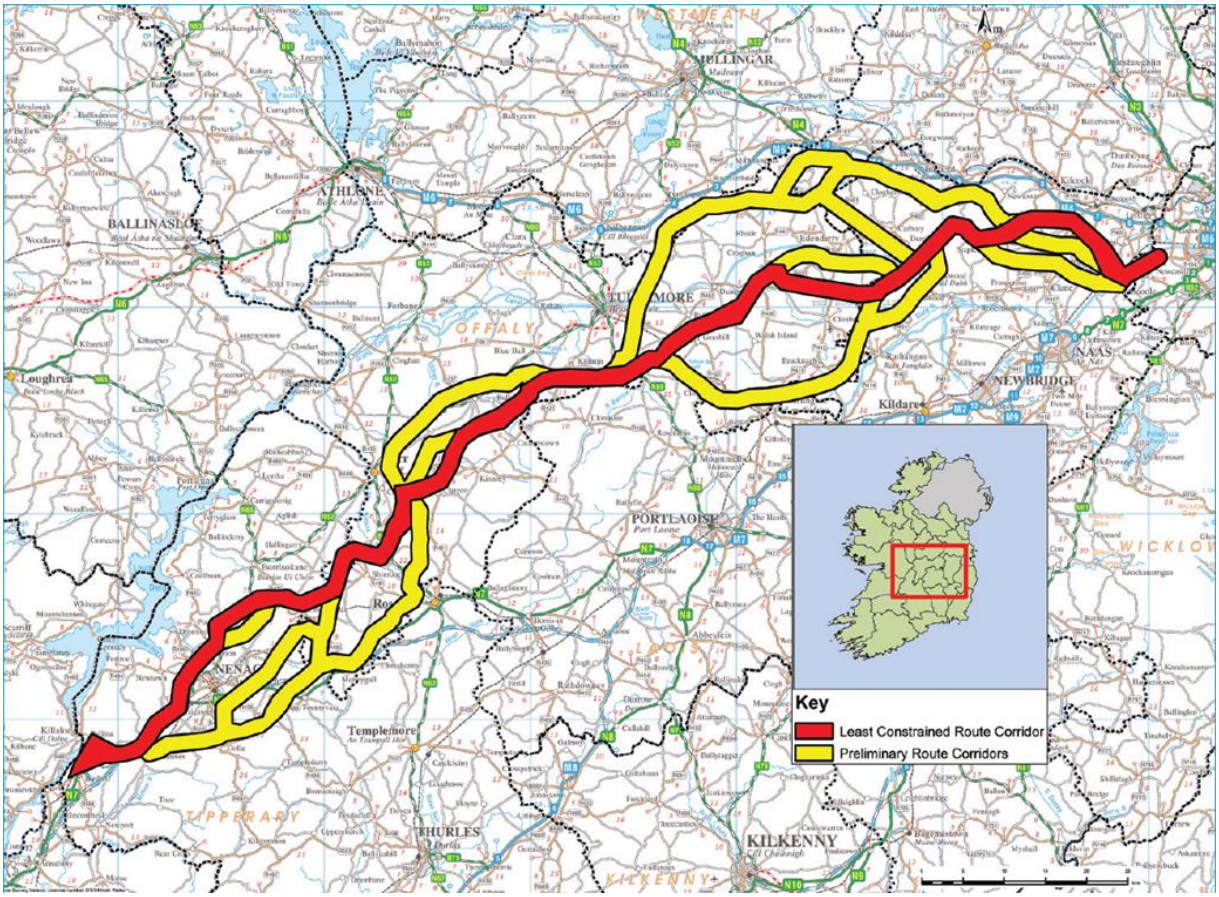


Image 4.2: Preliminary Route Corridors and Least Constrained Route Corridor (in red)

154. The following sections summarise the selection of the 'Least Constrained Route Corridor' from the Preliminary Route Corridors. A more comprehensive assessment is detailed in Volume 4 of the POAR (Irish Water 2015c).

155. For the purposes of reporting the consideration of alternatives, the Pipeline Route Corridor was divided into four sections:

- Birdhill to Birr
- Birr to Tullamore
- Tullamore to Carbury
- Carbury to Peamount.

156. *Note: the following sections discuss the initial selection of the Preliminary Route Corridor. The same approach was applied to several sub-options but only after selection of a Preliminary Route Corridor from the available alternatives. The sub-option or 'loops' as they were referred to have been reported in Section 4.6.2.1 – 4.6.2.4 where applicable to the least constrained Preliminary Route Corridor.*

4.6.2.1 Preliminary Route Corridors – Birdhill to Birr

157. Between Birdhill and Birr, three primary route options were identified, shown as A1, A2 and A3 in Image 4.3.

158. The MCA, reported in the POAR (Irish Water 2015c), determined that Preliminary Route Corridor alternatives A2 and A3 were, more constrained compared with the alternative Preliminary Route Corridor A1 and therefore, did not perform as well as it, for the following reasons:

- They are longer route alternatives and would involve a higher degree of hedgerow clearance and associated disturbance on flora and fauna
- Greater impact potential on local, secondary and tertiary roads, and potentially poorer construction access from the national, regional road and local primary road network
- Higher potential for encountering ground with peat and alluvium
- Greater impact potential for watercourse crossings as they both will require crossing of River Ollatrim whereas A1 does not.

159. Preliminary Route Corridor alternative A1 encountered a divergence point at Lough Eorna, County Tipperary. At this location the corridor could be routed either in a more northerly or southerly direction. These ‘sub-options’ or ‘loops’, were evaluated, and it was concluded that the potential environmental impacts, including ecology were similar for both routes and that the routing decision relied on engineering/technical considerations. On the basis of these technical factors, the northerly sub-option was preferred because it had the least potential for encountering poor ground conditions and was more favourably accessed from secondary roads. Therefore, the northerly Lough Eorna Loop was the least constrained of the two sub-options.

160. Overall, for the route section between Birdhill to Birr, Preliminary Route Corridor alternative A1, with the northerly sub-option alignment of the Lough Eorna Loop, was selected as the least constrained alternative for a combination of environmental and technical reasons.

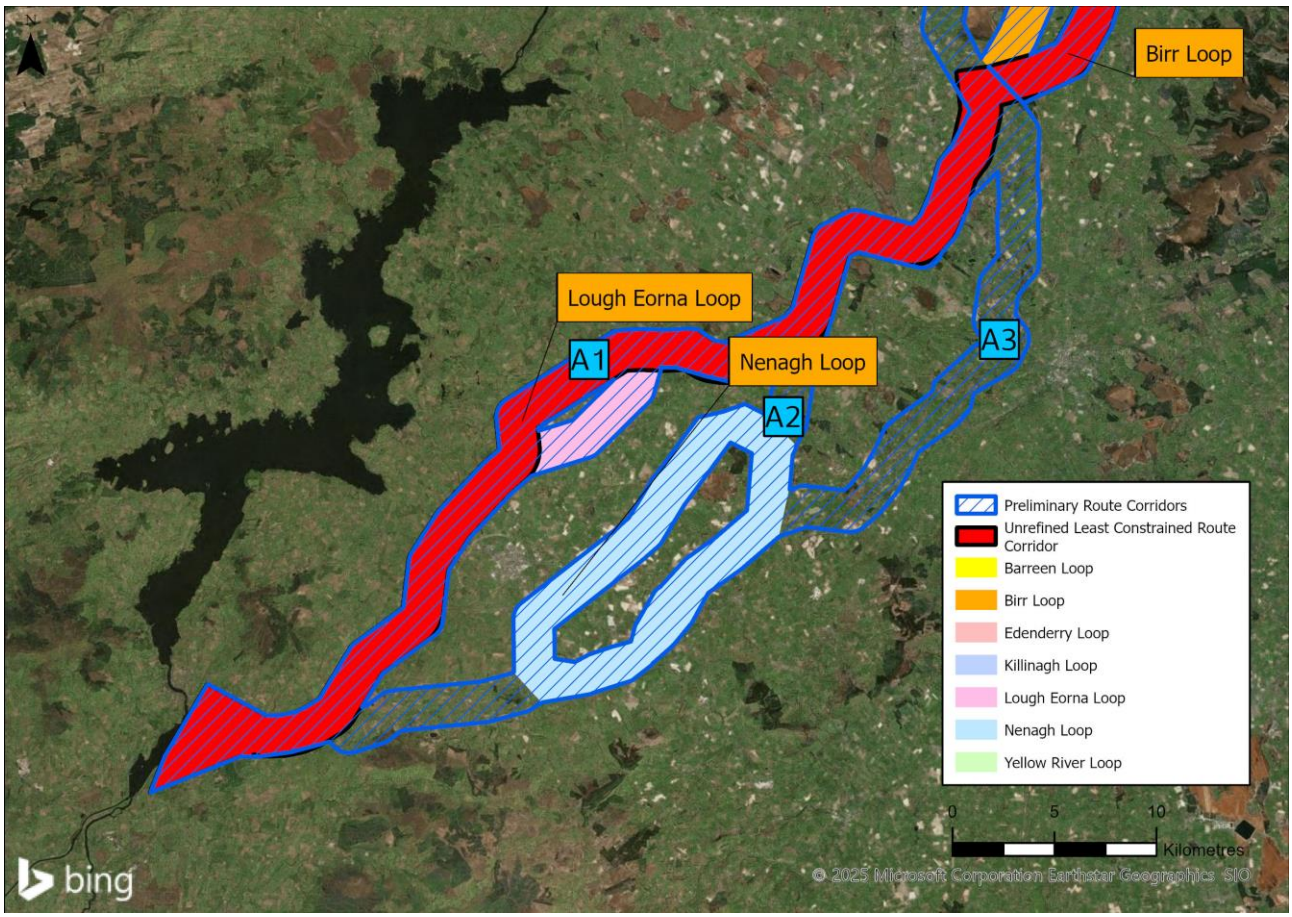


Image 4.3: Route Alternatives between Birdhill and Birr

4.6.2.2 Preliminary Route Corridors – Birr to Tullamore

161. Between Birr and Tullamore two primary route options were identified, shown as B1 and B2 in Image 4.4.

162. The MCA, reported in the POAR (Irish Water 2015c), determined that Preliminary Route Corridor B1 was more constrained compared with the alternative Preliminary Route Corridor B2, and therefore, did not perform as well as it, for the following reasons:

- It is a longer route and would involve a higher degree of hedgerow clearance and associated disturbance on flora and fauna
- Higher potential for encountering conditions where construction would be difficult, more crossings of major obstructions and has a less acceptable elevation profile
- It encounters a higher number of cultural heritage constraints
- A higher presence of extensive areas of peat, and the potential to sterilise mineral resources make it less suitable.

163. Preliminary Route Corridor B2 encountered a divergence point at Castletown, County Offaly. At this location the corridor could be routed either in a more north-easterly or south-easterly alignment. These were referred to as the Birr Loops, ‘North’ and ‘South’. Following appraisal of these sub-options, it was established that the South loop performed better on technical grounds. The environmental effects of both options were broadly similar, with low effects on the environment generally for either. However, the northern loop would have potential moderate impacts on cultural heritage, and soils, geology and hydrogeology. Therefore, the southern Birr Loop was the least constrained of the two sub-options.

164. Overall, for the route section between Birr to Tullamore, Preliminary Route Corridor alternative B2 with the southern sub-option alignment of the Birr Loop was selected as the least constrained alternative for a combination of environmental and technical reasons.

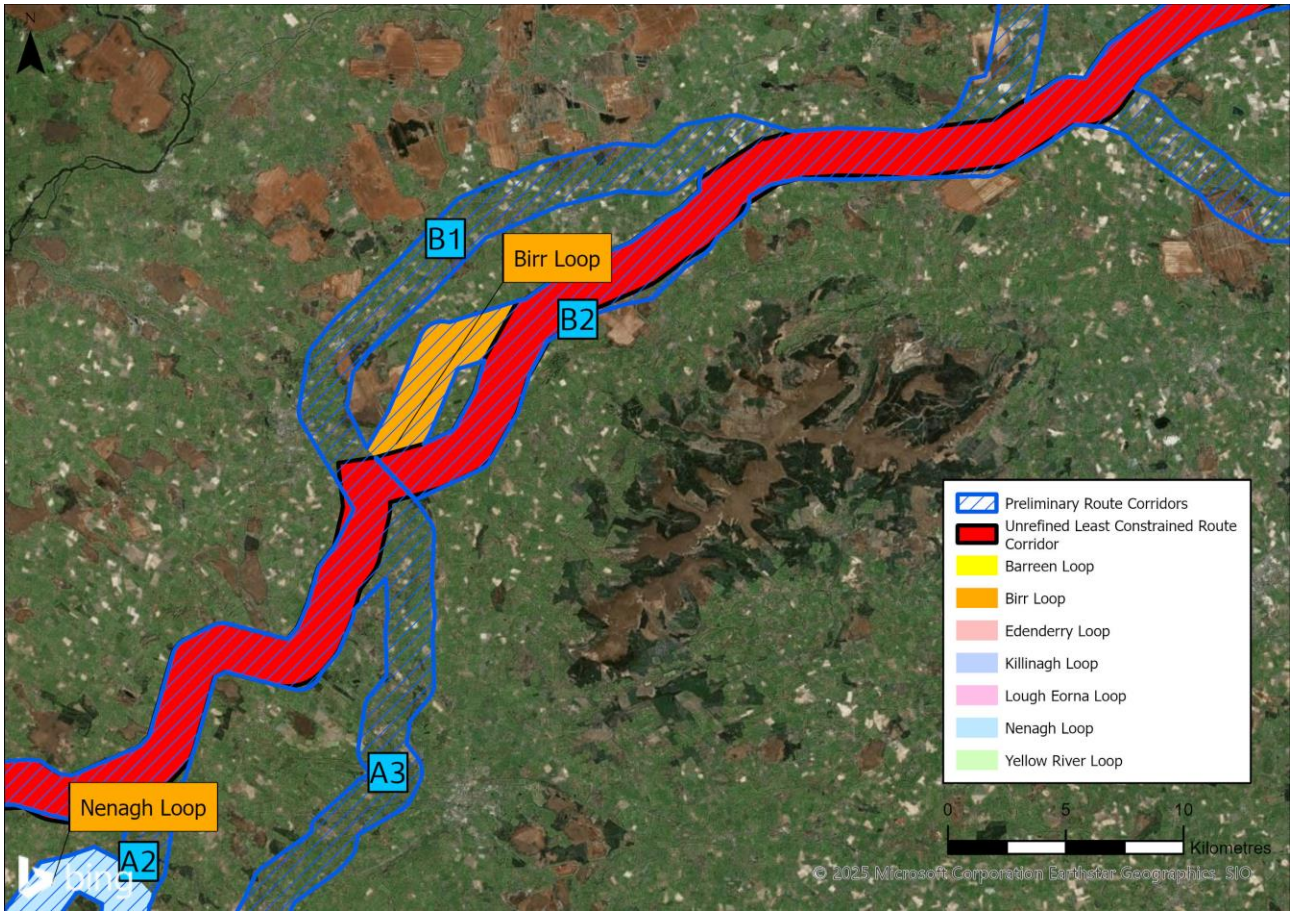


Image 4.4: Route Alternatives between Birr and Tullamore

4.6.2.3 Preliminary Route Corridors – Tullamore and Carbury

165. Between Tullamore and Carbury, four primary route options were identified, shown as C1, C2, C3 and C4 in Image 4.5.

166. The MCA, reported in the POAR (Irish Water 2015c), determined that Preliminary Route Corridor alternatives C1, C2, and C4 were more environmentally constrained compared with the alternative Preliminary Route Corridor C3, and therefore, did not perform as well as it, for the following reasons:

- They are longer routes and have a greater number of locally important habitats impacted than Route Corridor C3
- These routes present a higher risk to sensitive salmonid spawning areas in the River Boyne and Blackwater river SAC catchment
- These options have a greater number of local secondary and tertiary road crossings and poorer construction access with the regional road network.

167. Preliminary Route Corridor C3 encountered a divergence point at two locations and so further sub-options were considered.

168. The first of these was at Edenderry, County Offaly and was referred to as the Edenderry loop. At this location the corridor could be routed either in a more northerly or southerly direction. It was established,

following an appraisal of these sub-options, that the northern alignment passed through areas of high ecological value, including an area of remnant raised bog, the Long Derries SAC and the Grand Canal proposed Natural Heritage Area. The southern alignment was therefore selected as the least constrained option for the Edenderry Loop.

169. A second divergence point was identified further east, with the option of a more northerly or southerly alignment at Killinagh. The Killinagh Loop sub-options displayed comparable environmental characteristics but the northern alignment had lower biodiversity impacts. As a result, the northern alignment of the Killinagh Loop was selected as the least constrained of the two sub-options.

170. Overall, for the route section between Tullamore to Carbury, Preliminary Route Corridor alternative C3, with the southern alignment of the Edenderry Loop and the northern alignment of the Killinagh Loop was selected as the least constrained alternative for a combination of both environmental and technical reasons.

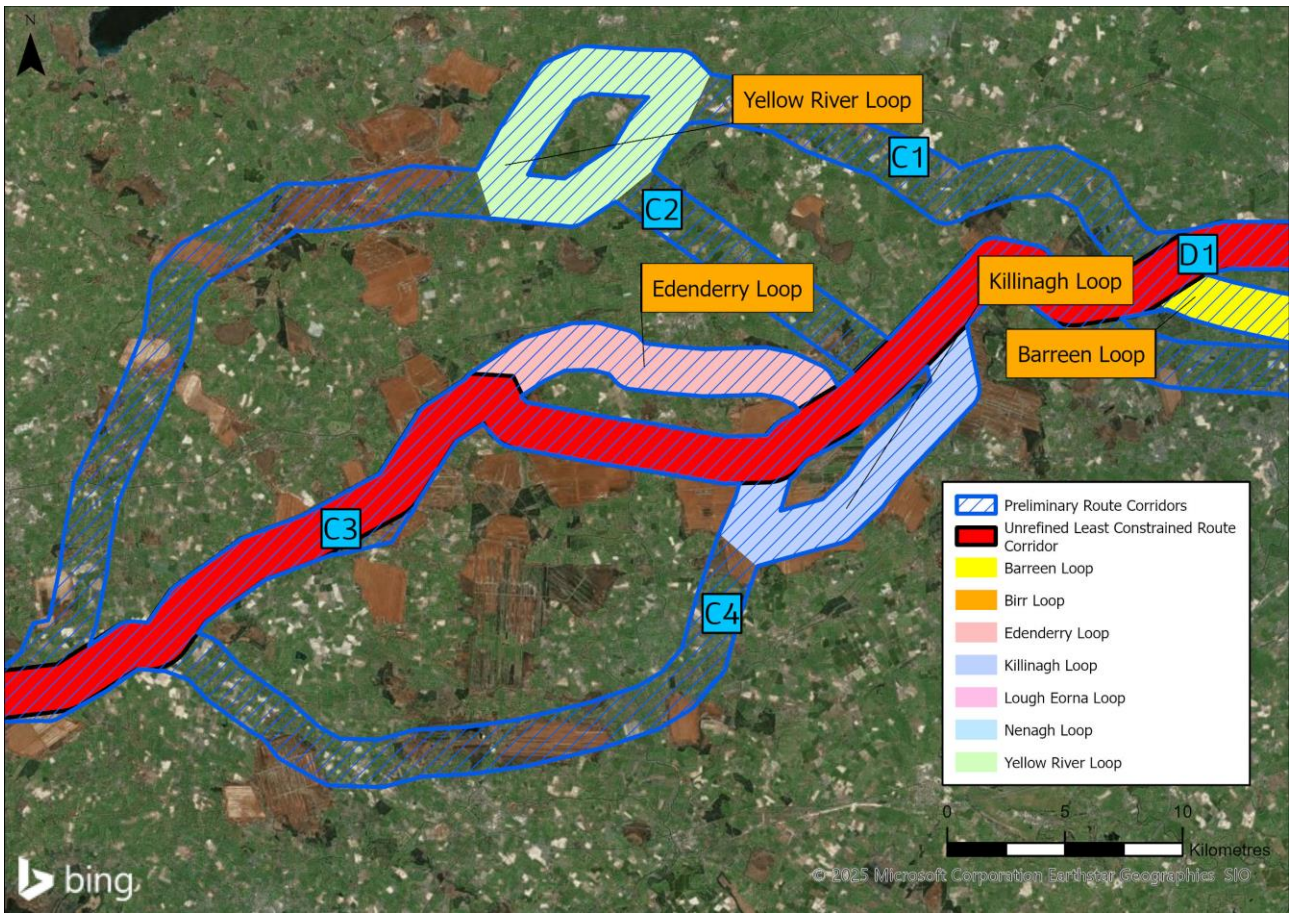


Image 4.5: Route Alternatives between Tullamore and Carbury

4.6.2.4 Preliminary Route Corridors – Carbury and Peamount

171. Between Carbury and Peamount two primary route options were identified, shown as D1 and D2 in Image 4.6.

172. The MCA, reported in the POAR (Irish Water 2015c), determined that Preliminary Route Corridor D2 was a more environmentally constrained option, compared with the alternative Preliminary Route Corridor D1 and therefore, did not perform as well, for the following reasons:

- A significant portion of the D2 corridor affects the sensitivity of the existing landscape character
- A significant portion of the D2 corridor is occupied by the K Club; a highly sensitive receptor as it an important source of local employment
- It has a higher potential for encountering ground where construction would be difficult, a greater number of crossings of major obstructions and has a less acceptable elevation profile
- It encounters a higher number of cultural heritage constraints.

173. Preliminary Route Corridor D1 encountered a divergence point at Barreen, County Kildare. At this location the corridor could be routed either in a more northerly or southerly direction. While the potential environmental impacts were similar for both routes, the northerly sub-option was preferred for landscape character reasons. There were some technical advantages to the southern loop including a more preferrable elevation profile. However, overall the north loop was considered the least constrained.

174. Overall, for the route section between Carbury to Peamount Preliminary Route Corridor alternative D1, with the northern Barreen Loop was selected as the least constrained alternative for a combination of environmental and technical reasons.

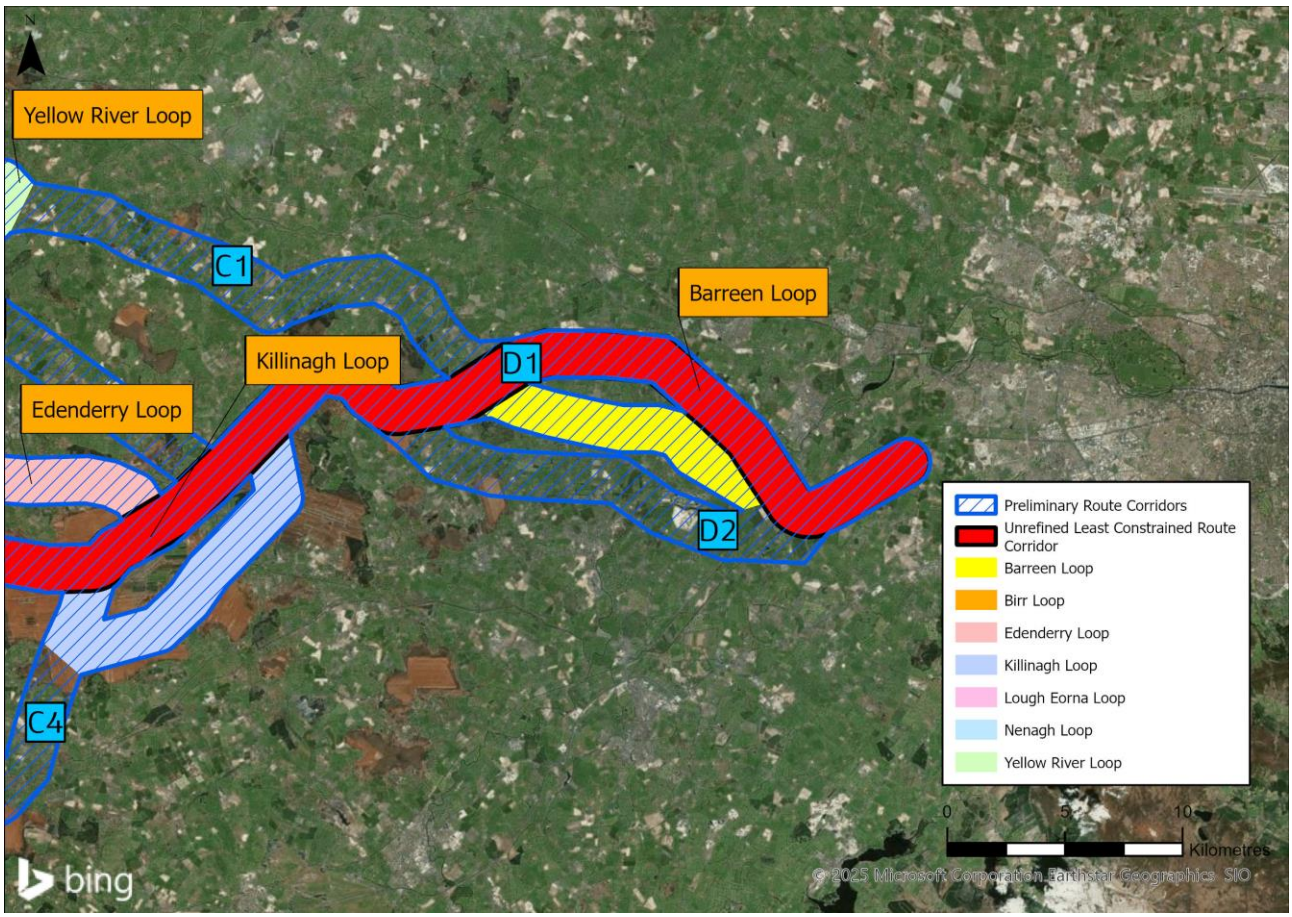


Image 4.6: Route Alternatives between Carbury and Peamount

4.6.3 The Least Constrained Route Corridor

175. The 'Least Constrained Route Corridor' that resulted from the process outlined in Sections 4.6.2 is contained in Appendix B and shown in Image 4.7. At this stage the Preliminary Route Corridor was 2km wide.

