Uisce Éireann

STALEEN WTP TO DULEEK TRUNK MAIN

ROUTE SELECTION REPORT

March 2025 **Rev. A**

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UISCE ÉIREANN

STALEEN WTP TO DULEEK TRUNK MAIN

ROUTE SELECTION REPORT

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March 2025

Project No. 20814.2					
Revision	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
-	First Issue – Initial Draft	S. Kumar	A. Aliaj	P. Coleman	11.11.2024
A	Address Clients Comments	S. Kumar	A. Aliaj	P. Coleman	12.03.2025

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1 INTRODUCTION

1.1 Project Description

Nicholas O'Dwyer Ltd. have been appointed by Uisce Éireann to carry out a route selection assessment for the replacement and upsizing of the trunk main from Staleen WTP to Bolies Little Connection, the initial section of the trunk main that supplies water from Staleen WTP to Windmill Hill Reservoir.

The existing trunk main from Staleen WTP to Windmill Hill Reservoir has an overall length of 16 km, as shown in Figure 1-1. This project addresses the initial 7.9 km section from Staleen WTP to Bolies Little Connection.