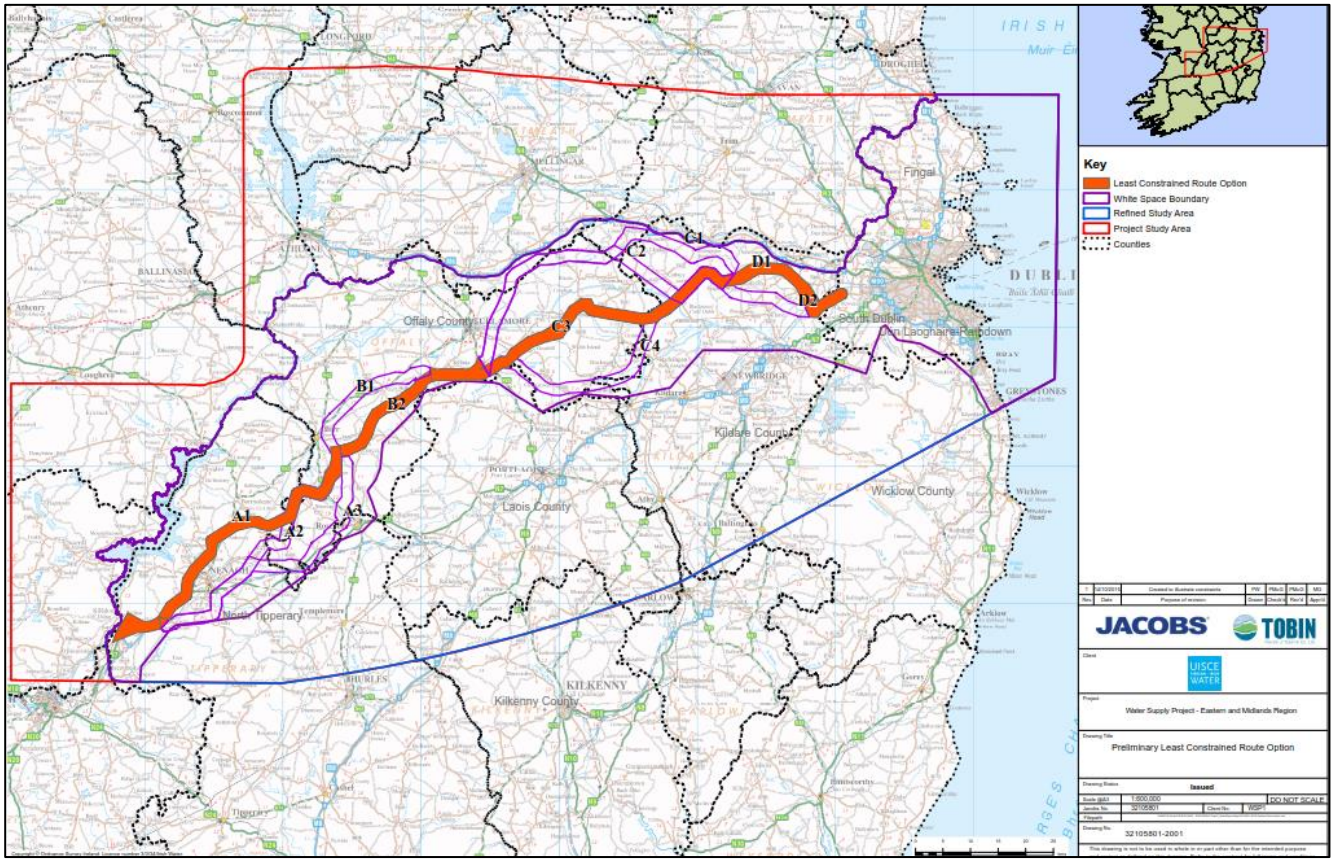


Image 4.7: Parteen Basin to Peamount - Least Constrained Route Corridor

4.7 Steps 3,4 and 5: Final Options Appraisal Report (FOAR) – Route Selection Methodology

176. The FOAR (November 2016) (Irish Water 2016) set out the detailed development to get from the 2km wide 'Least Constrained Route Corridor' to a 'Preferred Route Corridor' (Step 3) to a 'Preferred 200m Pipeline Corridor' (Step 4) incorporating an Indicative 50m Pipeline Corridor (Step 5). The development and refinement of a pipeline corridor followed an ongoing process of updating and augmenting the constraint database, field surveys, and feedback from stakeholders.

177. This section outlines the development of the pipeline corridor up to the point it was published with the FOAR (Irish Water 2016) for a non-statutory consultation.

4.7.1 FOAR – Step 3 – Preferred Route Corridor

178. The objective of Step 3 was as follows:

- Consider amendments to the 'Least Constrained Route Corridor' (Section 4.6.3) based upon feedback from the POAR (Irish Water 2015c) consultation process
- Confirmation of the 'Preferred Route Corridor' (generally 2km)
- Identification of pipeline / infrastructure assets.

179. Feedback was received from several stakeholders on the 'Least Constrained Route Corridor' for the emerging preferred option; Option C: Parteen Basin Reservoir (Direct).

180. A review of this feedback was undertaken by the project team. The review resulted in several refinements to the 'Least Constrained Route Corridor,' at the following locations:

- Lower Lake (Parteen Basin)
- Annaghmore, south of Tullamore (County Offaly)
- Esker Bog, south-west of Edenderry (County Offaly)
- Timahoe North Bog, south of Enfield (County Kildare)
- North Kildare, south of Maynooth.

4.7.1.1 Parteen Basin

181. The western boundary of the 'Least Constrained Route Corridor' was amended to accurately reflect the riparian boundary of Parteen Basin and the positioning of the infrastructure sites, i.e. the Raw Water Intake & Pumping Station at the proposed abstraction point, and the Water Treatment Plant (shown in Image 4.8).

182. The 2km least constrained corridor was broadened on the approaches to Parteen Basin, to include the areas within which these infrastructure sites were then proposed and sited, and then assessed for least constraint in their own right. Further work on pipeline routing then concentrated on linking the preferred Raw Water Intake & Pumping Station, with the preferred water treatment plant site, as fixed points in this area.

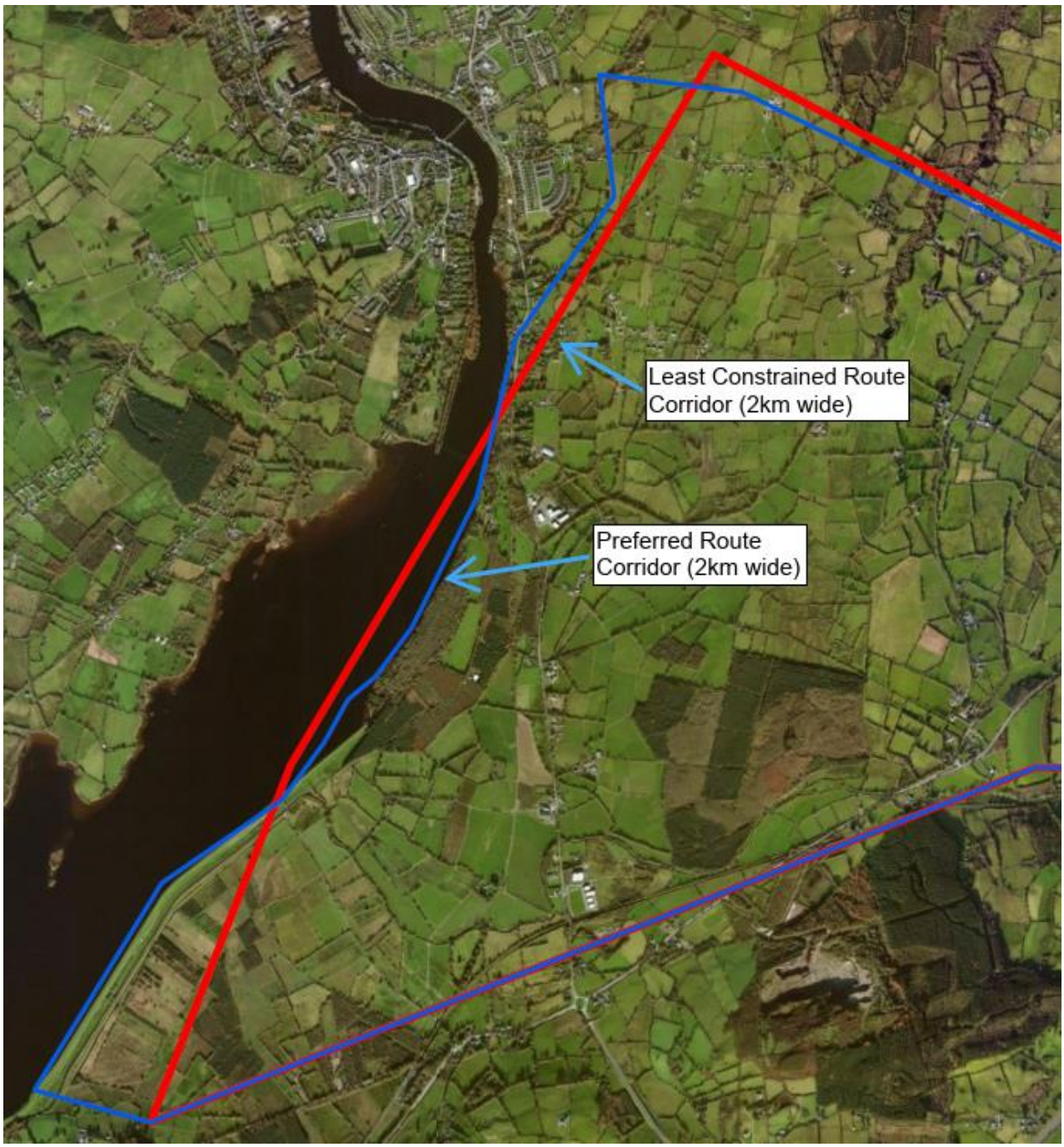


Image 4.8: Parteen Basin - Preferred Route Corridor (2km wide)

4.7.1.2 Annaghmore

183. Due to the high density of constraints identified in the area of Annaghmore, south of Tullamore (Co. Offaly), it was established that a 'Preferred 200m Pipeline Corridor' would be difficult to route within the area originally identified for the 'Least Constrained Route Corridor' (2km) alignment. The environmental constraints identified included:

- Groundwater vulnerability
- Additional habitats (raised bogs)
- Woodland habitats
- Forestry.

184. A detailed review of this area was conducted, and a minor positional amendment was made to the 'Least Constrained Route Corridor', in consideration of these environmental constraints (shown in Image 4.9). The amended corridor allowed the identification of a 200m wide corridor in this area within the known constraints; and became part of the 'Preferred Route Corridor' (generally 2km). The amended corridor was re-positioned slightly south of its original position in the POAR (Irish Water 2015c).

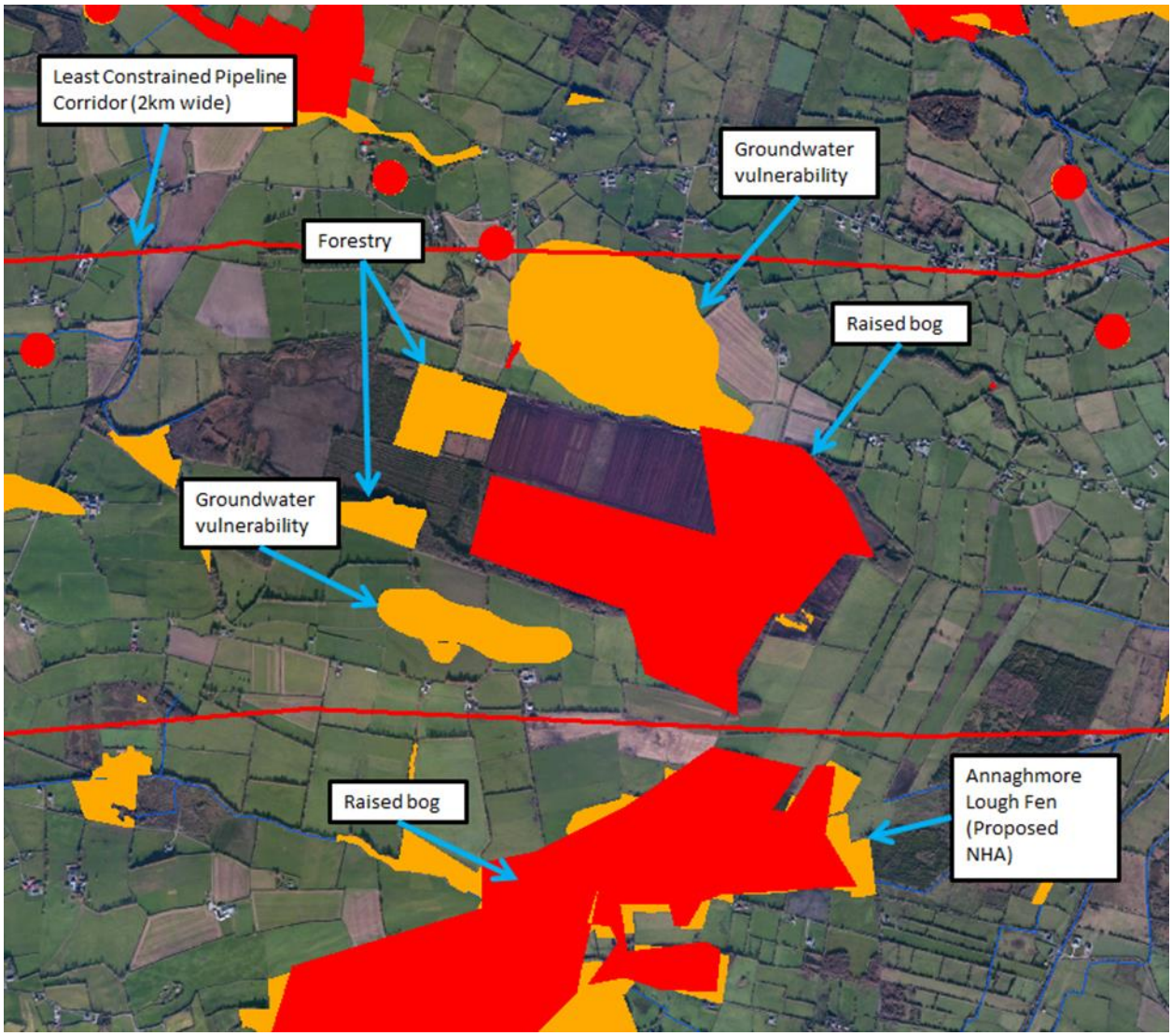


Image 4.9: Annaghmore - Preferred Route Corridor (2km wide)

4.7.1.3 Esker Bog

185. The positioning of the 'Least Constrained Route Corridor', to the south-west of Edenderry, was shown to pass directly through Esker Bog. It was subsequently confirmed through stakeholder consultation that small scale domestic peat production has not been exhausted at this location.

186. Consequently, a detailed review of this area was conducted and realignment to the 'Least Constrained Route Corridor' was proposed, which was cognisant of any potential further refinement in this area; in particular enabling the identification of a 200m wide corridor in this area within the known constraints. The positioning of the 200m corridor is cognisant, and mitigatory, of the:

- Impact on future habitat regeneration plans (subsequently entitled rehabilitation plans); and
- Impact on active small scale domestic peat production lands

187. It was determined that the alignment should be re-positioned slightly south of the original location of the 'Least Constrained Route Corridor (shown in Image 4.10). This would facilitate any further refinement of the pipeline corridor as it would allow a 200m corridor (Step 4) to skirt the boundary of the active bog workings. This became part of the 'Preferred Route Corridor' (generally 2km).

Image 4.10: Esker Bog – Preferred Pipeline Corridor (2km Wide)

4.7.1.4 Timahoe North Bog

188. The positioning of the 'Least Constrained Route Corridor', to the south of Enfield, was shown to pass directly through Timahoe North Bog. It was subsequently confirmed through stakeholder consultation that an existing wetland habitat in this area and a section of original undisturbed bog remnant should be avoided, in order to minimise impacts on these habitats.

189. A detailed review of this area proposed a local amendment to the 'Least Constrained Route Corridor', enabling the identification of a 200m wide corridor (Step 4) which would avoid the identified important habitat in this area. The positioning of the 200m corridor was cognisant, and mitigatory, of the:

- Impact on existing wetland
- Impact on original bog remnant.

190. It was determined that the route should be re-positioned slightly south of its original location skirting the boundary of the bog (shown in Image 4.11). This became part of the 'Preferred Route Corridor' (generally 2km).

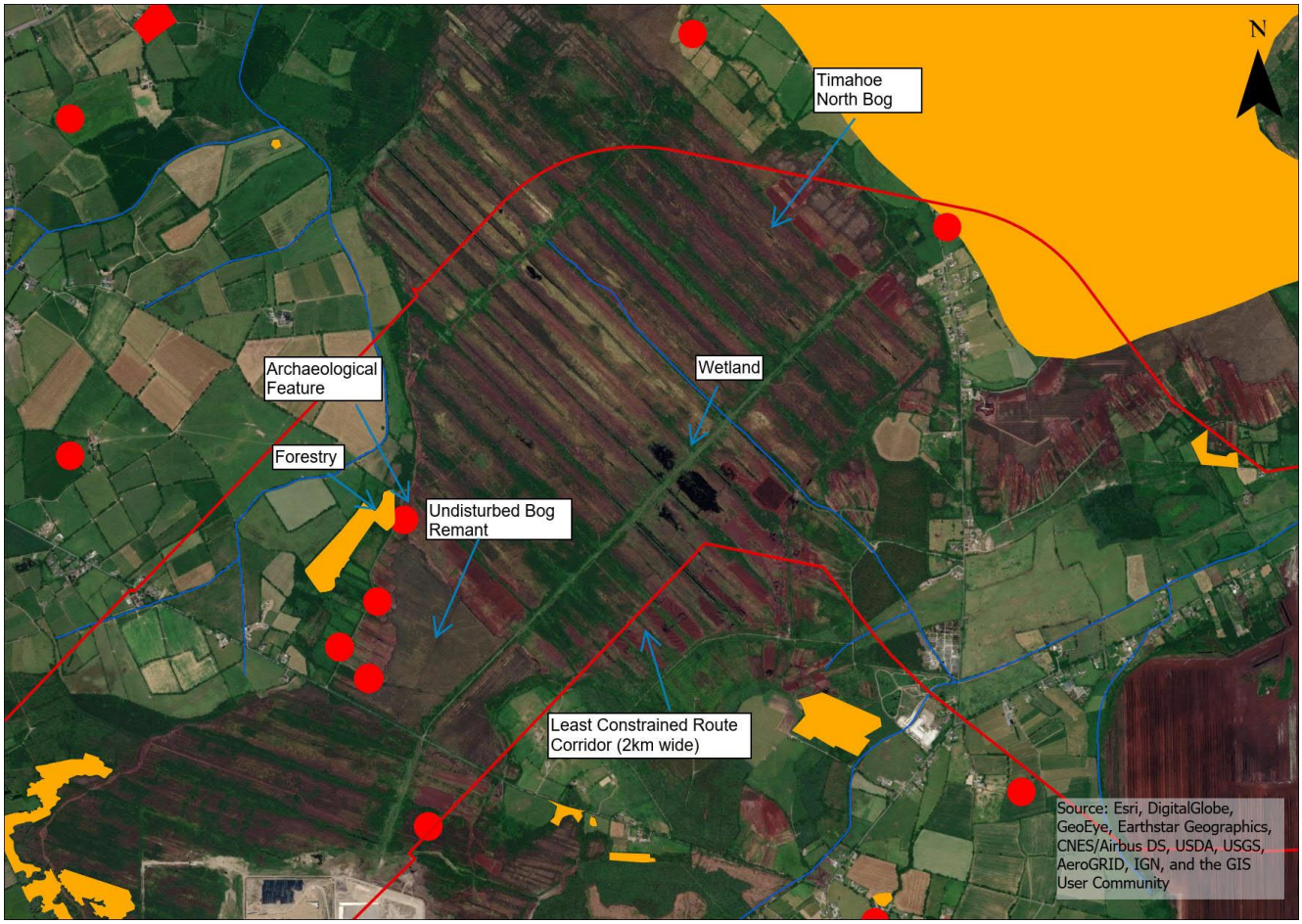


Image 4.11: Timahoe North Bog - Preferred Pipeline Corridor (2km Wide)

4.7.1.5 North Kildare

191. Feedback received during the POAR (Irish Water 2015c) public consultation indicated that the positioning of the 'Least Constrained Route Corridor', to the south of Maynooth, passed through an area of high constraint density, and directly through a number of large-scale local enterprises, which were not immediately identifiable through the earlier 'desktop' investigations. This local constraint density would make it difficult to route a 200m corridor (Step 4), within the 2km alignment of the overall 'Least Constrained Route Corridor'. A re-assessment of the potential route corridors in this area, as shown in the area of the Barreen Loop was carried out (shown in Image 4.12). These corridors were previously considered as part of the POAR published in November 2015.

192. Upon completion of this review a 'Preferred Route Corridor' (generally 2km wide) was established.

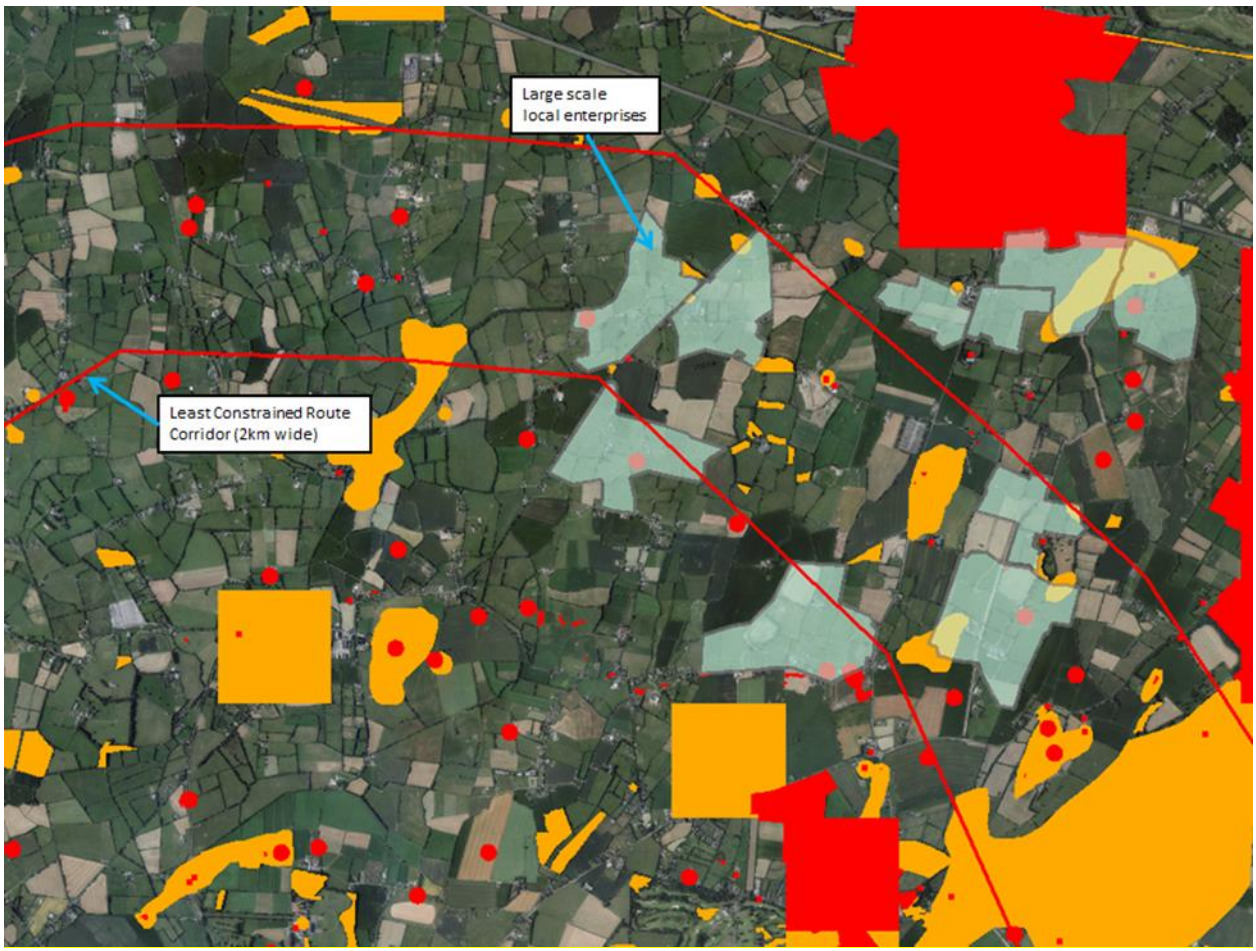


Image 4.12: North Kildare - Preferred Pipeline Corridor (2km Wide)

4.7.1.6 Preferred Pipeline Corridor

193. Upon completion of Step 3, which included taking cognisance of the public consultation process, the 'Preliminary Route Corridor' (generally 2km wide) was re-defined as the 'Preferred Pipeline Corridor'.

4.7.2 FOAR – Step 4 – Preferred 200m Pipeline Corridor

4.7.2.1 Preliminary 200m Pipeline Corridor

194. The objective of Step 4 was to refine the environmental and technical constraints and identify areas with the least constraints within the preferred route from Step 3.

195. The following process was adopted in defining the 'Preliminary 200m Pipeline Corridor':

- The environmental and technical constraints from Step 3 were carried forward and refined within the constraints database
- Data from Ordnance Survey Ireland was also mapped to take account of additional buildings e.g. farmhouses, sheds, etc. not previously identified
- Areas were excluded where a constraint, or combination of constraints, (classified as either 'High' or 'Medium') were of sufficient extent to influence the routing of the 200m corridor
- Field visits of the 'Preferred Pipeline Corridor (generally 2km),' identified in Step 3; and initiating landowner engagement in order to assist with refining the corridor to 200m.

196. See Appendix B for the 'Identification of Preliminary 200m Pipeline Corridor'. These were first published in the FOAR (Irish Water 2016).

197. This mapping was developed further in consideration of the following:

- Maintaining a pipeline elevation to optimise the system
- Avoiding areas of poor ground, where possible
- Minimising the number of obstructions such as road, rail and river crossings
- Minimising landowner impact
- Ease of access, both during construction and operation, to the existing road infrastructure.

4.7.2.2 Preferred 200m Pipeline Corridor

198. Field investigations were carried out, between May 2016 and October 2016, where the specialists surveyed the pipeline corridor. This was supported by landowner liaison and consultation with local stakeholders to avail of local advice and knowledge, and to establish the facts that may have a bearing on pipeline routing. This landowner engagement resulted in alterations to the 'Preliminary 200m Pipeline Corridor.'

199. Subsequently, the *in situ* investigations resulted in adjustments to the 'Preliminary 200m Pipeline Corridor'.

200. Appendix C includes the drawings showing the subsequent 'Identification of Preferred 200m Pipeline Corridor'. These were first published in the FOAR (Irish Water 2016). The constraints which informed the routing of the 'Preliminary 200m Pipeline Corridor', and the subsequent feedback from the environmental surveys, defined the identification of this 'Preferred 200m Pipeline Corridor'.

4.7.3 FOAR – Step 5 – Indicative 50m Pipeline Corridor

201. The objective of Step 5 was to:

- Validate the 'Preferred 200m pipeline corridor', identified in Step 4
- Identify an 'Indicative 50m Pipeline Corridor,' from the 'Preferred 200m Pipeline Corridor' in Step 4
- Obtain feedback from landowners as part of investigative surveys.

202. Whilst the 'Preferred 200m Pipeline Corridor' from Step 4 represents the least constrained route for a pipeline, there were several constraints within it. These constraints were considered in the Identification of an 'Indicative 50m Pipeline Corridor.' The latter represents the required construction working width.

203. See Appendix D for the 'Preferred 200m Pipeline Corridor and 'Indicative 50m Pipeline Corridor' drawings, which were published with the FOAR (Irish Water 2016).

204. This 'Indicative 50m Pipeline Corridor' was identified in consideration of known technical and environmental constraints, as well as feedback from landowners as part of the investigative surveys. The final corridor was subject to the following:

- Feedback from the FOAR (Irish Water 2016) public consultation on the 'Preferred 200m Pipeline Corridor', and actions arising
- Further constraints/requirements mapping exercise with the inclusion of an extended constraints/requirements dataset, augmented by additional information upon completion of the environmental surveys, as required
- Ongoing hydraulic design

- Ongoing consultation with landowners/stakeholders. The 'Indicative 50m Pipeline Corridor' will be refined for further positional adjustments accordingly.

205. Feedback from the Public Consultation on the FOAR (Irish Water 2016) was incorporated into the refinement of the pipeline corridor, where possible, but ensuring that at all times proposals are aligned with the environmental assessments.

206. Extensive field surveys supported the establishment of a robust environmental baseline. The extent and scope of these surveys were identified by the specialists/specialisms during the desktop review (during the preparation of the POAR (Irish Water 2015c)) and undertaken in support of the identification of the 'Preferred 200m Pipeline Corridor' and 'Indicative 50m Pipeline Corridor' which were included in the FOAR (Irish Water 2016). These surveys supported a full and proper impact assessment of the 'Indicative 50m Pipeline Corridor' and enabled suitable mitigation to be incorporated, as required.

207. Landowner engagement was carried out via Landowner Liaison Officers (LLOs). The function of LLOs includes relaying issues raised by landowners to the project team for consideration in the identification of the 'Indicative 50m Pipeline Corridor.'

208. Due to the large pipeline diameter and route curvature limitations, positional adjustments, where possible, are undertaken in a collective way, taking these issues into account. The 'Indicative 50m Pipeline Corridor' represents the least constrained route for the construction of a supply main between the water treatment plant and the termination point reservoir, the point of connection to the Greater Dublin Area Water Resource Zone; primarily defined by extensive environmental constraint mapping, and optimised (engineering) to efficiently convey the treated water.

209. The final route incorporated those line adjustments which are possible within the engineering constraints of a large diameter pipeline and developed from a collective consideration of views expressed in consultation with landowners, taking account of their advice with regard to their particular lands, and aligned to cause the least impact, during construction and operation.

4.8 Post Step 5 Route Refinement

210. The non-statutory consultation process on the FOAR (Irish Water 2016) initiated direct engagement by Irish Water with landowners along the route of the proposed pipeline. This process included landowner information evenings, public open days, and direct landowner engagement delivered by four LLOs. Feedback received during this process was considered by the project team to further inform the development of the proposed scheme. Further information on the non-statutory consultation process is provided in the Final Options Appraisal / EIS Scoping Report – Consultation Submissions Report (April 2018) (Irish Water 2018).

211. The constraints database was under continuous review, updated and augmented as required. Field surveys by ecologists continued, and geotechnical investigations were carried out; both intrusive and non-intrusive. In addition, the preliminary design has been informed by ongoing consultations with stakeholders.

212. The selection of a '50m Pipeline Corridor' is an iterative one and involved extensive consultation with landowners directly and indirectly affected by the proposed development. Subsequent to the FOAR (Irish Water 2016) non-statutory consultation, the LLOs have recorded almost 13,500 individual interactions with these landowners.

213. Landowners' reroute requests were received over 14 weeks from 8 November 2016 to 14 February 2017 and thereafter. All requested adjustments to the pipeline corridor were subjected to the same robust approach to pipeline route evaluation, where the various specialists used MCA to reach a consensus on the merits of a proposed change. In addition, any decision-making process took account of the potential

impact on neighbouring land holdings, i.e. an adjacent land could not be unduly disadvantaged by reaching an accommodation elsewhere.

214. This process has continued between 2018 and 2025 with on-going engagement with landowners and re-routes proposed by landowners throughout this period. These are set out in Appendix E.

215. At the same time as part of the on-going preliminary design process, a number of technical routing adjustments have been proposed. These adjustments result from minor improvements in the design and have been subjected to the same robust approach to pipeline route evaluation.

216. This decision-making process was broadly divided up into three categories:

- Technical Analysis
- Environmental Analysis
- Landowner Engagement.

217. Technical analysis assessed the constructability of a proposed change, and potential impact on the operation and maintenance of the proposed development; and included the following:

- Adequate working area to construct the pipeline
- Due consideration was given to how close the pipeline would be located relative to buildings and infrastructure, and other constraints such as archaeological features – maintaining an adequate buffer
- Impact of any change to the pipeline length and to the number of bends required, which affect the hydraulic operation of the pipeline
- The 'Layout' of the landholding was reviewed to ensure relative alignment of the pipeline
- Topography – the avoidance of steep gradients and high elevations, wherever possible, to facilitate hydraulic profiling and pipeline operation
- Increased number of watercourse crossings which introduce greater complexity in construction; and
- Traffic – the maintenance of access to property and sight lines.

218. The environmental analysis assessment of any proposed change considered the site-specific factors, which focused on the following:

- Ecology – impact on flora and fauna, particularly with respect to Annex 1 and Annex 2 of the Habitats Directive
- Impact on watercourses
- Alignment of watercourse crossings – pipeline to be perpendicular to watercourse, wherever possible.

219. With respect to the landowner engagement category, consideration was given to the following:

- Agreement required with neighbouring landowner(s) to effect a proposed realignment of the pipeline
- Increased impact on neighbouring landowner(s) which already have the proposed alignment of the pipeline through their land(s), e.g. length
- Introduction of new landowners that were not previously directly impacted by the proposed development.

220. Ongoing consultation, and design development, has continued to influence the route of the '50m Pipeline Corridor' with dialogue with landowners and other affected parties used to explore options to make minor amendments to the pipeline corridor. This has resulted in minor changes to the indicative planning

application boundary but the boundary of the indicative 50m pipeline corridor identified through the routing process in 2016 remains broadly the same.

221. This is documented in Appendix E where mapping describes the reroutes carried out, and includes a summary of each of the requests, and the environmental, technical and landowner engagement assessment.

222. A decision on the reroute requests were categorised as 'Not Facilitated', 'Partially Facilitated', or 'Facilitated' defined as follows:

- Not Facilitated – unable to alter the 'Indicative 50m Pipeline Corridor' as requested for a technical, environmental or landowner reason
- Partially Facilitated – able to alter the 'Indicative 50m Pipeline Corridor' to some extent but unable to comply fully with the request due to a technical, environmental or other landowner reason
- Facilitated – able to alter the 'Indicative 50m Pipeline Corridor' as requested.

223. Decisions along with the reasoning were communicated to the landowner(s) who made the request. A total of 140 requests were made with respect to an adjustment to the pipeline corridor; summarised as follows:

- Not Facilitated – 44 No.
- Partially Facilitated – 43 No.
- Facilitated – 50 No.
- No re-route required – 3 No.

224. In addition to these, 36 route refinements have been made for technical reasons such as revising the geometry of the pipeline.

225. The Pipeline Corridor with the accepted re-routes presented in Appendix E represents the pipeline route as submitted within the Strategic Infrastructure Development Planning Application and Compulsory Purchase Order Application.

226. An example of a facilitated landowner requested re-route is shown in Image 4.13. The landowner requested if a re-alignment could be facilitated to reduce the impact on the land. There were no technical or environmental reasons why this was not reasonably practicable and therefore, it was accommodated.

227. An example of a rejected landowner requested re-route is shown in Image 4.14. The request was to move the alignment closer to the boundary of the landholding. A sub-option which would not have involved such an extensive re-alignment was also considered. Neither re-route was not taken forward. This was due to technical implications of altering the alignment and the environmental consequences of doing so.

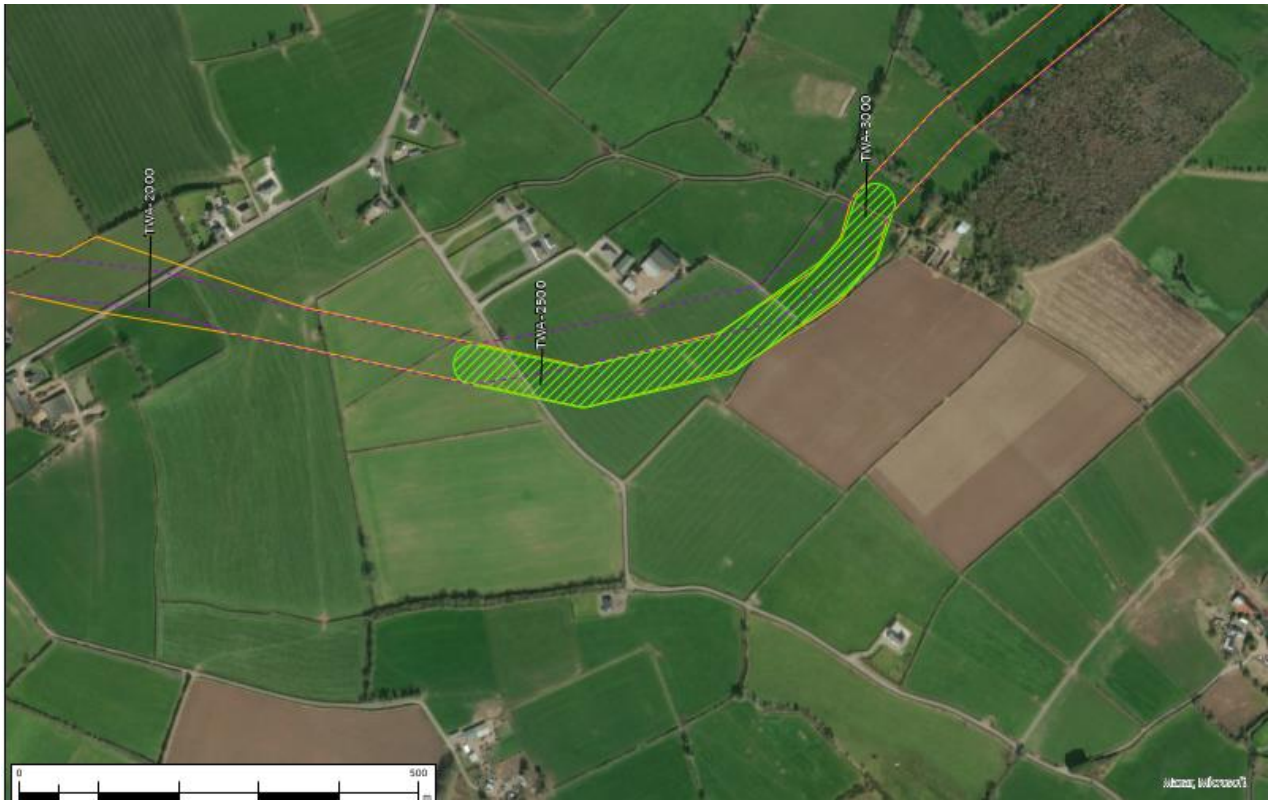


Image 4.13: Example of a landowner-requested re-route that was facilitated

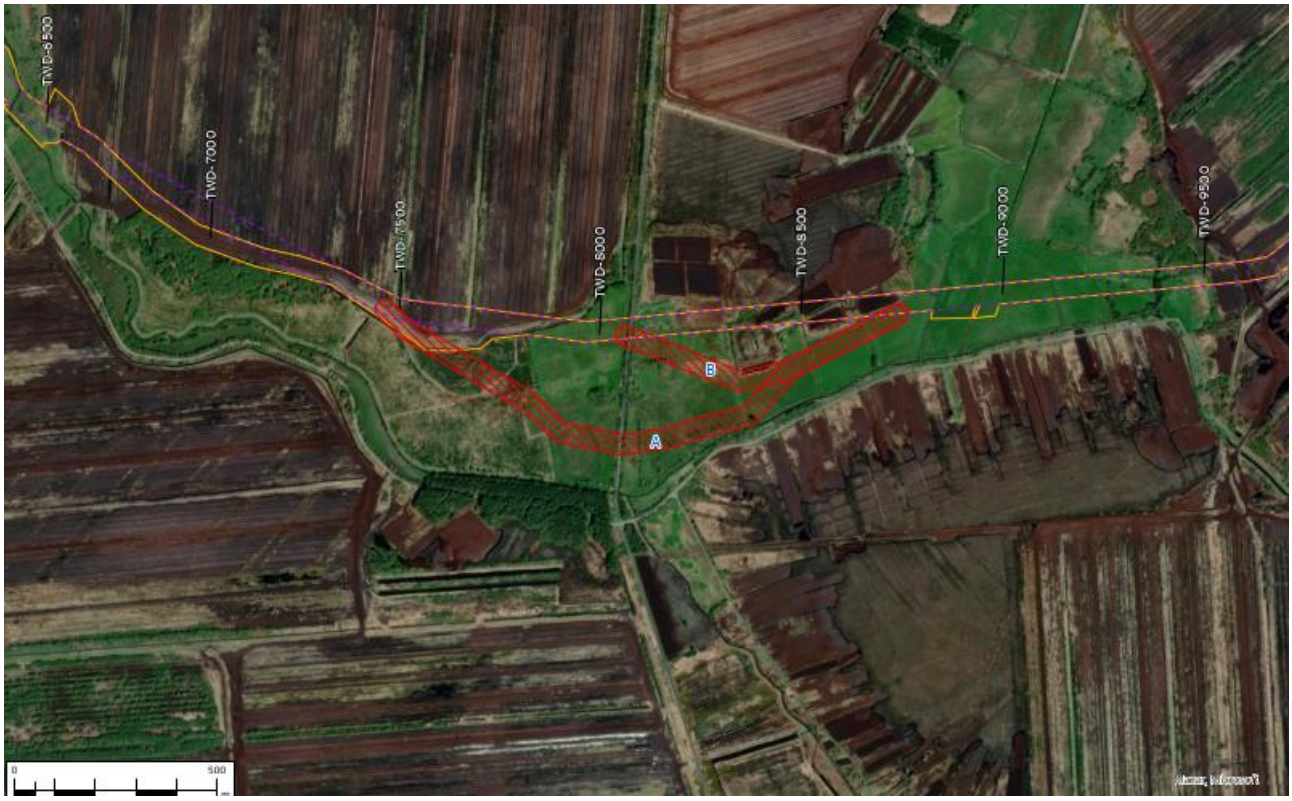


Image 4.14: Example of a landowner-requested re-route that was not facilitated

228. Image 4.15 shows an example of a partially facilitated landowner requested re-route. In this example, the alignment has been refined to reduce the impact of the project on paddocks, while maintaining an environmental buffer with the River Liffey. Image 4.16 shows a technical re-route with a slight realignment of the pipeline that was facilitated to reduce the impact on rehabilitated peat bog.

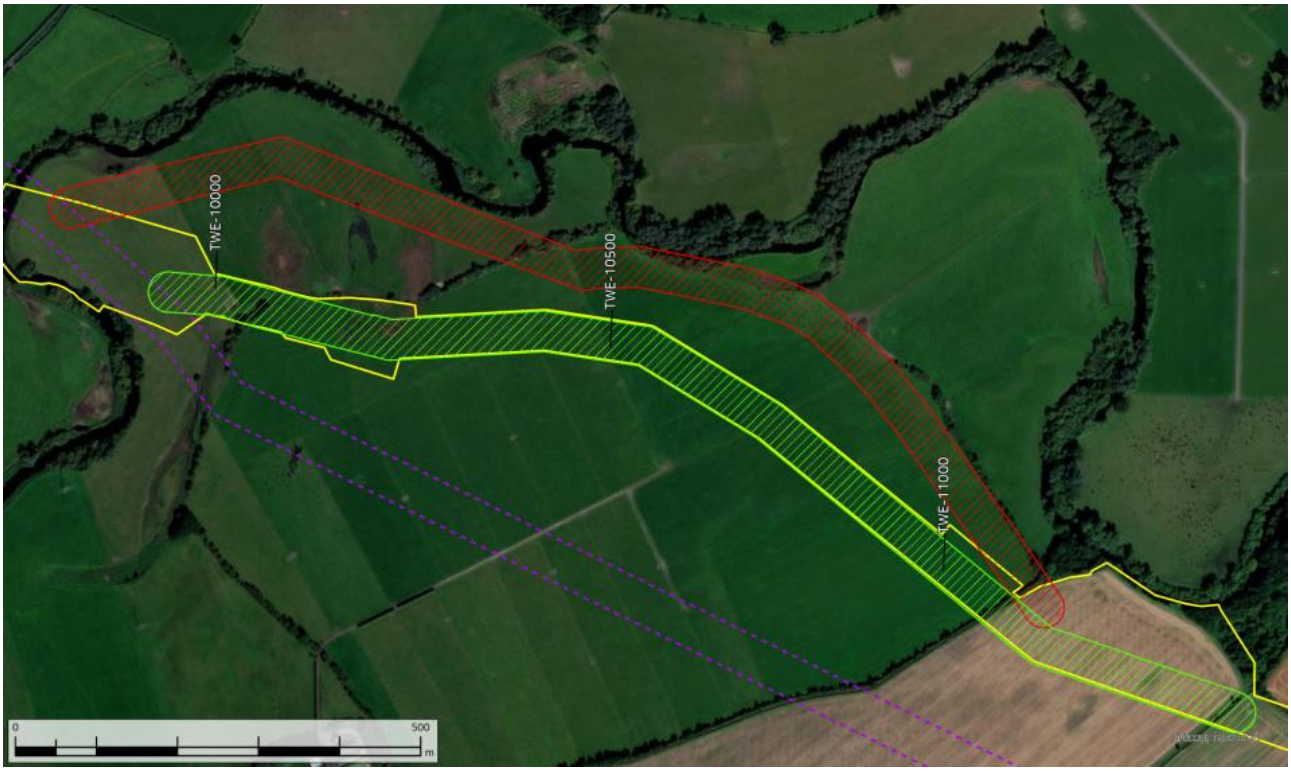


Image 4.15: Example of a landowner-requested re-route partially facilitated to reduce impact on paddocks

Image 4.16: Example of a technical re-route facilitated to reduce the impact on rehabilitated peat bog

5. Route Development Example – Ardcrony / Ballythomas

229. Section 3 set out the steps taken and principles employed, in developing the pipeline route between Parteen Basin (County Tipperary) and Peamount (County Dublin).

5.1 Steps 1 to 5

230. For demonstration purposes, an example has been taken to show how these steps informed the identification of a least constrained route for one particular section. The chosen example is in the Ardcrony and Ballythomas areas, west County Tipperary, which is an area noted for its high density of cultural heritage and sensitive habitats. This example has been included as the area was heavily constrained and involved extensive landowner engagement to arrive at the final proposed route.

231. The selection of the proposed route through the Ardcrony and Ballythomas areas is described in the following Sections.

5.1.1 Steps 1 and 2 – Ardcrony/Ballythomas

232. As part of the constraints process, a number of 2km wide route corridors were developed and through the process of assessing these corridors, a 'least constrained' route corridor was identified, as shown in 'red' on Image 5.1.

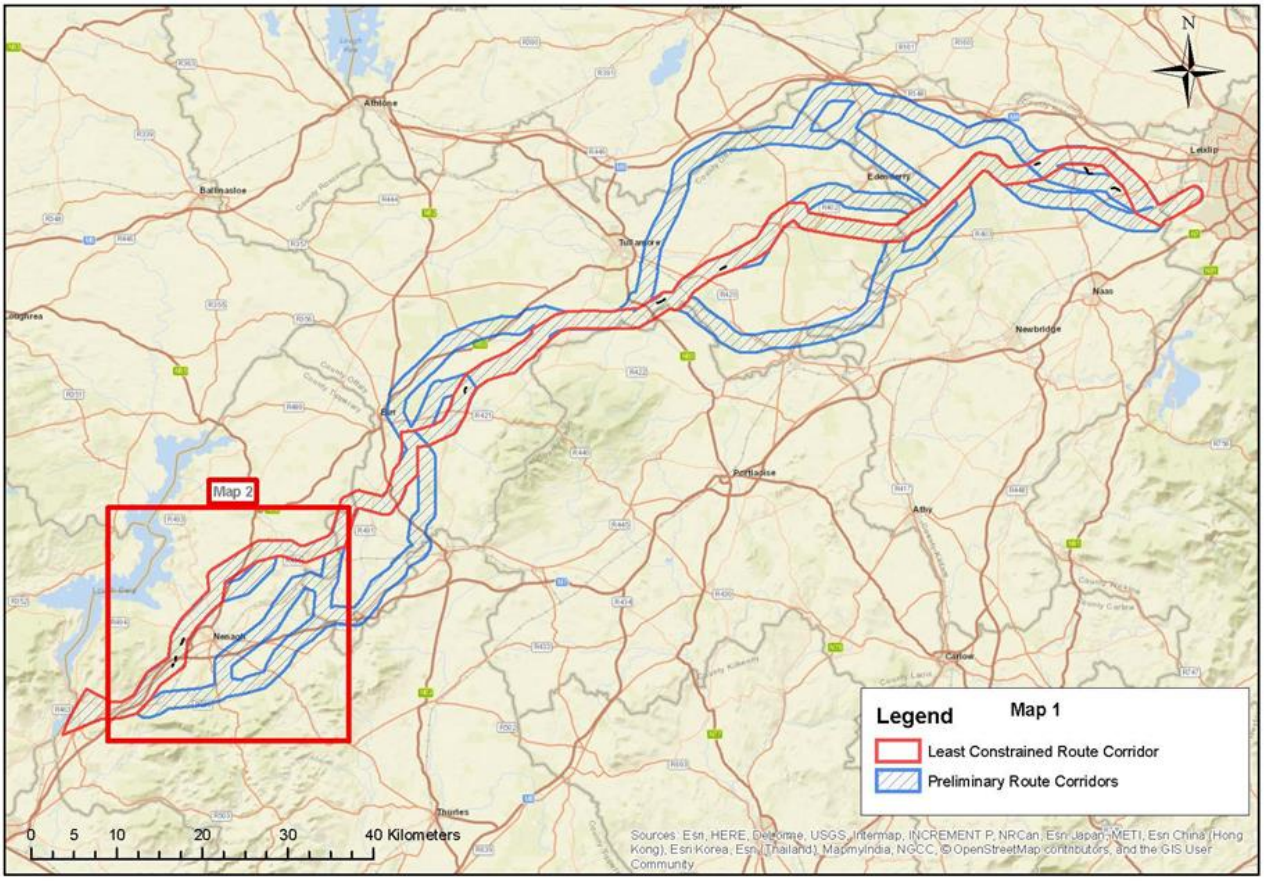


Image 5.1: Corridor Options and Least Constrained Corridor

233. Route corridors to the north and south of Nenagh, County Tipperary were considered, as shown in Image 5.2. The route corridor located to the north of Nenagh, emerged as a route of 'least constraint'. This corridor is located in the vicinity of Ballythomas/Ardcrony.

234. There were a number of constraint factors that determined the 'least constrained' route corridor; they included:

- Identified historical mine area at Kilnacranna
- A lesser number of national monuments, shown as 'red dots' on Image 5.2
- Rock and extreme groundwater vulnerability areas, shown in 'amber'.

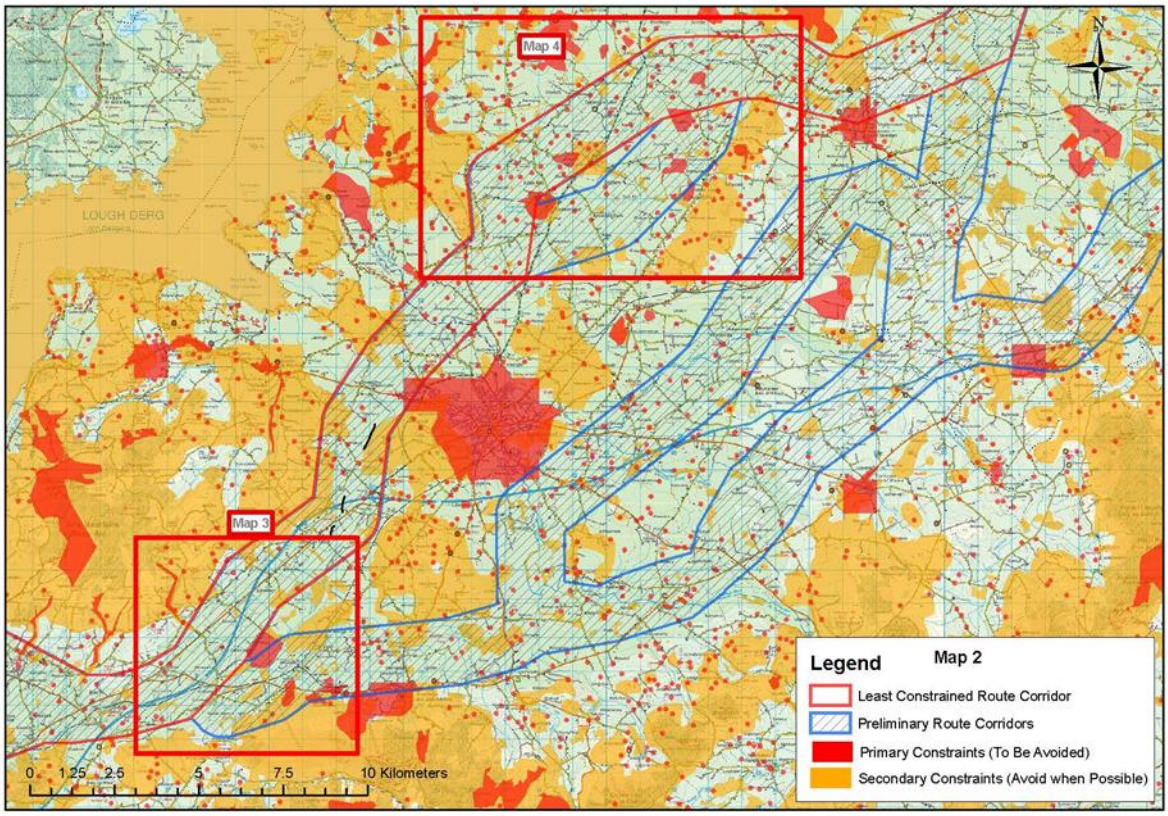


Image 5.2: Corridor Options and Least Constrained Corridor in Nenagh Area

235. The divergence, north and south, of Nenagh takes place near Kilnacranna, as shown in Image 5.3. A key constraint influencing the divergence at this location was the identified area of mining, along with the number of national monuments having archaeological importance. Further details on the route selection process at this location can be found within the published POAR (Irish Water 2015c) as previously outlined.

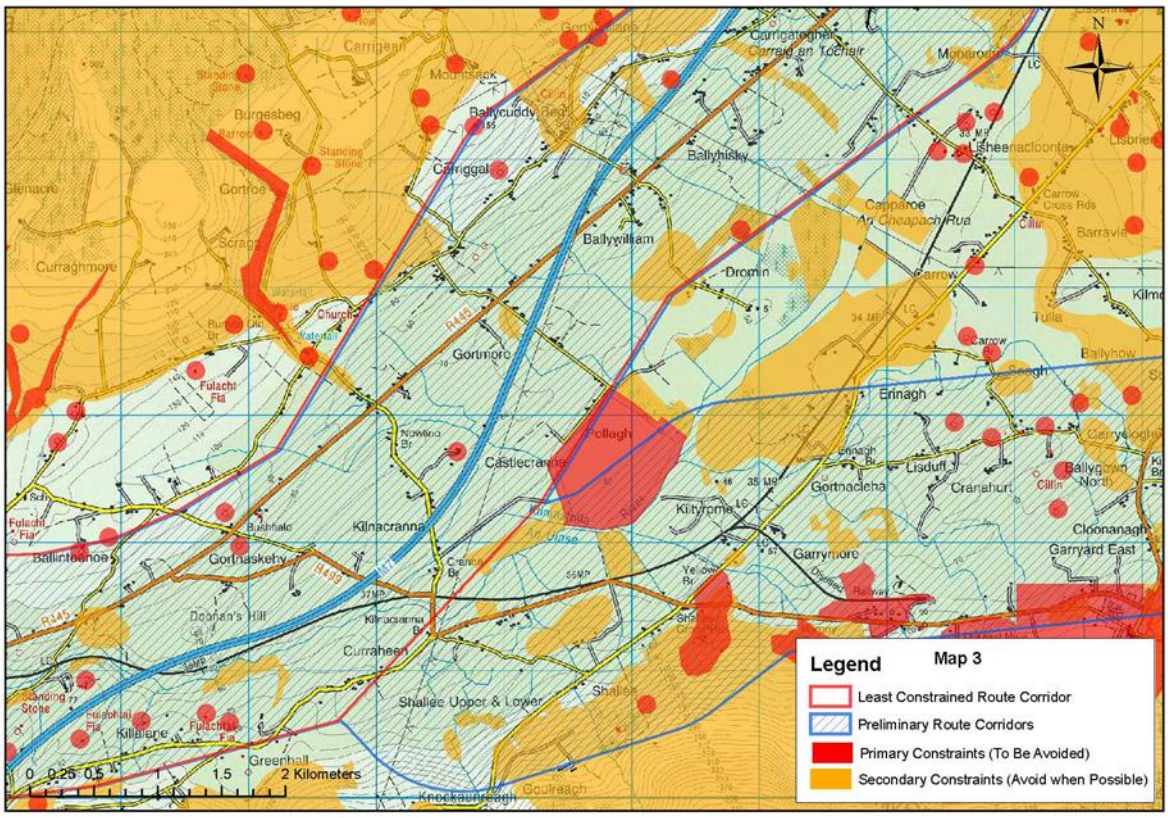


Image 5.3: Corridor Options and Least Constrained Corridor at Kilnacranna

236. Further northwards, the route corridor encountered a divergence point at Lough Eorna (near Ashley Park). At this location, the corridor could be routed either towards Ballylusky townland via Ballythomas (north of Ardcrony) or Coolderry (south of Ardcrony), as shown in Image 5.4. Potential effects on a number of ecological sites were considered, including:

- Lough Eorna (fen/wetland) and the potential Turlough at Ardcrony
- A number of potential esker grassland features
- Areas of discrete semi-natural woodland, bog woodland, scrub and fens
- Winter bird site at Coolderry/Ballylusky.

237. Following an assessment by a range of specialists on the diverging route corridors, it was established that all the potential environmental impacts, including ecology were similar for both routes and that the decision relied on the engineering considerations of pipeline routing. The northern corridor had the least potential for encountering ground where construction would be difficult, was more favourably accessed from secondary roads along its route and had the greater potential for avoiding areas prone to flooding.

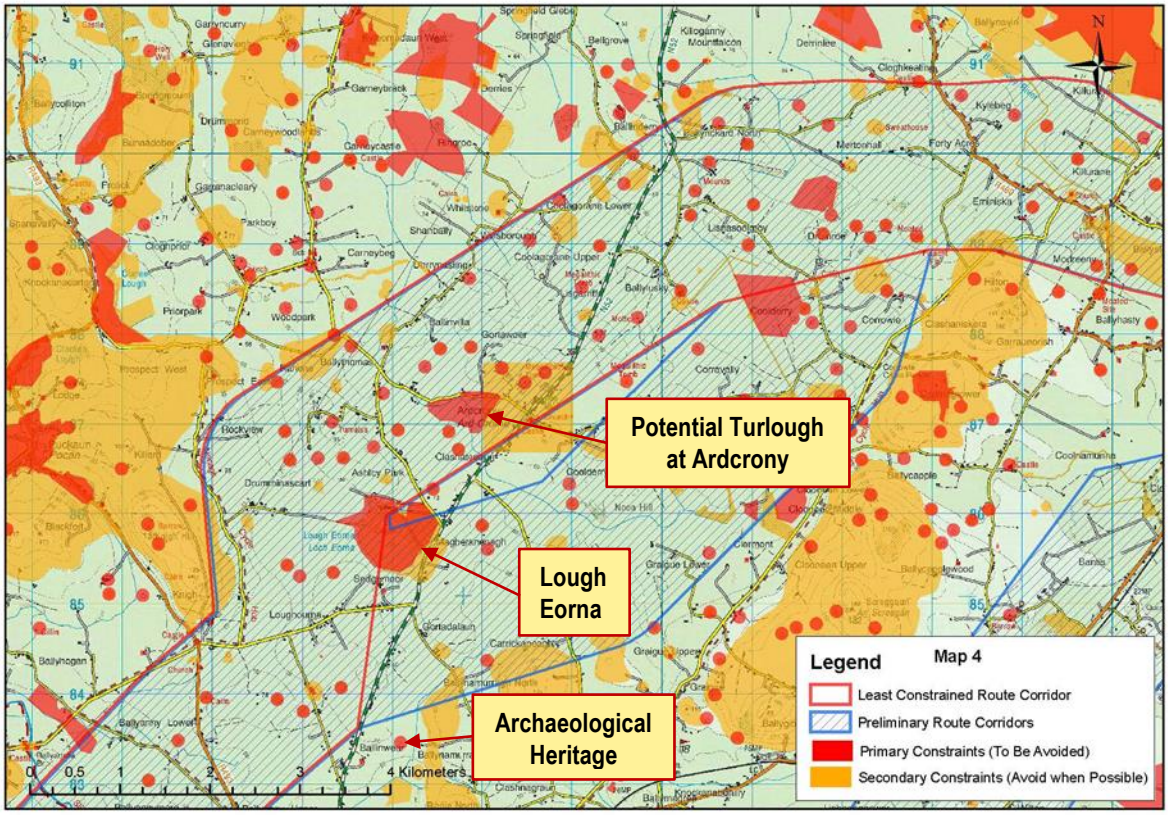


Image 5.4: Corridor Options and Least Constrained Corridor at Ballythomas / Ardcrony

5.1.2 Step 3 - Ardcrony/Ballythomas

238. During the POAR public consultation, no feedback was received in relation to the route corridor at Kilnacranna or Lough Eorna. Consequently, the 'Preferred Route Corridor' (generally 2km) was established through the Ardcrony/Ballythomas area.

5.1.3 Steps 4 and 5 - Ardcrony/Ballythomas

239. This next stage involved a refinement of the 'Preferred Route Corridor,' (generally 2km), to identify the initial position for a 'Preliminary 200m Pipeline Corridor.' This was followed up with visual surveys from the public road and field surveys, undertaken by the specialists as part of the process of confirmation, repositioning and refining the 200m corridor, with the final corridor shown in Image 5.5. This dynamic assessment process identified further constraints which had to be accommodated, including:

- An undocumented potential turlough
- Archaeological heritage features in an updated Record of Monuments and Places (RMP) database.

240. With regard to the foregoing various surveys and further specialist assessments, the alignment of the 'Preliminary 200m Pipeline Corridor' had evolved by the time it was published, as the 'Preferred 200m Pipeline Corridor,' for consultation, see Appendix C.

241. A further step taken in the FOAR (Irish Water 2015c) was to identify an 'Indicative 50m Pipeline Corridor' within the 'Preferred 200m Pipeline Corridor.' The assessment process applied to this step was identical to the process applied to identify the 200m corridor within the 2km corridor but was applied at a higher resolution. For example, the proximity to existing properties informed the 'threading' of a viable 50m pipeline corridor. A 40m buffer had been applied to the Geo-directory coordinate position.

242. The collective knowledge from the desk-based constraint mapping, supported by field surveys, facilitated the identification of a 'Preferred 200m Pipeline Corridor,' incorporating an 'Indicative 50m Pipeline Corridor.' See Appendix D.

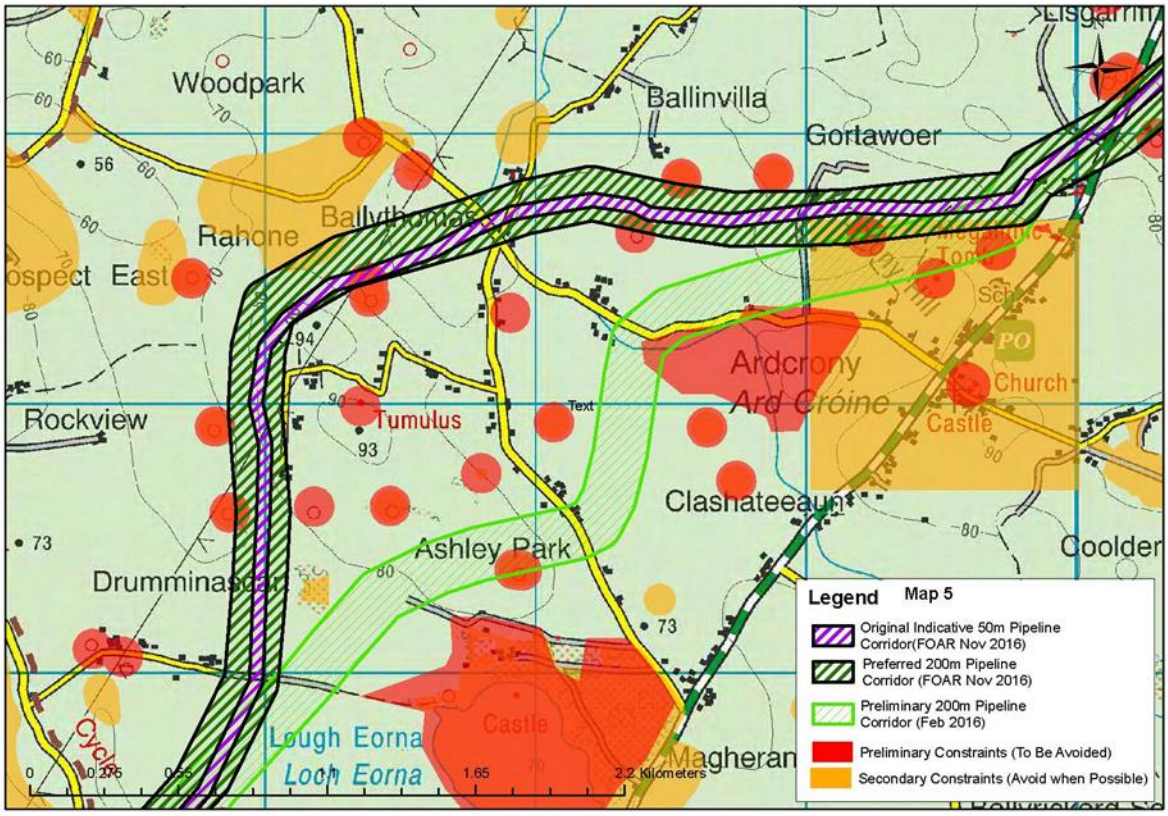


Image 5.5: Least Constrained Corridor at Ballythomas/Ardcrony

5.1.4 Post FOAR - Ardcrony/Ballythomas

243. Upon completion of the FOAR public consultation, including feedback from landowners in the Ardcrony/ Ballythomas area and a submission from an independent hydrogeologist concerning the impacts to a karst drainage system and associated surface karst features, several further hydrogeology, hydrology, ecology and geotechnical ground investigations were conducted.

244. In recognition of the further constraints identified through the investigations, the 50m corridor was adjusted as identified in 'blue' on Image 5.6. The adjustment was attributed to avoidance or accommodation of the following constraints:

- Feature identified in Ballythomas as possibly representing a turlough
- Overhead high voltage ESB power line
- Archaeological heritage features, in the updated RMP database.

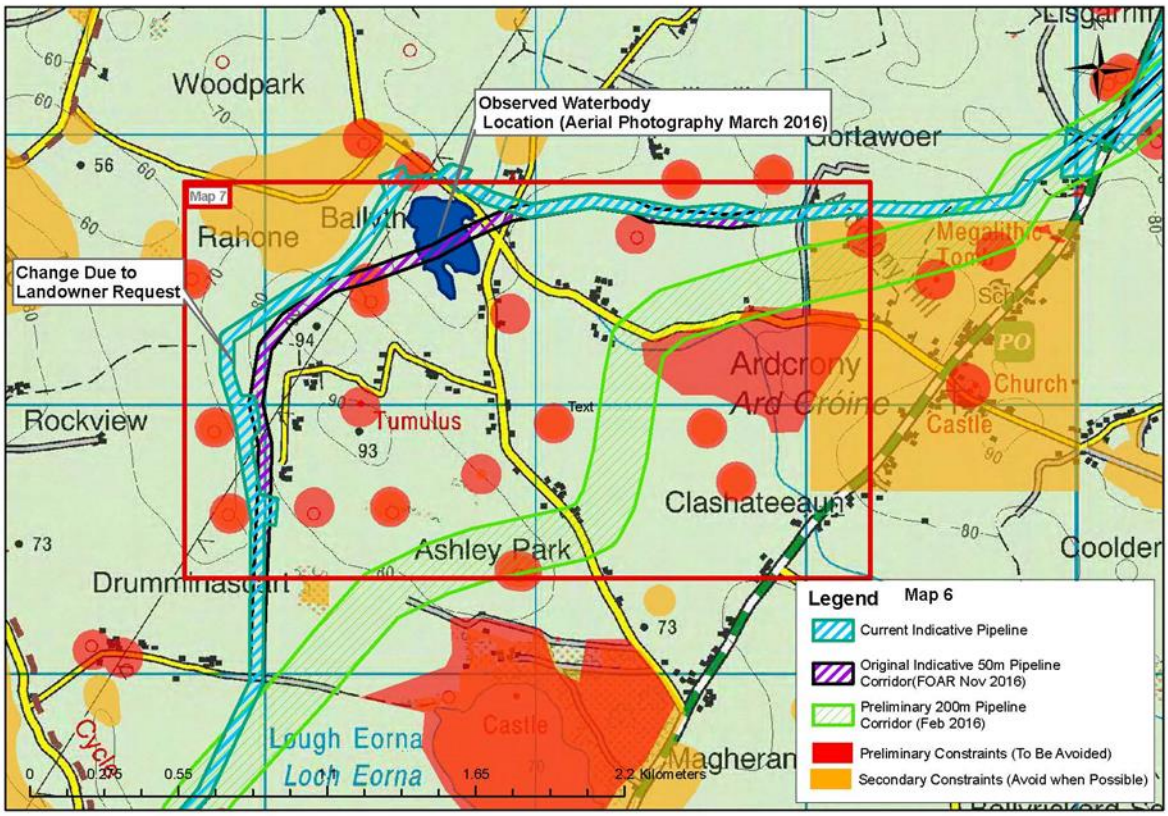


Image 5.6: Current Indicative 50m Pipeline Corridor at Ballythomas/Ardcrony

245. The 'Indicative 50m Pipeline Corridor' as identified in Image 5.6 avoided the feature representing a potential turlough, the ESB pylon and the archaeological site (fulacht fiadh). However, it was recognised that the route corridor lies in close proximity to the fulacht fiadh.

246. Due to the proximity to an existing ESB pylon and the crossing of the existing ESB high voltage power line, a section of the pipeline may be laid using a trenchless method such as tunnelling. The working area will be constrained to 20m instead of 50m to minimise the construction impact and vehicle movements. A trenchless method of construction will also mitigate against the impact on the fulacht fiadh.

247. To facilitate the trenchless crossing the Construction Working Width has been increased beyond the Indicative 50m corridor to allow for the additional equipment and materials required. Images 5.7 and 5.8 show the land owner request that was facilitated, the reduction in the working width for the trenchless method and the extended construction working width at either end of the trenchless section.

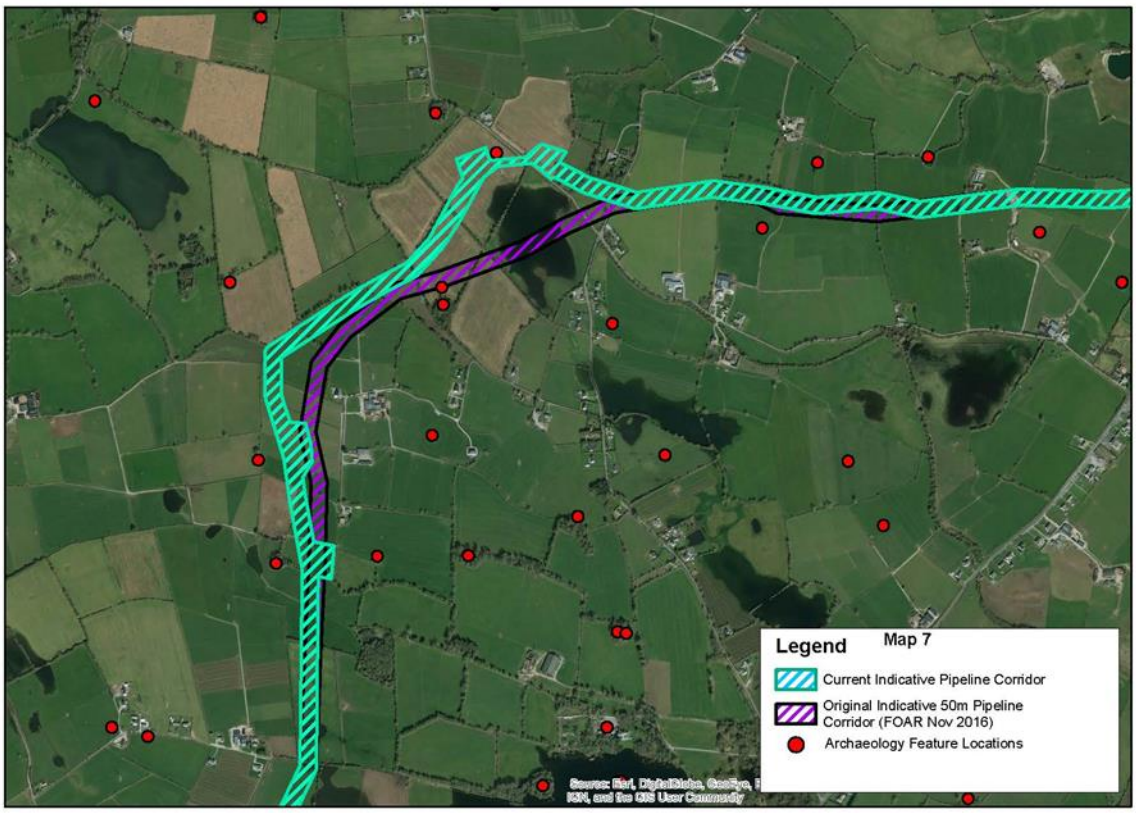


Image 5.7 – Indicative 50m Pipeline Corridor at Ballythomas/Ardcrony - Routed to avoid Potential Turlough

Image 5.8: Construction Working Width and Proposed Project including Facilitated Re-route at Ballythomas/Ardcrony

6. Other Infrastructure Sites

6.1 Water Treatment Plant

6.1.1 Site Selection for the Water Treatment Plant – Land Take Requirements

248. During the previous iterations of the project, the design of the proposed WTP evolved in response to changing engineering, construction and operational requirements that arose from ongoing engineering design, ground investigations and supply / demand balance considerations. Initially, a site requirement of 15 hectares (ha) was anticipated when identifying potential appropriate sites in the FOAR (Irish Water, 2016) for previous iterations of the project. Subsequently, there was a need to review the proposed land take requirement for the WTP site in light of several factors including specifically:

- Achieving the required water standards taking account of the water quality from the New Shannon Source and known invasive species
- Allowing safe and efficient working space clearances for operational maintenance and construction activities
- Accommodating a proposal to store water treatment sludge on the WTP site for periods of up to six months to make the sludge available for beneficial re-use (National Water Resources Plan Draft Framework Plan Technical Appendices, Appendix K – Residuals; (Irish Water 2020), and subsequently incorporated into the adopted Framework Plan (Irish Water 2021)
- Allowing for landscaping of the site in a rural area.

249. Previous iterations of the design for the proposed WTP were prepared prior to the collation of a large body of raw water quality data from the source at Parteen Basin. When such data was collated over an extended period, the design development took account of specific water quality challenges in the raw water, thereby increasing the required footprint of the plant. Examples of this include the incorporation of Granular Activated Carbon (GAC) filters to remove organic matter in order to limit the potential for trihalomethane (THM) generation in the treated water pipeline following disinfection, the incorporation of manganese filters to deal with occasional spikes in manganese in the raw water, and the inclusion of both On-Site Electrochlorination and sodium hypochlorite dosing options for final water disinfection to provide operational flexibility in limiting the potential for biofilm growth in the treated water pipeline. All of these additional treatment process resulted in an increase in the volume of used washwater settlement facilities, and in the scale of sludge management facilities. In previous iterations of the project the original design layout at the FOAR stage included sludge management facilities incorporating thermal drying of the treatment process sludge to minimise the volume of dried sludge that would need disposal from the site rather than temporary retention on site to enable beneficial reuse.

250. Uisce Éireann has opted for a treatment solution to support a circular economy model, and help mitigate climate change, whilst also having available stockpiles to meet supply and demand for sustainable recovery/recycling opportunities.

251. Uisce Éireann's proposal for sludge management at the proposed WTP is therefore not to thermally dry the sludge to 80–90% dry solids, but instead to produce sludge cake of 25% dry solids and to seek beneficial re-use of this cake. It would therefore be necessary to make provision for the storage of sludge cake on the WTP site, as outlets for beneficial re-use may not be available at all times throughout the year. Uisce Éireann has determined that storage would be provided for up to six months of dewatered sludge from the treatment process at the WTP site. It has been estimated that, with three treatment modules in operation producing up to 154Mld in normal operation, the proposed treatment process could produce up to approximately 9,280³ of dewatered sludge cake over a six-month period.

252. Separately, during construction of tankage and deep structures to the levels defined in the developed design, there is a requirement to maintain space to stockpile safely and later move excavated material, to construct interconnecting pipework, and to keep plant and equipment stored away from the immediate

work areas and construction traffic circulation areas. This would be facilitated on space which would later be used during the Operational Phase for storage of spare pipes and fittings and on space being preserved to maintain clearance for cranage during maintenance and for positioning external plant such as silos and surge vessels.

253. Furthermore, preliminary discussions with Tipperary County Council on previous iterations of the project in general, but on the proposed RWI&PS and WTP sites in particular, emphasised the importance of landscaping proposals to reduce the impact of the proposed WTP buildings on the surrounding area.

254. It was therefore concluded that the WTP and ancillary features would require a site of between 26ha to 28ha. The consideration of the alternative sites for the WTP was therefore based on this larger site requirement. This occurred prior to the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Eastern and Midlands Plan (Irish Water 2022) did not consider this level of detail and therefore, the adoption of the Plan does not affect the decision on the size of the WTP site. The Preferred Approach in the Eastern and Midlands Plan (Irish Water 2022) would require a WTP and to this extent the Proposed Project aligns with it.

6.1.2 Evaluation of Alternative Sites for the Water Treatment Plant

255. Arising from this, potential locations sufficiently large to accommodate this greater requirement of a 26ha to 28ha development were identified within approximately a 3km proximity to the proposed RWI&PS. This was achieved by excluding sites with significant environmental constraints, such as an identified flood risk, areas of higher biodiversity potential, existing residential development and areas of archaeological interest.

256. The 3km search radius from the RWI&PS was adopted to limit the length of raw water pipeline, as longer raw water pipelines would pose a higher invasive non-native species risk during the operational phase and would increase general maintenance requirements. The further the WTP is from the RWI&PS the longer the length of twin pipeline that would be required which would increase cost and pumping. This would reduce the energy requirement from the operation of the Proposed Project and, as a result, help to optimise the energy efficiency and reduce carbon emissions.

257. Three general areas were identified as shown in Image 6.1 that met the broad environmental and technical objectives and as such provided reasonable options in principle. Area A covered approximately 194ha and was 1.5km – 2.5km north-east of the RWI&PS and the R494 road. Area B was south of the RWI&PS and covers an area of approximately 230ha. It extended north of the Kilmastulla River and was bounded along the west by Parteen Basin and to the south-east by the R466 road between Birdhill and O'Briensbridge. Area C covered an area of approximately 87ha and incorporated considerable existing development, including residential properties.

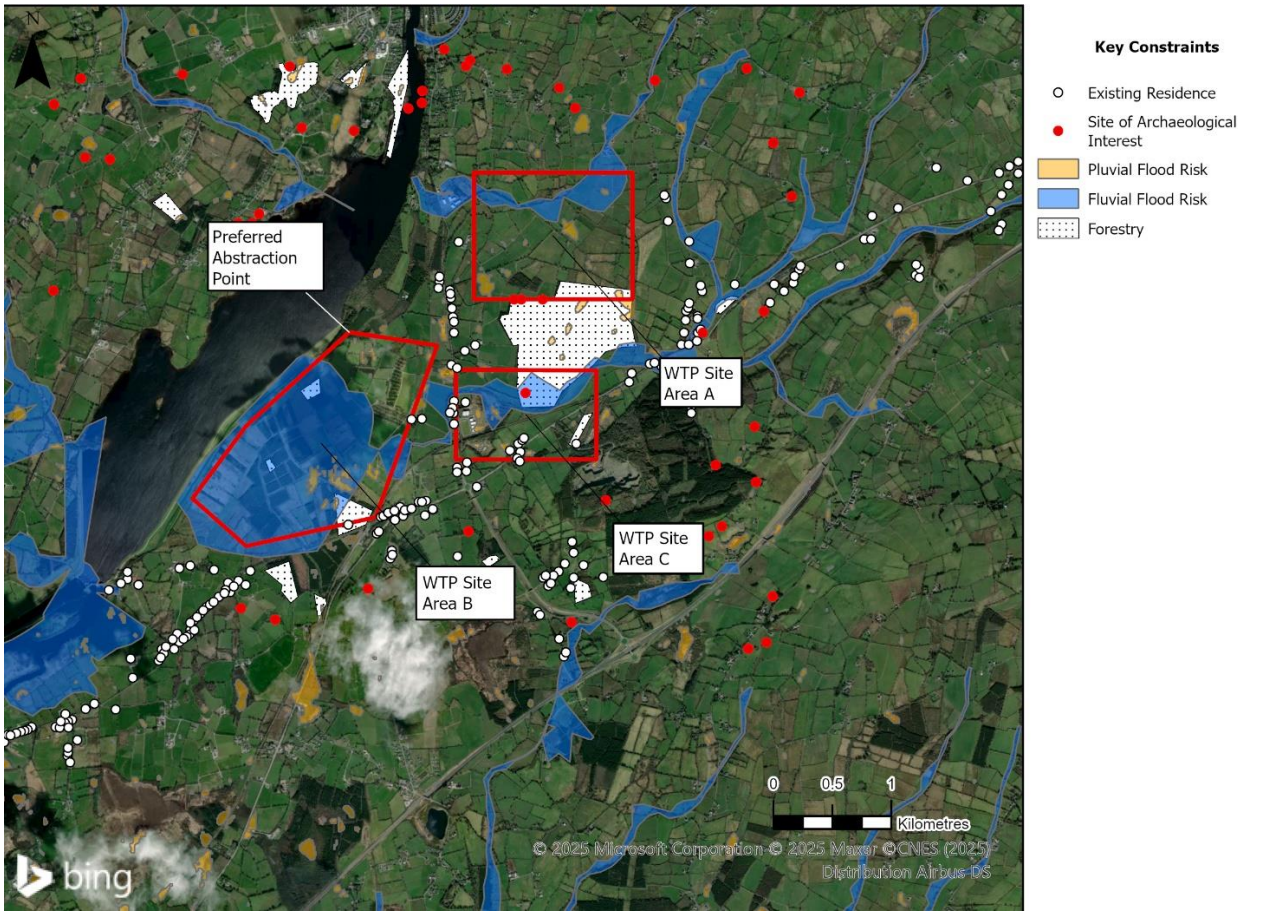


Image 6.1: Potential WTP Site Location Areas

6.1.2.1 WTP Site Location Areas

258. Overall, Area A was identified as the preferred general location for the WTP as a result of this sifting exercise. This was because sites within this area would not be highly visible from the public roads, were generally not in close proximity to a large number of houses and would not impact directly on priority habitats.

259. Once Site Area A had been determined to be the preferred area, four potential land parcels were identified for the WTP and compared using MCA. These sites are shown in Image 6.2 and comprised the following:

- WTP Site 1 was located in the townland of Incha Beg, contained within a sparsely populated rural area that is enclosed within a broad triangle formed by the R496, R445 and R494 regional roads. It was located immediately north of dense woodland, but consists up of open fields, covering an area of 27.5ha. The boundary was defined by existing field boundaries and the site was relatively square in shape and with the ground level falling west to east. This provided a desirable hydraulic profile for the treatment process units
- WTP Site 2 was located to the north of WTP Site 1 (and indeed overlapped WTP Site 1 in part) and east of WTP Site 3. The site covered an area of 28.3ha and was contained within a sparsely populated rural area that is enclosed within a broad triangle formed by the R496, R445 and R494 regional roads. The boundary of the site was defined by existing field boundaries and the site was relatively square in shape and with the ground level falling west to east. This provided a desirable hydraulic profile for the treatment process units
- WTP Site 3 was located to the west of WTP Site 1 and WTP Site 2 and was contained within a sparsely populated rural area that is enclosed within a broad triangle formed by the R496, R445

and R494 regional roads. The area of the site was 31.4ha. The boundary of the site was defined by existing field boundaries and is relatively square in shape

- WTP Site 4 was located immediately south of WTP Site 1, within an overgrown forested area. The boundary of the site was defined by existing field boundaries and the site was relatively square in shape and with the ground level falling west to east. This provided a desirable hydraulic profile for the treatment process units.

260. The summary of the MCA process for the site assessment is shown in Table 6.1. The rankings are colour coded to assessed impact levels as set out previously in Table 3.3.

Table 6.1: Evaluation of Alternative Sites Within Area 1

Constraint	WTP Site 1	WTP Site 2	WTP Site 3	WTP Site 4
Ecology				
Surface Water				
Air Quality				
Noise				
Cultural Heritage				
Landscape and Visual				
Agronomy and land-based enterprise				
People				
Soils, Geology & Hydrology				
Planning Policy				
Traffic, Engineering & Design				
Overall Ranking	1	2	4	3

261. The site selection assessment identified that, although the sites had similar characteristics and constraints and therefore, performed similarly in many environmental respects, WTP Site 1 was furthest from neighbouring residential receptors. and therefore, was marginally less constrained than the other sites for noise, air quality and population and tourism. Similarly, it was marginally less constrained, (along with WTP Site 4) from a landscape and visual perspective because it was well screened (by a combination of vegetation and the terrain) and would not be readily visible from surrounding roads, dwellings and settlements.

262. All sites were broadly similar from an ecological perspective, although for aquatic ecology WTP Site 1 was considered to be slightly less constrained than the other sites based on ecological receptors within and directly adjacent to the site. No surface water constraints were identified at WTP Site 1. However, it was noted that potential access requirements to all sites could give rise to watercourse crossings, with connectivity to the Lower River Shannon SAC downstream.

263. WTP Site 1 was also favoured on the basis of potential traffic connections to the R445 and therefore, avoided effects that could have arisen from the use of smaller local roads. This was also a benefit in terms of construction and longer term operational access.

264. For Cultural Heritage, WTP Site 1 had higher potential for historic remains and so was slightly more constrained than the other sites in that regard.

265. The assessment concluded that WTP Site 1 was the preferred location for the WTP for the following reasons:

- WTP Site 1 was the site that is furthermost from neighbouring residential receptors, and that could be accessed easily by construction and operational traffic using the most direct access from the R445

- WTP Sites 2 and 3 were more constrained than WTP Site 1 by residential and commercial receptors, and through proximity to the Roolagh watercourse
- WTP Site 4 shared the same access road off the R445 as that proposed for WTP Site 1 and consequently shared the associated advantages relating to traffic. However, WTP Site 4 would impact on a greater number of sensitive receptors than the other sites, having a greater number of residences within 500m of the site boundaries.

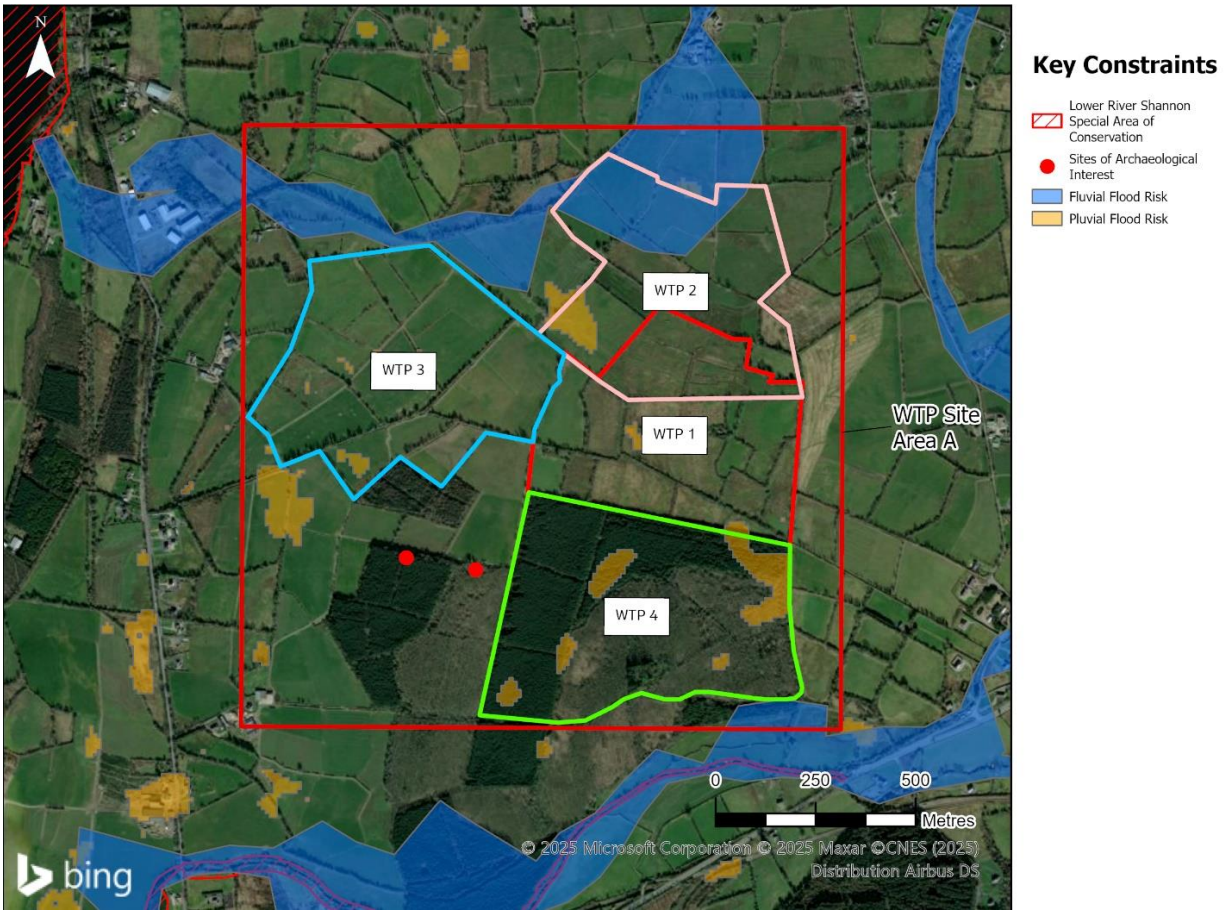


Image 6.2: Potential WTP Sites Within WTP Area A

6.1.2.2 Alternative Access Option for the Water Treatment Plant

266. Four potential access roads were considered to connect the preferred WTP site to the public road. These are shown in Image 6.3.

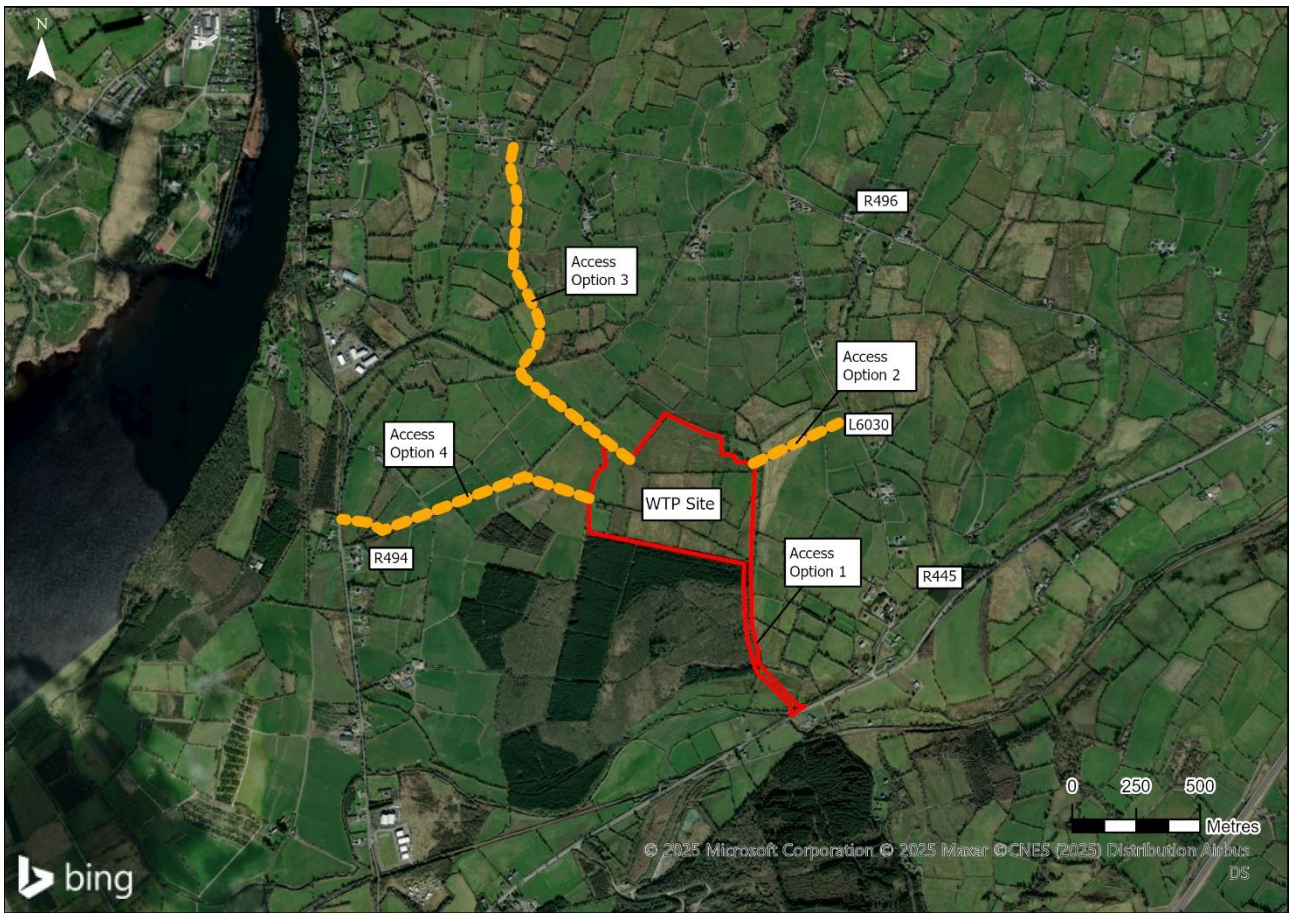


Image 6.3: Potential Access Roads from Proposed WTP Site to Public Roads Network

267. Option 1 approached the WTP site from the south, connecting the site with the R445 (formerly the N7 main Limerick to Dublin road). Option 2 connected the WTP site to a local road, L6030, to the east of the site. Option 3 considered making use of an existing unsurfaced track from the R496 to the north of the WTP site, while Option 4 connected the WTP site to the R494 to the west.

268. Option 1 crossed open farmland and forested land while Options 2, 3 and 4 cross open farmland along their respective routes.

269. There were technical considerations relating to the operation of the WTP which influenced the access road selection. The site topography is such that Raw Water would enter at a relatively high elevation from the western side, and the treatment process would be hydraulically stepped down so that Clear Water Tanks and the HLPS sit at the lowermost (eastern) end. It is preferable, therefore that the access road should enter the WTP Site at the clear water side of the treatment process since the hydraulic gradient for that process is from the Raw Water Balancing Tanks on the western side, to the HLPS on the eastern side. This is for a number of reasons:

- The requirement for independent ESB access to the WTP site substation is better provided for by an access road entering at the south-east corner of the site, since the substation itself is best located near the high lift pumping power requirement. This is the preferable location when cable ducts for ESB power supply are designed to enter via an access road
- The Control Building is properly positioned at the down-gradient Clear Water side of the site, with short runs, routed away from the working area of the site, and from the entrance gate for staff vehicles and for visitors. It is preferable to bring construction traffic and excavated material imports onto the WTP site on a construction traffic route with a road base that would form the eventual access road, and which does not unnecessarily impact the Intake RWRM–WTP axis of early construction work. It is also preferable that WTP construction traffic would not cross or cause

interference with the separate RWRMs and Intake works traffic. The requirement to provide a watermain within the access road to provide for a potential future connection to align with the Eastern and Midlands Plan (Irish Water 2022), is best positioned from an access road entering the site in the quadrant near the Clear Water tanks. It is also preferable to route attenuated surface water drainage from the WTP site within the access roads. Therefore, operationally there was a clear preference for an access on the eastern side of the WTP site.

270. Option 1 was selected as the preferred access road for the following reasons:

- Option 2 would connect to the local road to the east which is a narrow road constrained by ribbon development with poor alignment. This would limit the suitable construction and other traffic and further the required sight lines could not be delivered at the L6030. Option 3 connecting to the north would be constrained by road geometry at Ballina and adequate sightlines could not be delivered on the regional road. This road access would direct traffic movements through Ballina village, which would affect the amenity of the village, particularly at construction stage. The route would also affect a large number of landholdings. Option 4 connection to the west would be to a regional road heavily constrained by ribbon development and could not deliver adequate sight lines with the regional road
- The first 200m to 250m of the route of Option 1 from the R494 would have to be raised above the flood plain of the Kilmastulla River and culverts incorporated into the raised section to allow flood waters to pass under the road in order to avoid an effect on flood risk. In addition it would sever an existing open field and, given that this section of the road would be raised above existing ground levels, it would have a high impact on the land. However, Option 1 to the south was the shortest route (640m in length) with direct access to a high-quality regional road, the R445. Therefore, although it would have some environmental and landowner effects Option 1 was preferred for this reason.

6.1.3 Conclusion of the Site Selection for the Water Treatment Plant Location and Access

271. WTP Site 1 had the least environmental impact of the reasonable alternatives available. It benefitted from more favourable traffic connections to the R445 (the former N7) and would, through avoidance, help to mitigate potential construction related impacts on human beings from haulage traffic employing local roads in the area. As a result, WTP Site 1 was selected for the Proposed Project.

272. Option 1 was selected for the access route as safe access to this site could be achieved and it was the least constrained alternative. Technical and environmental factors were taken into account in the selection for the access route, with no archaeological features nearby, no special protected flora species in evidence and no suitable areas for breeding or wintering birds. It was noted that the route is partially within the Kilmastulla River flood plain and there is some risk of contaminated soil at the former petrol station at the entrance to the public road, however, these could be managed / mitigated through the design process.

273. These design decisions and the options evaluation undertaken in respect of them were made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and the preferred options for the WTP remain valid and continue to be the preferred options for the design of the Proposed Project.

6.2 Break Pressure Tank

6.2.1 Break Pressure Tank Site Selection

274. In the previous iteration of the Proposed Project, it was identified that for hydraulic design reasons, a BPT would be required to be located at, or near, the highest elevation along the transmission pipeline. The BPT would provide the transition between the pumped section of the Treated Water Pipeline and the section that will usually be gravity fed (with additional pumping required for higher flows). Therefore, putting the BPT at the highest point along the pipeline route would provide the greatest opportunity use

of gravity, harnessing the natural topography to convey water by gravity to the TPR. Higher elevations are preferable in principle as this would generate higher energy potential in the Treated Water Pipeline which would make the delivery of water to the TPR more efficient. This would reduce the energy requirement from the operation of the Proposed Project and, as a result, help to optimise the energy efficiency and reduce carbon emission.

6.2.2 Evaluation of Alternative Sites for the Break Pressure Tank

275. The site selection process for the BPT followed a two-stage approach. Initially, strategic locations (necessarily high points along the pipeline route) were identified within the preferred 200m Pipeline Corridor. Following the identification of an optimal strategic location, specific sites were examined to identify a preferred site for the BPT that met technical requirements and minimised adverse environmental effects. This was previously presented in the FOAR (Irish Water, 2016).

276. The initial hydraulic analysis determined that land with an elevation in excess of 125 metres above Ordnance Datum (mAOD) presented the opportunity to maximise gravity flows during operation. Therefore, areas in excess of 125mAOD on the route of the proposed pipeline were mapped.

277. Environmental constraints mapping was applied to the potential sites (noting that impacts on forestry plantations represented a key constraint), and as a result three alternative locations were identified as potential sites for the BPT. Location 1 at Knockanacree, Cloughjordan, County Tipperary was deemed preferable to the other two locations as it is at a higher elevation than the alternatives (147mAOD). As noted, higher elevations are preferable in principle as this would generate higher energy potential in the Treated Water Pipeline which would make the delivery of water to the TPR more efficient. In addition, Location 1 offered the greatest flexibility for siting the BPT, as the elevated area is relatively extensive, (over 2,200m wide), compared with the available area and elevation at the other locations.

278. Within Location 1 three alternative options for the site of the BPT were developed, as shown in Image 6.4[6].

[6] FOAR, Appendix G

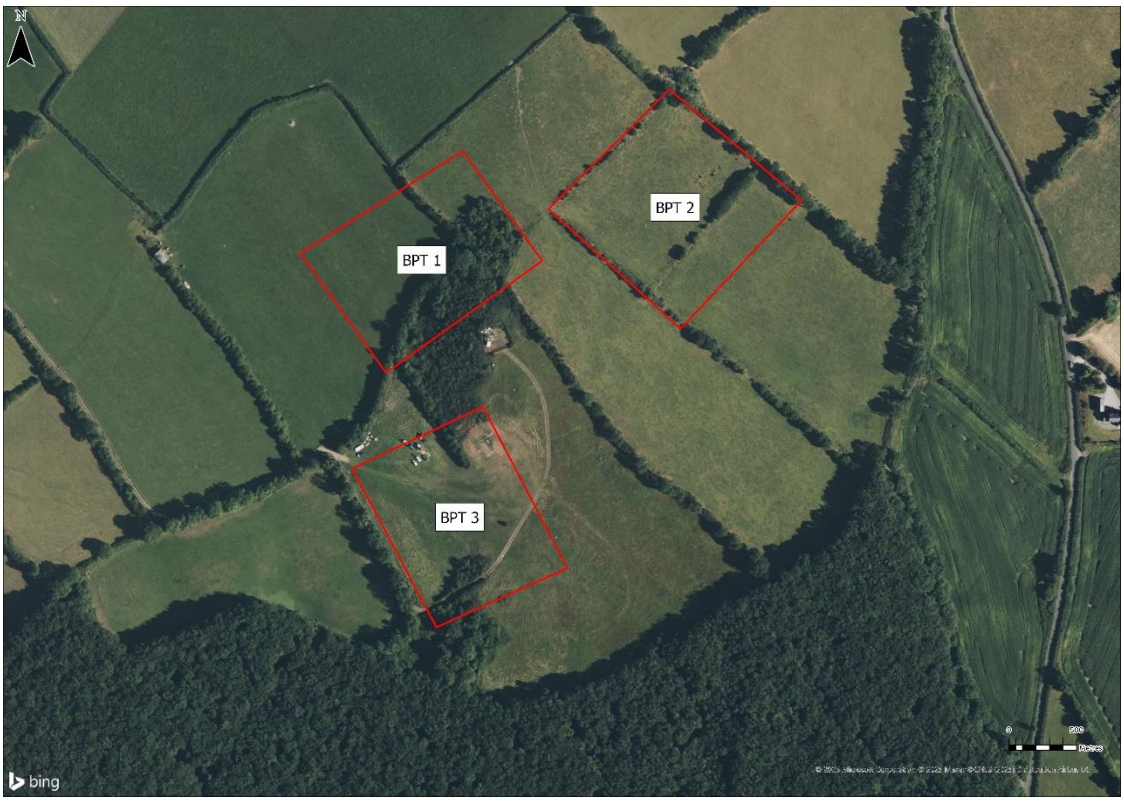


Image 6.4: Potential Break Pressure Tank Sites

279. The three potential sites were all located in the townland of Knockanacree, north of the Knockanacree Woods and trails. The Eco Village of Cloughjordan is located approximately 1.7km south east.

280. The summary of the MCA process for the sites is shown in Table 6.2. The rankings are colour coded to assessed impact levels as set out in Table 3.3.

Table 6.2: Evaluation of Alternative BPT Sites at Knockanacree

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

281. The site selection assessment identified that, environmentally the sites were similar. BPT Site 3 was identified as less favourable from the landscape and visual perspective and had the potential for archaeological remains. However, it was less constrained than BPT Site 2 across a range of environmental topics and was favoured compared with BPT Site 1 on technical grounds. Therefore, overall, BPT Site 3 was less constrained than the other sites.

282. The MCA process concluded that BPT Site 3 represented the preferred location for the siting of a BPT for the following reasons:

- It maintained the maximum elevation relative to the termination point thereby giving greater flexibility for routing a pipeline whilst still retaining delivery under gravity
- It would be on the side of the ridge that has less of an incline compared with the other two sites, thus facilitating integration of the works into the existing landscape. It would also be screened by the forestry adjacent to the site
- While each of the alternative sites had similar environmental characteristics, BPT Site 3 was less constrained by existing housing receptors and as a result, would have reduced noise and air impacts on sensitive receptors during the construction stage.

6.2.3 Alternative Access Options for the Break Pressure Tank

283. In examining access to the preferred BPT site, six options were considered as shown in Image 6.5 and included access alignments to the site from the north, south, east and west.

284. As the BPT site was to be at an elevated position it was important to establish the viability of an access road geometric profile. Primarily, this involved an assessment of the topography and whether suitable gradients in the road vertical alignment could be achieved.

285. Route Option 1 was identified from the L1064, close to field boundaries and directed to a point where it then skirted the forested area en route to the BPT site. Route Option 2 was identified from the L1064 primarily following the existing farm access track close to field boundaries en route to the BPT site. For both options the gradient along the alignment did not generally exceed 10% until its final approach to the BPT site.

286. In respect of the L5020, routing Options 3, 4 and 5 were considered. In all three options on the approach from the L5020 (Option 3, Option 4 and Option 5), the topography rose sharply in the middle third of the alignment with gradients in excess of 15%. To overcome this would require a cutting in the road alignment, necessitating additional land-take. Consequently, it was determined that the land-take for these options could be up to two or three times wider than would otherwise be necessary.

287. Option 6 was considered for an approach from the L1060. On the approach from the L1060, the topography rose sharply in the middle third of the alignment with a gradient in excess of 11.5%. To overcome the excessive gradient would require a cutting in the road alignment, which would necessitate additional land-take. Consequently, it was determined that the land-take could be up to two to three times wider than would otherwise be necessary.

288. In addition, the routes from both the L5020 (which Options 3, 4 and 5 connected into) and L1060 (which Option 6 accessed) had potentially adverse ground conditions and groundwater vulnerability.

289. For Options 3, 4 and 5 there were additional constraints in the form of National Monuments near to the site affecting access from the east.

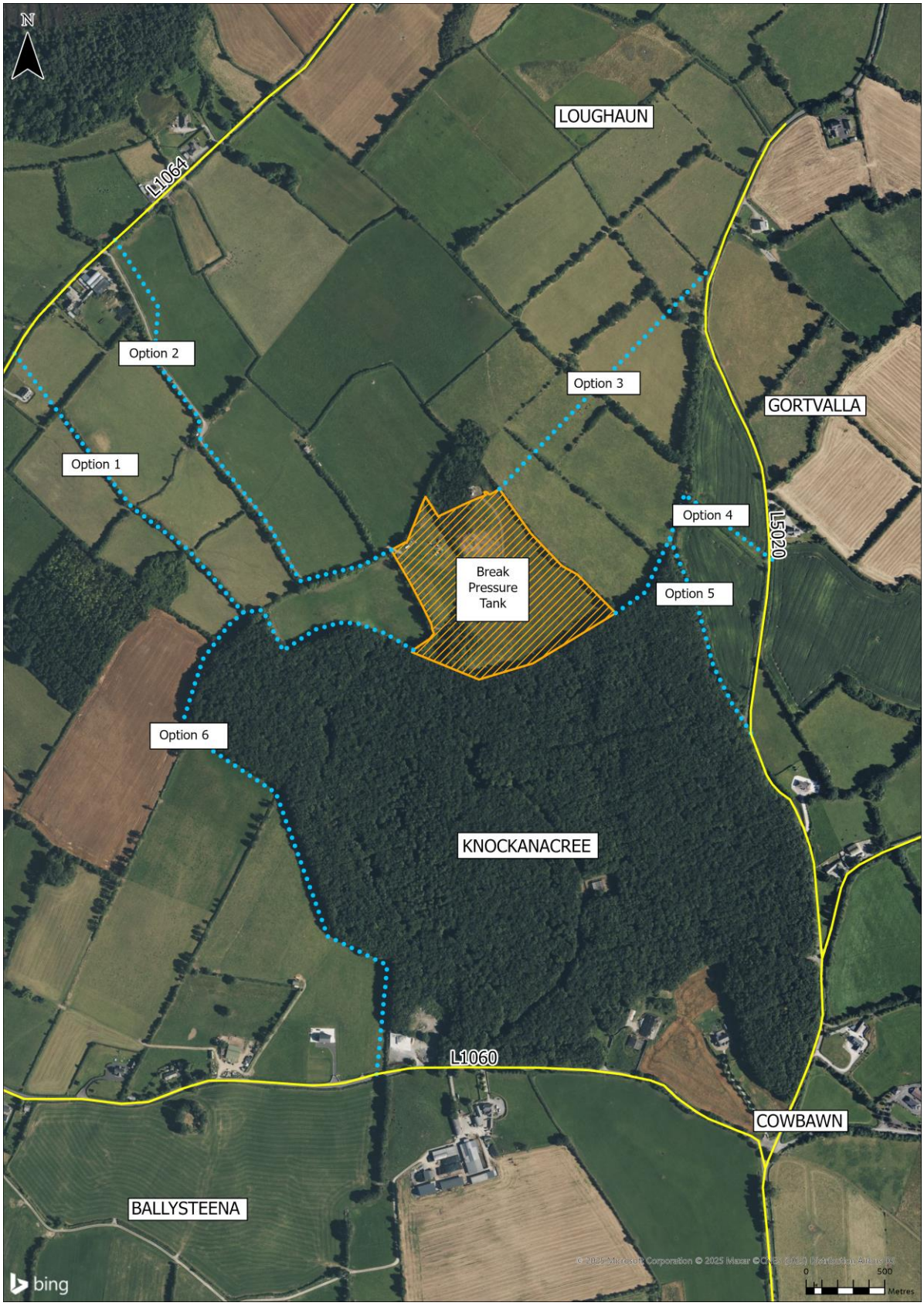


Image 6.5: BPT Location – Access Route Options

290. Option 6, involving an access from the L1060 to the south would have required either passing through Knockanacree Woods, or an alignment to the west and outside of the wooded area. In Knockanacree Woods there was an existing, well developed internal track, which would require a relatively short

extension in order to create an access to the BPT site. However, use of this track would affect the local amenity use of the woods and was likely to experience disruption from construction traffic for an extended period.

291. It was concluded, therefore, that access to the BPT site should be from the L1064 local road (Option 1 or Option 2), for the following reasons:

- The environmental and technical assessment determined that these were the least constrained routes
- Given the BPT's elevated position, the vertical alignment of the access road could be graded to the existing ground profile
- The access road approach from the west could be readily integrated with the proposed orientation of the BPT
- The access road profile could be readily incorporated into the BPT's works construction
- The route from the L1060 would be through an amenity area
- The route(s) from the L1060 and L5020 would require significant reprofiling of ground levels to effect a suitable gradient for the movement of vehicles, and would include increased land-take.

292. Option 2 was ultimately selected as the preferred option for the following reasons:

- Alternative routes posed greater environmental constraints, including archaeology, the Beara Breifne Way trail and woodlands. There were also more significant constructability issues on narrow local roads, unsuitable for operational access and particularly construction access, due to their constrained width and inadequate alignment for construction traffic
- Option 2 was aligned along land boundaries and has been selected to stay outside the boundaries of the archaeological features in the vicinity. Traffic management measures would maintain the local road network's ability to accommodate construction traffic at that stage.

6.2.4 Conclusion of the Site Selection for the Break Pressure Tank Location and Access

293. Of the three sites, BPT Site 3 would have the least impact when taking account of environmental, design and construction parameters. This remained the case when the access road is included. BPT Site 3 also benefits from more favourable topography than the other sites considered in relation to reducing potential landscape and visual impacts, general vegetation screening, and distance from residential property.

294. The design decisions for the BTP and the options evaluation undertaken in respect of them were made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and the preferred options for the BPT remain valid and continue to be the preferred options for the design of the Proposed Project.

6.3 Booster Pumping Station

295. The need for a BPS was confirmed during previous iterations of the project when the decision was taken to reduce the diameter of the pipeline to 1.6m. This would be necessary because a smaller pipeline requires more pressure to move the peak flows through it.

296. The extent of the locations that could be considered for the BPS was defined by the point along the pipeline where the pressure or flow needed to be supplemented. This was identified using profiles of the hydraulic pressure within the pipeline as set out in Section 6.3.2.

297. The location of a BPS determines the level of pumping pressure required, which in turn dictates the power demand of the pumps. All BPS site location alternatives would require a connection to the 38 kV supply

network. Sites located further away from a suitable connection point would require additional infrastructure to deliver a supply to site, contributing to an overall increase in the cost of building the BPS.

6.3.1 Booster Pumping Station Site Selection Exercise

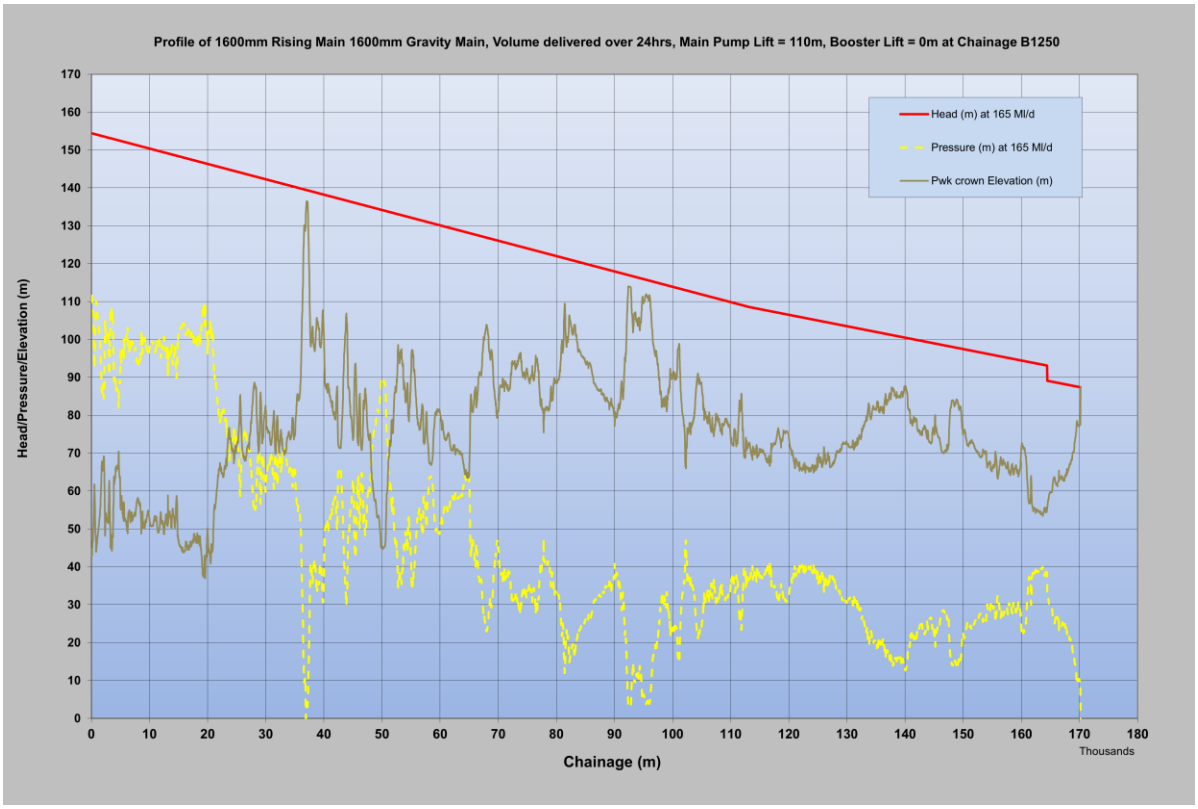
298. The RWI&PS, WTP, BPT and TPR comprise core elements of the Proposed Project with significant technical, environmental and operational requirements that required a site selection process prior to or alongside the pipeline routing decisions. The pipeline routing identifies the preferred route between these determined points. Therefore, the preferred locations for these sites and the routing of the pipeline were activities undertaken in parallel. As a result, a large spatial area could be considered for the location of these sites. The need for the BPS (and FCV) was established as the project design developed, at a date after the determination of the pipeline routing and the selection of the RWI&PS, WTP, BPT and TPR sites. As online elements of the pipeline, the site selection for the BPS (and FCV) was limited to locations along the pipeline, in areas that had already been examined for likely environmental constraints and technical considerations. As a result, a slightly different methodology was required to reflect that the engineering and environmental considerations were within site constraints including environmental considerations that had been taken account of in the routing of the pipeline. This is reflected in the slightly different evaluation criteria in Table 6.4 (compared with the MCA for the other sites).

6.3.2 BPS Site Selection Hydraulic Requirements

299. As water flows along a pipeline it loses energy due the frictional losses arising from contact with the walls of the pipe. For a given pipeline diameter, the higher the flow rate, the higher the losses.

300. The energy in the pipe is known as the ‘total head’ (often abbreviated to just ‘head’). If plotted on a graph, the line joining the dots representing all the energies at different points along the pipe is known as the hydraulic gradient or hydraulic grade line. The higher the flow rate, the greater the energy losses, and therefore the steeper the hydraulic gradient.

301. Graph 6.1 below shows the hydraulic gradient for a flow rate of 170Mld in a 1,600mm diameter pipe along the length of the Treated Water Pipeline (shown in red). The darker line represents the pipework elevation and the yellow line shows the pressure in the pipe.



Graph 6.1: Hydraulic Profile of 1600mm Diameter Steel Pipe at 170Mld Flow

302. In Graph 6.1 the highest elevation is at the BPT at chainage 37km approximately. This is the only place where pressures are allowed to drop to zero at the free surface of the tank.

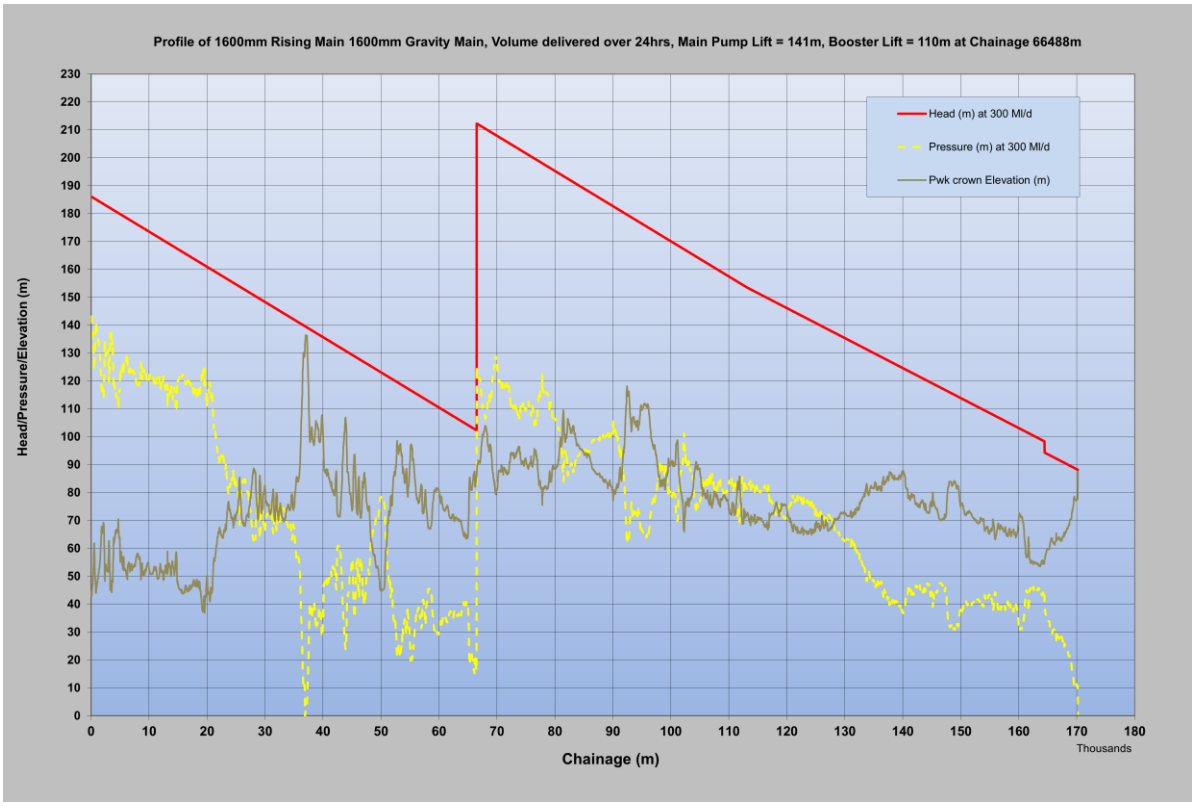
303. To function efficiently and to avoid any ingress that might contaminate the potable water, the pipelines must run full of water, with a positive pressure and with no air in the pipe. Graphically, this means the yellow line, representing pressure in the pipeline, must stay above a minimum level, commonly taken as 5m.

304. As the flow rate increases above 170Mld, the hydraulic gradient will get steeper and a BPS is required, to ensure that the water can reach the TPR (i.e. the head exceeds the elevation at the TPR). This is demonstrated in the following sections describing the parameters for identifying the appropriate eastern and western limits along the Gravity Pipeline for potential BPS site locations.

6.3.2.1 Eastern Limit for the Location of the BPS

305. The hydraulic gradient is steeper for higher flow rates and the most easterly location suitable for the BPS was dictated by the point along the pipeline where the hydraulic gradient intersects the notional line 5m above the ground profile.

306. Graph 6.2 shows the hydraulic profile of the Gravity Pipeline, for the highest flow design case, namely the year 2050 'Dry Year Critical Period (DYCP)+Head Room (HR)' demand profile, which requires a daily flow rate of 300Mld. In this graph the location of the BPS is represented by the sudden jump up in the hydraulic gradient at chainage TWB – 2600m where the suction pressure (the upstream side of the pumps) reaches the 5m limit. This was the most easterly potential BPS location.



Graph 6.2: Hydraulic Profile for 1,600mm Diameter Pipework at 300Mld – BPS 67.5km east of WTP)

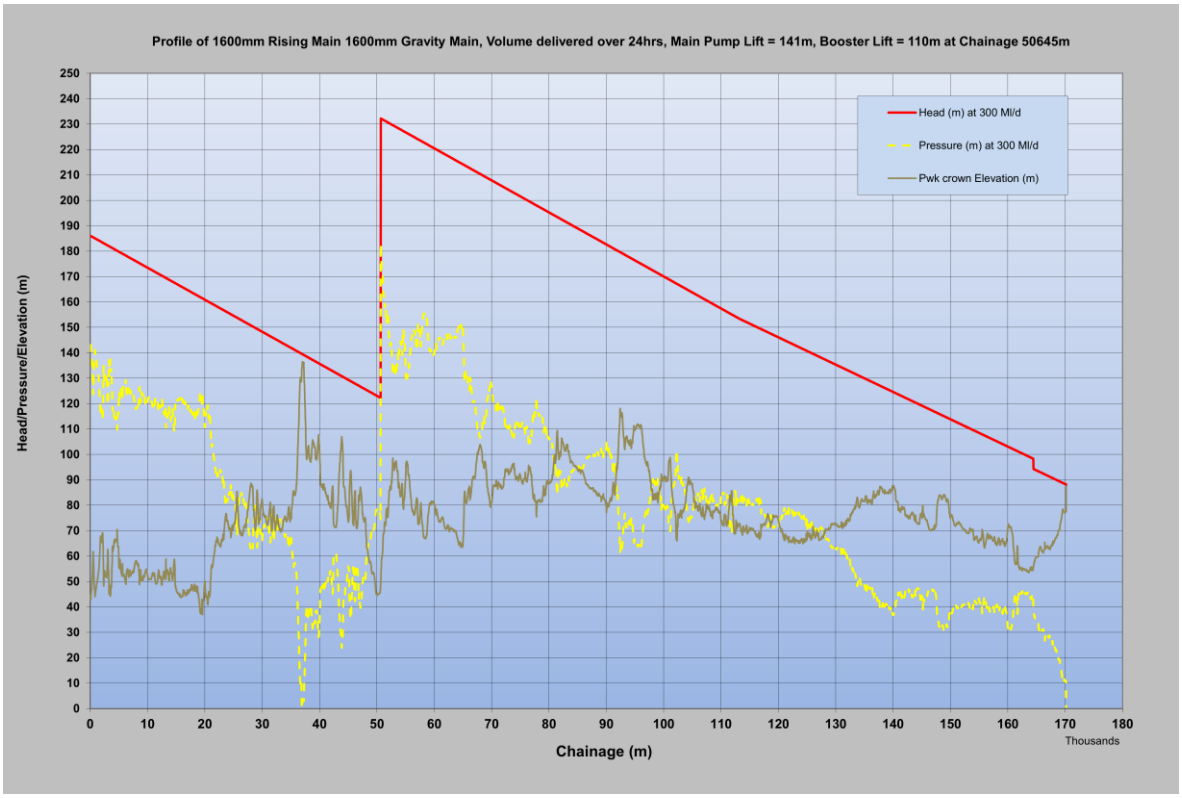
6.3.2.2 Western Limit for the Location of the BPS

307. To determine the most westerly location it was necessary to consider the maximum pressure in the downstream pipework. This increases as the BPS is moved to the west along the Treated Water Pipeline.

308. The most common and cost-effective pressure rating placed on the pipework is 16bar. Using this parameter it was possible to determine the western limit for a potential BPS, by identifying where this 16bar pressure would be exceeded. Graph 6.3 shows this point as around chainage TWA – 13900 (at the time of the assessment) where the yellow line is touching 160m (which is approximately 16bar).

6.3.2.3 Extents of the BPS location

309. Using the two hydraulic constraint criteria to define the eastern most and western most location for the BPS a site location area was identified between chainages TWA - 13900 and TWB - 2650. Within this study area it was apparent that the further east the location, the higher the potential to cater for additional flows whilst still meeting the two requirements for positive suction pressures and avoiding delivery pressures above 16bar.



Graph 6.3: Hydraulic Profile for 1,600mm Diameter at 300Mld – BPS 50.6km east of the WTP

6.3.2.4 Booster Pumping Station Site Selection Exercise – Long List

310. An initial desktop assessment of the Treated Water Pipeline route within the extents defined in Section 6.3.2 was undertaken to create a long list of sites at which the BPS could potentially be located (Sites 1 – 13). This was informed by the technical requirements for the BPS including the need for a relatively flat site of, at minimum, 2 hectares with suitable access and a viable power supply for peak pumping requirements. 13 sites were included on the long list, all located at road crossings along the length of the pipeline within the hydraulic envelope. These are shown in Image 6.6.

311. Locations 3 and 4 were discounted on the basis that the roads where they were located were too small and therefore unsuitable for permanent access. Therefore, only 11 locations were taken forward.

312. Three of the eleven had an option to be either side of the road and therefore, effectively had two sub-options. On this basis the long list was refined to 14 sites.

Image 6.6: Long Listed Site Locations (Previous Iteration of the Project Boundary Shown in Red)

313. Table 6.3 summarises the reasons that sites were discounted and which sites were taken forward.

Table 6.3: Shortlisted Sites for the BPS

Alternative Site	Discounted / Short Listed
1	Discounted – less hydraulically preferred compared with other options
2	Discounted – less hydraulically preferred compared with other options
5	Discounted - Proximity to SAC
6	Discounted – less hydraulically preferred compared with other options
7	Short listed
8	Discounted – very similar to site 7 however site 7 preferred and so site 8 not taken forward.
9A	Discounted - East of site within PFRA identified flood zone. Reasonably close proximity to Kilmaine 25 water body
9B	Short listed
10	Discounted – adjacent to to Kilmaine 25 water body
11	Discounted – minor road and proximity of properties
12A	Discounted – due to potential landscape impact and proximity of properties
12B	Discounted – due to potential landscape impact and proximity of properties
13A	Discounted – 13B preferred compared with 13A as it was further east and due to proximity of existing property
13B	Short listed

6.3.3 Booster Pumping Station Site Selection Exercise – Short List

314. As a result of the process described in Section 6.3.3 three sites were shortlisted based on the hydraulic envelope and access requirements, site 7, 9B and 13B. These were then assessed against the methodology for site selection, technical evaluation criteria, proximity to pipeline route road and potential environmental constraints. All three options met the broad environmental and technical objectives and as such provided reasonable options in principle.

315. Location 7 was located approximately 6km to the south of Birr. The site was adjacent to a single-lane road, which connects to the R440 approximately 3.7km away, towards Birr. There were no watercourses in the vicinity of the site and it had a low risk of flooding. The site was used as a mixed livestock enterprise. The nearest property to the Location 7 boundary was 50m to the south.

316. Location 9B was approximately 7km to the east of Birr. The site was adjacent to a single-lane road, which connects to the R440 approximately 5.2km away, towards Birr. The site was approximately 130m away from the Kilmaine water body and was located in agricultural land used for mixed livestock. The nearest property was a newly built domestic dwelling approximately 150m to the west.

317. Location 13B was approximately 12km to the east of Birr on the L3003. The L3003 is a single-lane public road, which connects to the R440 and the N52. Location 13B is the closest to the R440 regional road which is of higher standard, and this would aid the transport of materials and equipment during construction and operation. The Upper Coagh River runs 180m to the east of the site, along the field boundary. The site was approximately 160m away from this river's flood zone. The site was located in agricultural land defined as mixed livestock/grassland. The nearest property to the site was approximately 250m to the north-west.

318. As noted above, the route of the pipeline corridor had been established prior to the BPS site selection. The pipeline routing had taken account of, and avoided, major environmental constraints and therefore, the environmental considerations for all potential BPS sites were broadly similar. Therefore, the technical requirements for the operation of the BPS were materially more influential in the decision on its location. An environmental comparison was carried on a site-specific basis, as set out in Table 6.4.

319. All three locations could meet the hydraulic requirements however, Location 13B provided the optimum location for hydraulic performance. The electricity supply would be provided by ESB. All three locations would potentially require an upgrade of Ikerrin 110 kV substation and would contribute to the drivers for the already planned up-rating of the Ikerrin to Roscrea and Dallow to Birr 38 kV overhead lines. However, the difference in the distances meant there was a difference in the cost associated with each option with Location 7 being cheaper than the other options. The evaluation of each location against the assessment criteria has been summarised into Table 6.4. A RAG (Red, Amber, Green) system has been used to convey preferred (green), feasible but with potential constraints (orange), and least preferred (red) locations.

Table 6.4: Summary of Evaluation

Assessment Parameter	Location 7	Location 9B	Location 13B
Delivery pressure of pipework	14.6bar	14.6bar	12.3bar
Maximum achievable flow at 16bar delivery pressure	310Mld	310Mld	340Mld
Power supply			
Site topography			
Site Access			
Geotechnical Info			
Biodiversity			
Water/Flooding			
Land and Soils			
Agriculture			
Air Quality			
Noise and Vibration			
Traffic and Transport			
The Landscape			
Cultural Heritage			
Material Assets			
Waste			

320. On completion of the evaluation process, Location 13B represented the preferred location for siting the BPS for the following reasons:

- Technically it was the optimum location for hydraulic delivery thereby enabling the greatest energy efficiencies in plant selection
- Access to all of the sites would be via minor public roads; however, Location 13B was the closest to the R440 regional road which is of a higher standard and so would aid the transport of materials and equipment during construction and operation
- The ground conditions at Location 13B were more suitable for the construction of the BPS compared to Locations 7 and 9B
- Location 13B is the least environmentally constrained of the three options. It is noted in particular that Location 7 was less preferred due to its proximity and setting close to a number of residences. Location 9B required a higher loss of hedgerows and is not preferred.

6.3.4 Conclusion of the Site Selection for the Booster Pumping Station Location

321. Location 13B was the preferred site for the BPS as it has the most favourable hydraulics and ability to handle surge pressures. It comprised a relatively level site requiring minimal earthworks, has a low visual

impact giving less disturbance during construction and operation, has favourable ground conditions for construction and was least environmentally constrained. Whilst the power supply would represent a more significant cost compared to the other locations this was outweighed by the benefits.

322. The design decision for the BPS and the options evaluation undertaken in respect of it was made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and this preferred option remains valid and continues to be the preferred option for the design of the Proposed Project.

6.4 Flow Control Valve

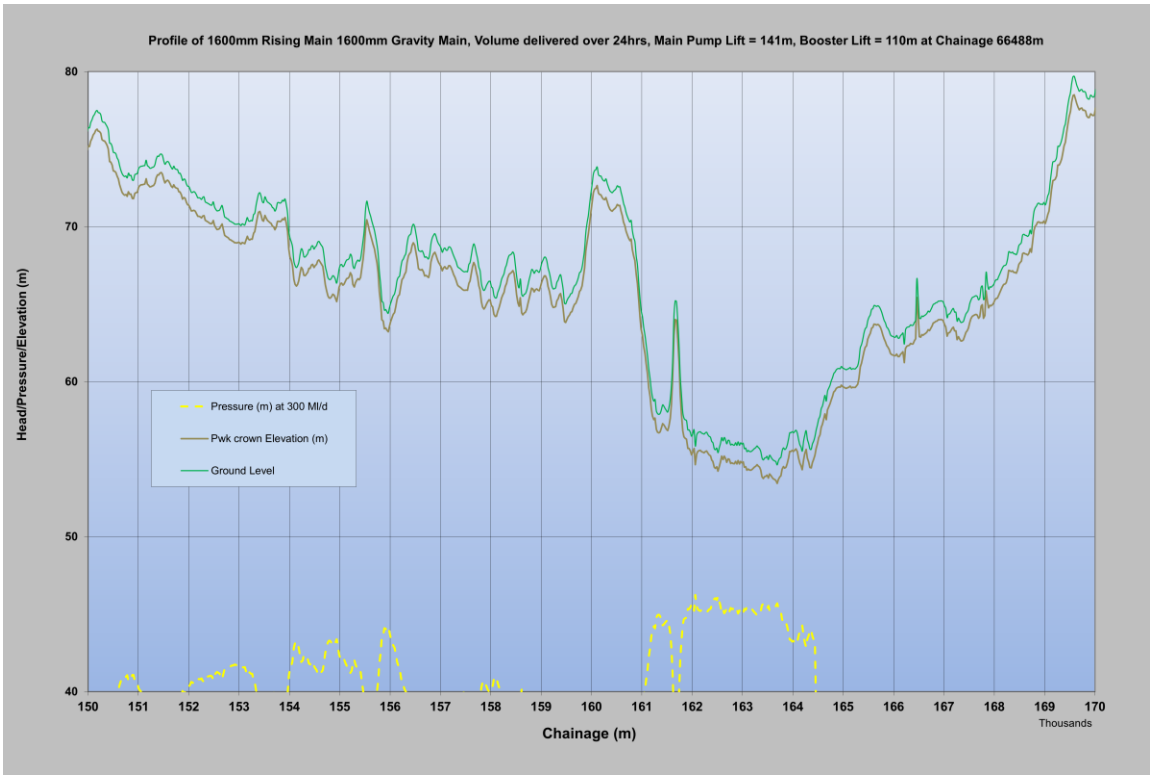
6.4.1 Flow Control Valve Site Selection Exercise

323. To manage and refine the flow in the pipeline between the BPT and the TPR a Flow Control Valve (FCV) would be required. The FCV would provide the control to ensure the BPT would not overflow or empty. It facilitates the means to control or if necessary, shut-off the water arriving at the TPR and ensure, that the capacity of the storage at the TPR is not exceeded. The spatial requirements needed to operate the FCV were used to identify that a permanent site of approximately 0.3ha would be needed for the FCV.

324. The RWI&PS, WTP, BPT and TPR comprise core elements of the Proposed Project with significant technical, environmental and operational requirements that required a site selection process prior to or alongside the pipeline routing decisions. The pipeline routing identifies the preferred route between these determined points. Therefore, the preferred locations for these sites and the routing of the pipeline were activities undertaken in parallel. As a result, a large spatial area could be considered for the location of these sites. The need for the FCV (and BPS) was established as the project design developed, at a date after the determination of the pipeline routing and the selection of the RWI&PS, WTP, BPT and TPR sites. As online elements of the pipeline, the site selection for the FCV (and BPS) was limited to locations along the pipeline, in areas that had already been examined for likely environmental constraints and technical considerations. As a result, a slightly different methodology was required to reflect that the engineering and environmental considerations were within site constraints including environmental considerations had been taken account of in the routing of the pipeline. This is reflected in the slightly different evaluation criteria in Table 6.6 (compared with the MCA for the other sites).

6.4.2 Flow Control Valve Site Selection Hydraulic Requirements

325. For hydraulic design reasons the FCV is required to be placed around the lowest point along the pipeline. This gives the highest downstream pressure which mitigates the risk of the formation of cavitation bubbles that could lead to a risk of damage to the infrastructure. Based on this and as shown in Graph 6.4 the FCV needed to be located between approximately TWE-8000 (Chainage 160) and TWE-15000 (Chainage 167). This technical requirement identified the study area for the location of the FCV along the pipeline.



Graph 6.4 Ground profile at the end of the Treated Water Pipeline

6.4.3 Flow Control Valve Site Selection

326. An initial desktop assessment of the Treated Water Pipeline within the study area defined in Section 6.4.2 was undertaken to create a list of potential sites for the FCV. The sites were identified based on an examination of the availability of land within the construction wayleave of the Proposed Project adjacent to the public road and limited to those roads that act as haul roads for the Proposed Project. This process identified six potential road crossings along the pipeline route within the identified hydraulic envelope, all of which are within the Kildare County Council or South Dublin County Council areas as shown in Image 6.7.

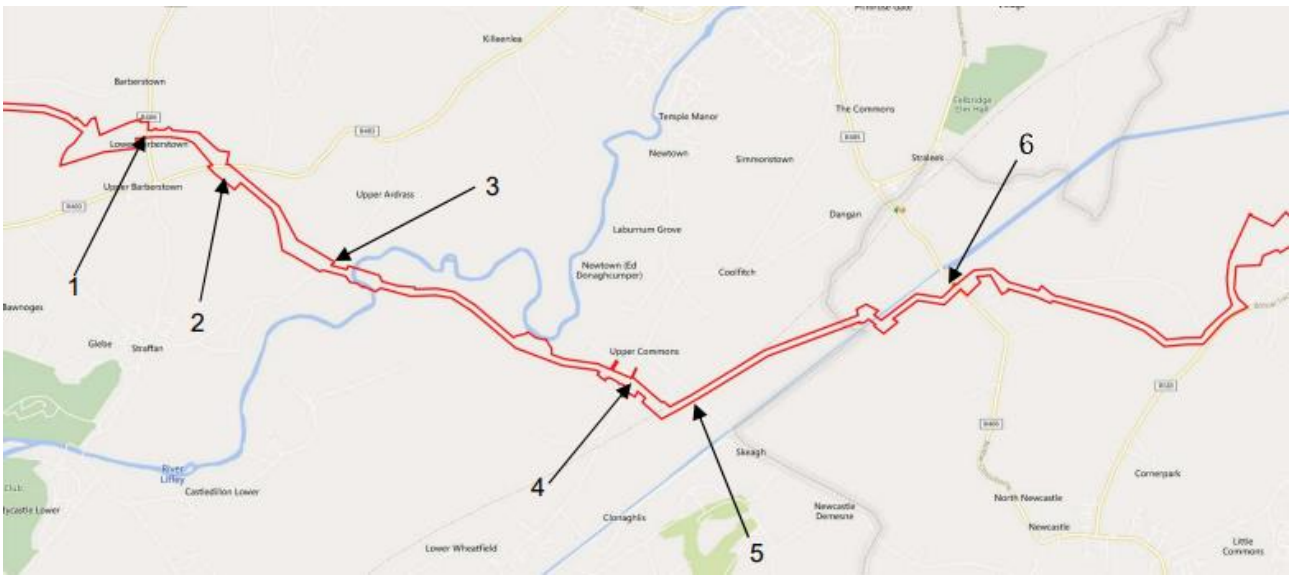


Image 6.7: Location of Road Crossings within the Search Area

327. The evaluation criteria included systems hydraulics, engineering, environment and the availability of power. Both sides of the road were then examined, and this identified sub-options on either side of the road for locations 1,2,4 and 5. This increased the number of locations to 10. All 10 options met the broad environmental and technical objectives and as such provided reasonable options in principle. The 10 identified sites were assessed against the methodology for site selection.

328. Table 6.5 provides a summary of the review of the sites.

Table 6.5: Summary of analysis of FCV sites

Alternative Site	Analysis
1A and 1B	No environmental constraints, site has suitable access but least favourable for hydraulic performance due to elevation
2	Potential landscape effect, site has suitable access but less favourable for hydraulic performance due to elevation.
3	No environmental constraints and close to optimal location for hydraulic performance. Access road is narrow and has some construction constraints.
4A and 4B	Site has suitable access and close to optimal location for hydraulic performance. Location 4B has no environmental constraints. Location 4B would sever part of a field.
5A and 5B	Acceptable hydraulic performance but on a narrow road and adjacent of railway line.
6	Acceptable hydraulic performance, but would impact on equine land use.

329. As noted above, the route of the pipeline corridor had been established prior to the FCV site selection. The pipeline routing had taken account of, and avoided, major environmental constraints and therefore, the environmental considerations for all potential FCV sites were broadly similar. Therefore, the technical requirements for the operation of the FCV were materially more influential in the decision on its location. An environmental comparison was, therefore, carried out on a broad, site-specific basis.

330. The assessment of each location against the criteria identified has been summarised into Table 6.6.6 to identify the preferred location. A RAG (Red, Amber, Green) system has been used to convey preferred (green), feasible but with potential constraints (orange), and least preferred (red) locations.

331. Orange and Red ranking for environmental matters across the sites came from potential effects on scenic views, loss of hedgerows and mature trees, and potential disturbance of sensitive land use.

Table 6.6: Summary of Evaluation

Site	Road Name	Side of Road	Hydraulics	Engineering and Access	Environmental
1A	R406	West			
1B	R406	East			
2A	R403	North			
2B	R403	South			
3	Ardrass Road	North			
4A	Temple Mills Road	North-west			
4B	Temple Mills Road	South-east			
5A	Lyons Road	West			
5C	Lyons Road	East			
6	Hazelhatch Road	West			

332. On completion of the evaluation process, location 4B represented the preferred location for the FCV as it had been rated green in all categories. Therefore, the FCV was included in the design at this location.

6.4.4 Conclusion of the Site Selection for the Flow Control Valve Location

333. Location 4B is the preferred site for the FCV. It has good road access and is close to the optimal hydraulic location. It has no additional constraints.

7. Pipeline Design

7.1 Alternative Pipeline Design

334. During the previous iterations of the project, consideration was given to whether multiple pipelines were needed to supply drinking water to the region or whether a single pipeline was the preferred design solution.

335. The choice between one or more pipelines is driven primarily by a consideration of:

- Strategic need
- Water age
- Operational flexibility
- Asset optimisation.

336. Multiple pipelines opened the possibility of reducing pipe sizes and increasing the possibility of more vendors being able to supply pipeline products as at larger diameters the number of suppliers, and suitably appropriate materials would be reduced.

337. A preliminary hydraulic analysis was carried out on a number of alternative approaches to the pipeline design from the BPT to the TPR, including an assessment of phasing, and single/multiple pipe configurations, based on the following demand scenarios (which were applicable at the time and preceded the National Water Resources Plan (Irish Water 2021 and 2022) which represented Ireland's first co-ordinated assessment of demand at national and regional levels):

- 150Mld (day 1 of WTP operations)
- 245Mld, as demand grows
- 314Mld, being the assumed ultimate output of the WTP (as of the time of analysis).

338. A summary of the options considered is set out in Table 7.1.

Table 7.1: Pipeline Design Alternatives

Alternative	Description
Option A – Single pipe / phased Booster Pumping Station solution optimised for 314Mld	This option assumed a solution which would be gravitational for a number of years in a pipeline which could deliver 150Mld and 245Mld, but could be upgraded to a higher output (to be delivered in a future planning application) by the installation of a booster pumping station at a time of the growing demand. The supply main infrastructure is phased accordingly.
Option B – Twin pipes / phased Booster Pumping Station solution optimised for 314Mld.	This option assumed a solution which would be gravitational for a number of years in twin pipes which could deliver 150Mld and 245Mld, but could be upgraded to a higher output (to be delivered in a future planning application) by the installation of a booster pumping station at a time of the growing demand. The supply main infrastructure is phased accordingly.
Option C – Single pipe solution optimised for 314Mld.	This option assumed a solution which would be entirely gravitational. Whilst the supply main infrastructure for the ultimate demand would be constructed at the outset, the operation of the WTP would be phased according to demand.
Option D – Twin pipe solution optimised for 314Mld (No Phasing of Pipeline Capital Expenditure (CAPEX))	This option assumed a solution which would be entirely gravitational. Whilst the supply main infrastructure for the ultimate demand would be constructed at the outset, the operation would be phased according to growing demand.
Option E – Two pipe solution optimised for 245Mld (single pipe) and 69Ml/d (single pipe)	This option assumed a solution which would be gravitational for a number of years in a smaller pipeline diameter which could deliver 150Mld and 245Mld, but could be upgraded with the construction of a second pipe at a time of growing demand. This second pipe would have a capacity of 69Mld to balance the ultimate demand of 314Mld. The supply main infrastructure is phased accordingly.

Alternative	Description
Option F – Twin pipe solution optimised for 314Mld (Phasing of Pipeline CAPEX).	This option assumes a solution which would be gravitational for a number of years in a pipeline diameter which can deliver 157Mld, but could be upgraded with the construction of a second pipe (capacity 157Mld) at a time of growing demand. This second pipe would balance the ultimate demand of 314Mld. The supply main infrastructure would be phased accordingly.
Option G – Single pipe / Booster Pumping Station (constructed at the outset) solution optimised for 314Mld.	This option assumes a solution which would use a combination of smaller diameter pipes/ booster station capable of delivering the ultimate demand of 314Mld. Whilst the supply main infrastructure for the ultimate demand would be constructed at the outset, the operation would be phased accordingly.

7.1.1 Evaluation of the Pipeline Design

339. Hydraulic analysis indicated that a single pipe configuration was the optimum solution, irrespective of diameter and flow capacity. This was significantly more cost effective than two pipe equivalents. The analysis was as follows:

- Option G was marginally the most cost-effective solution. However, Option A (consistent with the Proposed Project) was the most cost-effective solution when potential fluctuations in energy tariffs and inflationary pressures were taken into account.

340. The twin pipe alternative was likely to have greater impacts on the environment for a number of reasons, including:

- A higher volume of material construction needed to construct the same length of pipeline, with higher levels of resulting traffic movements, air and noise emissions and impacts on local communities from this source
- A potentially wider construction wayleave, as the laying of the pipelines would require a separation distance. This would increase the land take at construction stage, and resulting higher levels of impact on landowners, extent of soil and vegetation removed, and higher resulting waste
- Higher carbon usage from the larger volume of construction material needed for twin pipeline construction
- Approximately double the number of line valves, air valves and wash out valves for a twin pipeline, with higher project land take.

341. It is noted that one advantage of twin pipes was that they would present fewer challenges in relation to draindown repairs and environmental discharges. Pumping from one pipe, across to the other would reduce the risk of a discharge anywhere to the environment.

7.1.1.1 Conclusion of the Selection for the Pipeline Design

342. The single pipeline approach represented the preferred option in terms of cost effectiveness and lesser impacts on the environment. This design decision and the options evaluation undertaken in respect of it was made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and this preferred option remains valid and continues to be the preferred option for the design of the Proposed Project.

7.1.2 Pipeline Sizing

343. During previous iterations of the project an assessment was made of the optimum pipeline diameter which included the options for using an in-line BPS part way along the Treated Water Pipeline. This permitted the consideration of pipe diameters that would otherwise be too small to facilitate the peak flows required. The cost saving and risk reduction of using a smaller diameter pipe had to be offset by the capital expenditure (CAPEX) and operational expenditure (OPEX) costs of the BPS.

344. The Eastern and Midlands Plan (Irish Water 2022) identified a small reduction in peak demand to be conveyed by the pipeline and updated information on flows during normal operation of the pipeline. As a result, an optimisation assessment was undertaken to consider whether alternative pipe diameters could achieve the required design flows at a lower project delivery cost, whilst taking account of the operational flexibility to achieve alternative flows.

345. This assessment used the Normal Year Annual Average (NYAA) flows and Dry Year Critical Period (DYCP) profiles from the National Water Resources Plan (Irish Water 2021 and 2022) including an allowance for Head Room (HR), which caters for outages elsewhere in the supply system. The following demand profiles, derived from information provided by Uisce Éireann, have been used:

- NYAA
- NYAA+HR
- DYCP+HR.

346. The principle of the optimisation was to find the lowest Total Expenditure (TOTEX) solution. Whilst a smaller pipe diameter would result in lower CAPEX costs for the pipeline, it would result in higher CAPEX and OPEX costs for both the HLPS and the BPS since larger pumps would be required. For the larger pipe diameters, no BPS would be required at all as the elevation difference between the BPT and the TPR is sufficient to drive the full peak flows.

7.1.2.1 Evaluation of Pipeline Sizing

347. As part of the assessment an analysis was undertaken for the Treated Water Pipeline between the WTP and the BPT and a second analysis for the BPT to the TPR. The conclusions for each are set out in the following sections.

7.1.2.2 Treated Water Pipeline Between the WTP and BPT

348. Between the WTP and BPT the water would always be pumped and a range of pipeline sizes were considered for this section of the pipeline given this specification. These included pipe diameters between 1,400mm and 2,000mm. The summary conclusions were:

- Diameters of 1,400mm and below were technically unsuitable due to the high operating pressures
- Whilst 1,500mm was marginally cheaper it was very close to the 16bar threshold at the peak design flows (300Ml/d) and had no capacity beyond that if 16bar rated
- The 1,600mm diameter pipe was well within the 16bar threshold and the Net Present Value (NPV) of costs is only very marginally more than for 1,500mm yet offers considerably more capacity (up to c.345Ml/d) and less risk of exceeding pressure ratings
- A 1,700mm whilst giving greater capacity, this was beyond what is required by the Proposed Project and the lower velocities for the vast majority of the operation life would add to the residence time (the amount of time the water spends in the system) increasing the risk of reduced water quality. Any degree of over-sizing results in greater drain down volumes resulting in more line valves, more landowner disruption and higher on-going maintenance costs.

349. On this basis, a 1,600mm 16bar pipeline was recommended for the Treated Water Pipeline between the WTP and BPT.

7.1.2.3 Treated Water Pipeline Between the BPT and TPR

350. Between the BPT and TPR, the water would usually be gravity driven but for higher flows this would be supplemented with pumping from the BPS. A range of pipeline sizes was considered for this section of the pipeline given this specification. These included pipe diameters between 1,400mm and 2,000mm. The summary conclusions were:

- The lowest TOTEX cost in the assessment model, between the BPT and the TPR, by a fraction, was for a 1,400mm diameter pipe. However, the limitations of the model under-estimated the costs of multiple boosters which would increase costs by several million euro. This premium would not apply to larger diameters
- A 1,400mm diameter pipe was also not recommended based on operational restrictions, with multiple boosters required to accommodate 300Ml/d peak flows, and restrictions in the flow under gravity
- The 1,500mm pipe diameter was technically feasible, however it was barely able to accommodate 2050 NYAA+HR flows under gravity. In addition, the 1,500mm diameter limited the flexibility in selecting the BPS location, which would be required in order for the 1,500mm diameter pipeline to achieve maximum NYAA+HR flows and above. Diameters above this size were capable of achieving this flow under gravity and permit much greater scope in selecting the location of the BPS
- The 1,600mm diameter pipeline reduced the power requirements for pumping (by circa 3MW), but still allowed for significant flexibility in the future if the flows were required to increase to accommodate an extreme event
- 1,600mm diameter was able to supply all 'normal' flow (NYAA+HR) under gravity and up to circa 345Ml/d with a single booster under 16bar
- Whilst 1,700mm diameter would allow additional flows beyond 345Ml/d to be transferred without the need for an additional booster or increases in pipe pressure ratings, the additional cost when compared with 1,600mm diameter is estimated to be in the region of €15m. Additionally age of water and minimum velocities should not be overlooked and can become problematic in over-sized pipes
- 1,600mm pipe is far more common than 1,700mm (there are nearly 50 times the length of 1,600mm pipe than 1,700mm pipe in the UK) and prospective contractors reviewing the Proposed Project are likely to associate less risk with a 1,600mm pipeline than a 1,700mm and are typically more comfortable handling the smaller of the two. In addition, the availability of valves is likely to be much better and cost effective for this size of pipe.

351. On this basis, a 1,600mm 16bar pipeline was considered optimal for the Treated Water Pipeline between the BPT and TPR.

7.1.2.4 Conclusion on the Alternatives for the Size of the Pipeline

352. Based on cost, projected flow scenarios and technical feasibility a 1,600mm pipeline with an in-line booster for peak events provides the right balance of cost versus flexibility and was the recommendation for the size of the Treated Water Pipeline and was included in the design. This design decision and the options evaluation undertaken in respect of it was made before the adoption of the National Water Resources Plan (Irish Water 2021 and 2022) including the Eastern and Midlands Plan (Irish Water 2022). The Proposed Project aligns with the Eastern and Midlands Plan (Irish Water 2022) and this preferred option remains valid and continues to be the preferred option for the design of the Proposed Project.

8. Construction

353. The consideration of alternatives for Construction Compounds and Pipe Storage Depots are inter-related because the delivery of the pipe to site would be to both compounds and depots. As a result the location of a Construction Compound could influence the decision on the location of a Pipe Storage Depot because it would change the potential distance between that compound and the next depot along the route of the pipeline. Therefore, the consideration of alternatives was a combined decision making process.

8.1 Number and Extent of Construction Compounds

354. The number of Construction Compounds and Pipe Storage Depots proposed in the design, was influenced by several factors including:

- The overall length of the Proposed Project
- Distance between Construction Compound and/or Pipe Storage Depots to ensure a good spatial distribution, if possible.

355. It was assumed that based on the length of the Proposed Project four Principal Construction Compounds would be required. One Principal Construction Compound would be required in each of the following sections:

- RWI&PS, RWRM and WTP
- Approximately 37km of the Treated Water Pipeline between the WTP and BPT
- Approximately 64km of the Treated Water Pipeline between the BPT and approximately TWC-8000
- Approximately 69km Treated Water Pipeline between approximately TWC-8000 and the TPR.

356. A Principal Construction Compound acts as a central hub for plant/materials/labour movement, general storage and temporary contractor offices. In consultation with the reference contracts/contractors a Construction Compound requirement for a minimum site area of the order of 12ha was estimated. Apart from the WTP none of the other four permanent infrastructure sites were big enough to act as a Principal Construction Compound.

357. In addition to Principal Construction Compounds, Satellite Construction Compounds would need to be located at proposed infrastructure sites for basic requirements, such as office and welfare facilities and space for plant and equipment.

358. Therefore, when considering alternatives it was determined that there would need to be:

- Four Principal Construction Compounds
- Satellite Compounds at any of the Infrastructure Sites not proposed as a Principal Construction Compound (This excluded the FCV because it was so small).

8.2 Number and Extent of Pipe Storage Depots

359. To support delivery of the pipe to site the need for pipe storage depots, in addition to the construction compounds was identified. The initial determination was that a requirement for up to 11 sites for Pipe Storage Depots and Construction Compounds at approximately 16km intervals, would be appropriate.

360. At a Pipe Storage Depot, a number of vehicles is likely to arrive at a given location simultaneously, and therefore space is required to remove them from the public road as quickly and safely as possible for off-loading pipes, limiting any potential disruption to other road users and facilitating turning movements; a Pipe Storage Depot requirement for a minimum site area of the order of 2ha was estimated.

361. The Principal and Satellite Construction Compound would also act as a Pipe Storage Depot.

8.3 Site Selection Process

362. For each section of the pipeline, as described in Section 8.1, the following steps were undertaken:

1) Identify a Principal Construction Compound in each section of the pipeline. Key site identification criteria include:
    a. Site selection in order of land type hierarchy - Proposed Infrastructure Site, Brownfield / Commercial and then greenfield
    b. Site is to be connected directly to a Haul Road and preferably to a national road
    c. Site area is to be a minimum of 12ha.
2) Identify Pipe Storage Depots along the Proposed Project. Key site identification criteria include:
    a. Site selection in order of land type hierarchy - Proposed Infrastructure Site, Brownfield / Commercial and then greenfield
    b. Sites to be a maximum haulage distance of 16km between sites along the Construction Working Width and 8km haulage distance from end of contract works.

363. The site selection methodology for Construction Compounds and Pipe Storage Depots is shown in Image 8.1.

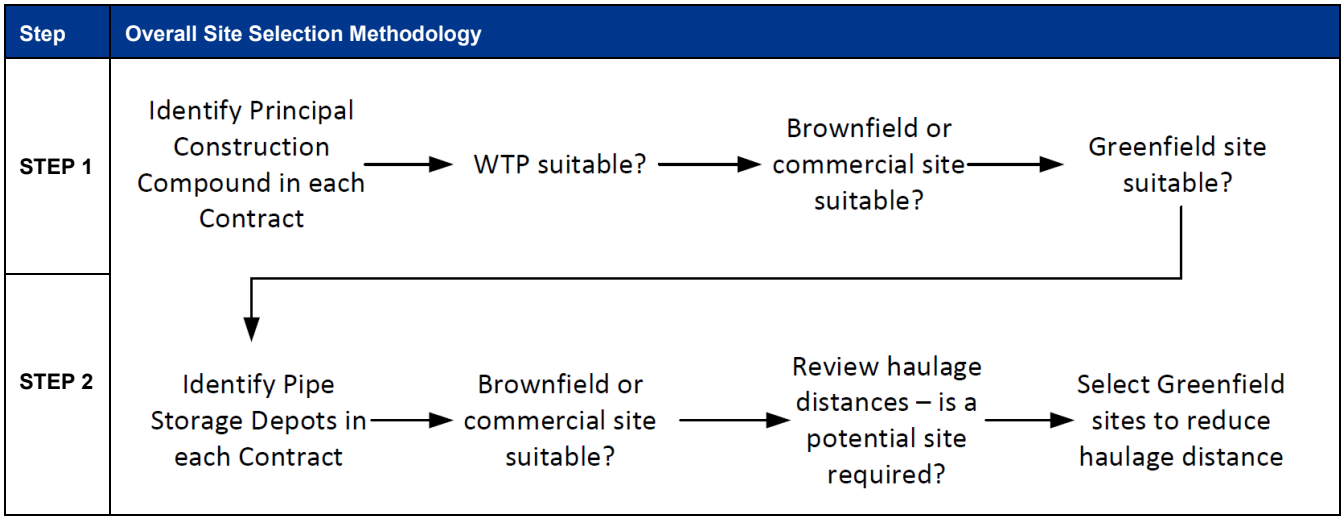


Image 8.1: Overall Site Selection Methodology – Construction Compounds and Pipe Storage Depots

8.4 Site Identification

8.4.1 Step 1 – Identify Construction Compounds

364. A site for a Principal Construction Compound was selected in each section of the pipeline route, (as defined in Section 8.1). These site locations are summarised in Table 8.3.

365. The initial step was to consider if any of the permanent Infrastructure Sites could also act as the temporary Principal Construction Compound. Only the WTP was of sufficient size to do this and it was determined that it could act as an operational compound for plant / material / labour movement and has sufficient capacity to store the approximate 4km (two pipes x 2km) of RWRM required for construction. Therefore, the WTP was selected as the Principal Construction Compound for the first section of the Proposed Project (as defined in Section 8.1).

366. None of the other Infrastructure Sites were suitable as Principal Construction Compound and so an exercise was undertaken to identify potential sites. This focused initially on brownfield sites and then in the absence of sufficient suitable sites was extended to greenfield sites.

8.4.1.1 Type 1 Sites – Brownfield and Commercial Sites

367. Ten type 1 (brownfield and commercial) sites were identified within 2km of the Construction Working Width as potential sites for Construction Compounds and Pipe Storage Depots. In addition, to identifying sites in accordance with the methodology three further potential Type 1 sites were identified via on-ground investigations.

368. A summary of potential brownfield and commercial sites for Construction Compounds and Pipe Storage Depots is found in Table 8.1. The status ('rejected' or 'potential') was determined in accordance with the site identification criteria and methodology outlined in this section.

Table 8.1: Brownfield and Commercial Sites Identified as Potential Sites

No.	Site location	Chainage	Contract	Status	Key reason for status
1	Kilmaglasderry, County Tipperary (B1)	RW-1500	1	Rejected	This site is within 8km of the WTP and therefore no longer required.
2	Glasderry More, County Offaly (B2)	TWA - 15000	3	Rejected	Access to Haul Road not suitable for daily HGV traffic.
3	Cloghanmore, County Offal (B3)y	TWA - 28000	3	Rejected	Multiple land drains and ecologically sensitive area.
4	Derrinboy, County Offaly (B4)	TWB - 6500	3	Rejected	Significant depth of peat remaining.
5	Annaghbrack Glebe, County Offaly (B5)	TWB - 20000	3	Rejected	Access to Haul Road not suitable for daily HGV traffic.
6	Ballinvally, County Offaly & County Laois (B6)	TWB - 26000	3	Rejected	Access to Haul Road not suitable for daily HGV traffic.
7	Derryweelan, County Offaly (B7)	TWC - 7500	3	Potential	Complies with site identification criteria and methodology.
8	Clonad, County Offaly (B8)	TWC - 13500	4	Rejected	Access to Haul Road not suitable for daily HGV traffic.
9	Ballykilleen Townland, County Offaly (B9)	TWD - 3500	4	Rejected	Access to Haul Road not suitable for daily HGV traffic.
10	Timahoe West, County Kildare (B10)	TWD - 21500	4	Rejected	Access to Haul Road not suitable for daily HGV traffic.
11	Derrylahen, County Kildare - Site 1 (B11)	TWD - 25500	4	Rejected	This site is over 500m from a Haul Road. Access to Haul Road not suitable for daily HGV traffic.
12	Derrylahen, County Kildare – Site 2 (B12)	TWD - 26500	4	Rejected	Access to Haul Road not suitable for daily HGV traffic.
13	Barberstown Upper, County Kildare (B13)	TWE - 7500	4	Rejected	Subject to planning enforcement.

369. In the absence of a sufficient number of brownfield and commercial sites available that meet the site selection criteria, greenfield sites were considered as potential sites for Construction Compounds and Pipe Storage Depots.

8.4.1.2 Type 2 Sites – Greenfield sites

370. Greenfield sites were identified on the Construction Working Width and assessed according to the methodology outlined in Image 8.1

371. Thirty greenfield sites were identified and a summary of these are listed in Table 8.2. The status ('rejected' or 'potential') was determined in accordance with the site identification criteria and methodology outlined in Image 8.1, followed by the site-specific review of potential technical or environmental constraints.

Table 8.2: Greenfield Sites Identified as Potential Sites

No.	Site Location	Chainage	Pipeline Section	Status	Key Reason for Status
1	Kilmastulla (G1), Co. Tipperary	TW - 2000	2	Potential	Complies with site identification criteria
2	Carrigatogher (G2), Co. Tipperary	TW - 12500	2	Potential	Complies with site identification criteria
3	Belleen Lower (G3), Co. Tipperary	TW - 16500	2	Potential	Complies with site identification criteria
4	Boolagelagh (G4), Co. Tipperary	TW - 18500	2	Potential	Complies with site identification criteria
5	Knigh/Ballyanny (G5), Co. Tipperary	TW - 21500	2	Potential	Complies with site identification criteria
6	Lisgarriff (G6), Co. Tipperary	TW - 29500	2	Potential	Complies with site identification criteria
7	Eminiska (G7), Co. Tipperary	TW - 34500	2	Potential	Complies with site identification criteria
8	Newtown (G8), Co. Tipperary	TWA - 2000	3	Potential	Complies with site identification criteria
9	Toora (G9), Co. Offaly – Site 1	TWA - 5000	3	Potential	Complies with site identification criteria
10	Toora (G10), Co. Offaly – Site 2	TWA - 5500	3	Rejected	Haul Road not suitable for daily HGV traffic
11	Toora (G11), Co. Offaly – Site 3	TWA - 6000	3	Potential	Complies with site identification criteria
12	Curralanty (G12), Co. Offaly	TWA - 11500	3	Potential	Complies with site identification criteria
13	Boveen (G13), Co. Offaly	TWA - 14500	3	Potential	Complies with site identification criteria
14	Fortel (G14), Co. Offaly	TWA - 23500	3	Potential	Complies with site identification criteria
15	Derrinboy (G15), Co. Offaly	TWB - 7500	3	Potential	Complies with site identification criteria
16	Killananny (G16), Co. Offaly	TWB - 19000	3	Potential	Complies with site identification criteria
17	Killeigh (G17), Co. Offaly	TWB - 28000	3	Potential	Site approximately 7km from potential commercial forestry site. This site is suitable if no other potential sites are identified in the area.
18	Curragh (G18), Co. Offaly	TWC - 8000	3	Rejected	Site circa 0.5km of potential commercial forestry site.
19	Esker Beg (G19), Co. Offaly	TWC - 19000	4	Rejected	Site is in the flood plain. Equipment and materials cannot be stored in the flood plain without risk of damage.
20	Rathlumber/Rathvilla (G21), Co. Offaly	TWC - 24500	4	Potential	Complies with site identification criteria
21	Shean (G22), Co. Offaly	TWD - 3500	4	Rejected	Site is in the flood plain. Equipment and materials cannot be stored in the flood plain without risk of damage.
22	Drummond (G23), Co. Kildare	TWD - 16500	4	Potential	Complies with site identification criteria
23	Derryvarroge (G24), Co. Kildare	TWD - 26500	4	Rejected	Haul Road not suitable for daily HGV traffic
24	Derrycrib (G25), Co. Kildare	TWD - 29000	4	Rejected	Line of mature trees restricts area available to less than 2Ha
25	Graiguepottle (G26), Co. Kildare	TWD - 34000	4	Potential	Complies with site identification criteria
26	Graiguesallagh (G27), Co. Kildare	TWE - 4000	4	Potential	Complies with site identification criteria

No.	Site Location	Chainage	Pipeline Section	Status	Key Reason for Status
27	Barberstown Lower (G28), Co. Kildare	TWE - 8500	4	Potential	Complies with site identification criteria
28	Commons Upper (G29), Co. Kildare	TWE - 12000	4	Rejected	Site within 16km haulage distance of potential brownfield site. Haul Road not suitable for daily HGV traffic.
29	Kearneystown Upper (G30), Co. Kildare	TWE - 13000	4	Rejected	Site within 16km haulage distance of potential brownfield site. Haul Road not suitable for daily HGV traffic
30	Commons (G31), Co. Kildare	TWE - 15000	4	Rejected	Site within 16km haulage distance of potential brownfield site. Haul Road not suitable for daily HGV traffic

372. All of the 'potential sites' were then reviewed to determine which were required from a construction and logistics perspective.

8.5 Site Selection Assessment

8.5.1 Principal Construction Compounds

373. No brownfield or commercial sites, of sufficient size for a Principal Construction Compound were connected directly to a Haul Road and therefore, no brownfield or commercial site was selected as a potential site for a Principal Construction Compound. As a result, Principal Construction Compounds for the other three sections of the pipeline, as defined in Section 8.1, were proposed to be located on greenfield sites. These are listed in Table 8.3.

374. Between the WTP and the BPT, (Section 2 for the purpose of the consideration of alternatives for compounds and depots) all potential greenfield sites complied with the site identification criteria. However, only one greenfield site would connect directly to a national secondary road. To reduce traffic congestion on local and regional roads, reduce vehicle distances and associated air and noise emissions, Lisgarriff was selected as the preferred site for a Principal Construction Compound in this section.

375. Between the BPT and the TPR, (both Sections 3 and 4 as defined in Section 8.1) a greenfield site that complied with the site identification criteria and located approximately halfway along the pipeline alignment in each contract was selected as the preferred site for a Principal Construction Compound.

Table 8.3: Principal Construction Compounds

Site Location	Chainage (m)	Pipeline Section	Land Type
WTP	TW - 0	1	Proposed infrastructure site
Lisgarriff (G6), County Tipperary	TW - 29500	2	Greenfield
Killananny (G16), County Offaly	TWB - 19000	3	Greenfield
Drummond (G23), County Kildare	TWD - 16500	4	Greenfield

8.5.2 Satellite Construction Compounds

376. The support satellite compounds were pre-determined based on the location of the Infrastructure Sites as set out in Table 8.4.

377. No alternatives were considered. The FCV was too small to act as a Satellite Construction Compound

Table 8.4: Satellite Construction Compounds

Site Location	Chainage (m)	Pipeline Section	Land Type
RWI&PS	RW - 0	1	Commercial forestry
BPT	TWA - 0	2	Greenfield
BPS	TWB - 1200	3	Greenfield
TPR	TWE - 17500	4	Greenfield

8.5.3 Pipe Storage Depots

378. Brownfield and commercial sites that comply with the site identification criteria and methodology are listed in Table 8.5.

Table 8.5: Pipe Storage Depots on Brownfield or Commercial Sites

Site Location	Chainage (m)	Pipeline Section	Land Type
Derryweelan (B7), County Offaly	TWC - 7500	3	Commercial forestry

379. For the first section of the pipeline, as defined in Section 8.1 a Pipe Storage Depot is not required to facilitate works as WTP has capacity to store approximately 4km (two pipes x 2km) of RWRM.

380. Between the WTP and BPT, a Pipe Storage Depot is required to reduce the haulage distance of approximately 29km between the start of the contract and the potential Principal Construction Compound in Lisgarriff. Two potential greenfield sites, Carrigatogher and Belleen Lower, comply with the site identification criteria and are located halfway between the start of the contract and the potential Principal Construction Compound. The site in Carrigatogher is connected to a national motorway, M7 and the site in Belleen Lower is connected to a regional road, R494. Carrigatogher was selected as a potential site for a Pipe Storage Depot to reduce the traffic congestion and number of HGVs on regional roads.

381. While the haulage distance from the start of the contract to the site in Carrigatogher is approximately 12km, slightly above the initial screening criteria of 5-10km, an additional Pipe Storage Depot was not deemed required.

382. The selected sites between the WTP and BPT are summarised in Table 8.6.

Table 8.6: Proposed compounds and depots between WTP and BPT

Site Location	PSD or PCC	Chainage	Land Type
Carrigatogher (G2), County Tipperary	Pipe Storage Depot	TW - 12500	Greenfield
Lisgarriff (G6), County Tipperary	Principal Construction Compound	TW - 29500	Greenfield

383. Between the BPT and TWC-8000, Pipe Storage Depots are required to reduce the haulage distance of 46km between the BPT and the selected Principal Construction Compound G16 at Kilananny. A greenfield site in the townland of Boveen was selected as it is directly connected to a national secondary road, N62. An alternative greenfield site in Curralanty was not selected as the connecting Haul Road is a regional road.

384. A Pipe Storage Depot is required in both directions from the potential site in Boveen as the haulage distances are approximately 14km and 32km respectively. Potential greenfield sites in the townland of Toora, Fortel and Derrinboy were selected as Pipe Storage Depots. These sites comply with the site identification criteria and provide similar haulage distances between each site.

385. The selected sites are summarised in Table 8.7.

Table 8.7: Proposed compounds and depots between BPT and TWC-8000

Site Location	PSD or CC	Chainage	Land Type
Toora (G11), County Offaly	Pipe Storage Depot	TWA - 6000	Greenfield
Boveen (G13), County Offaly	Pipe Storage Depot	TWA - 14500	Greenfield
Fortel (G14), County Offaly	Pipe Storage Depot	TWA - 23500	Greenfield
Derrinboy (G15), County Offaly	Pipe Storage Depot	TWB - 7500	Greenfield
Killananny (G16), County Offaly	Principal Construction Compound	TWB - 19000	Greenfield
Derryweelan (B7), County Offaly	Pipe Storage Depot	TWC - 7500	Commercial forestry

386. Between TWC-8000 and the TPR, a Pipe Storage Depot is required to reduce the haulage distance of approximately 34km between the TWC-8000 and the Principal Construction Compound in Drummond. The site in Rathlumber was selected as it complies with the site identification criteria and is located halfway along the haulage distance.

387. There is a haulage distance of approximately 14km from the potential site in Rathlumber to the start of the contract. There are no other potential sites between Rathlumber and the start of the contract that comply with the site identification criteria and therefore no additional Pipe Storage Depot has been selected.

388. Pipe Storage Depots are required to reduce the haulage distance of approximately 34km from the potential site in Drummond (Principal Construction Compound on a greenfield site) and the TPR. The site at Graiguepottle was selected as it is the closest available site to Drummond. The haulage distance from Graiguepottle to Drummond is approximately 18km. While this is slightly above the initial screening criteria of 16km it is deemed acceptable. The site at Barberstown Lower was selected as it is approximately half way between Graiguepottle and the TPR.

389. The selected sites are summarised in Table 8.8.

Table 8.8: Proposed compounds and depots between TWC-8000 and the TPR

Site Location	PSD or CC	Chainage	Land Type
Rathlumber (G21), County Offaly	Pipe Storage Depot	TWC - 24500	Greenfield
Drummond (G23), County Offaly	Principal Construction Compound	TWD - 16500	Greenfield
Graiguepottle (G26), County Kildare	Pipe Storage Depot	TWD - 34000	Greenfield
Barberstown Lower (G28), County Kildare	Pipe Storage Depot	TWE - 8500	Greenfield

8.5.5 Summary of the Compounds and Depots Site Selection

390. A summary of selected sites for Principal Construction Compounds, Satellite Construction Compounds and Pipe Storage Depots is set out in Table 8.9.

Table 8.9: Overall Site Selection for Construction Compounds and Pipe Storage Depots

ID Reference	Site Location	Land Type	Chainage	Construction Compound or Pipe Storage Depot	Pipeline Section
CC0	RWI&PS		RW - 0	Satellite Construction Compound	1
CC1	WTP		TW - 0	Principal Construction Compound	1
PSD1	Carrigatogher (G2)	Greenfield	TW - 12500	Pipe Storage Depot	2
CC2	Lisgarriff (G6)	Greenfield	TW - 29500	Principal Construction Compound	2
CC3	BPT		TWA - 0	Satellite Construction Compound	2
PSD2	Toora (G11)	Greenfield	TWA - 6000	Pipe Storage Depot	3
PSD3	Boveen (G13)	Greenfield	TWA - 14500	Pipe Storage Depot	3
PSD4	Fortel (G14)	Greenfield	TWA - 23500	Pipe Storage Depot	3
CC4	BPS	Greenfield	TWB - 1200	Satellite Construction Compound	3
PSD5	Derrinboy (G15)	Greenfield	TWB - 7500	Pipe Storage Depot	3
CC5	Killananny (G16)	Greenfield	TWB - 19000	Principal Construction Compound	3
PSD6	Derryweelan (B7)	Commercial forestry	TWC - 7500	Pipe Storage Depot	3
PSD8	Rathlumber (G21)	Greenfield	TWC - 24500	Pipe Storage Depot	4
CC6	Drummond (G23)	Greenfield	TWD - 16500	Principal Construction Compound	4
PSD9	Graiguepottle (G26)	Greenfield	TWD - 34000	Pipe Storage Depot	4
PSD10	Barberstown Lower (G28)	Greenfield	TWE - 8500	Pipe Storage Depot	4
CC7	TPR		TWE - 17500	Satellite Construction Compound	4

9. Conclusion

391. As demonstrated through this report, a rigorous and well documented decision-making process was implemented to identify the optimum route for all new infrastructure between the Abstraction Point at Parteen Basin in County Tipperary, west to east across the Midlands to the proposed Termination Point in Dublin which is consistent with the recommendations of the Eastern and Midlands Plan (Irish Water 2022).

392. The Proposed Project is a water supply project involving the abstraction and pumping of raw water from the Lower River Shannon at Parteen Basin, treatment of the water nearby at Birdhill, County Tipperary, and pumping of the treated water to a high point near Cloughjordan, County Tipperary. From this high point near Cloughjordan, the treated water will flow by gravity through the Midlands to a termination point at Peamount, in County Dublin (within the administrative area of South Dublin County Council), where it will connect into the existing Greater Dublin Area Water Resource Zone (GDA WRZ) network. The pipeline elements of the Proposed Project include the administrative area of four local authorities; Tipperary County Council, Offaly County Council, Kildare County Council and South Dublin County Council.

393. The Proposed Project itself constitutes sustainable development, supports sustainable development and is in the community interest. It will meet the domestic, commercial and Industrial needs of over 50% of Ireland's population into the medium to long-term future (to 2050).

394. Accordingly, I, as Project Manager, for JacobsTobin confirm that this document records the process used to determine the land required to be compulsorily acquired by Uisce Éireann within the Uisce Éireann Compulsory Purchase (Water Supply Project Eastern and Midlands) Order 2025.

395. SIGNED: _____

Projects Manager, Jacobs, December 2025

10. References

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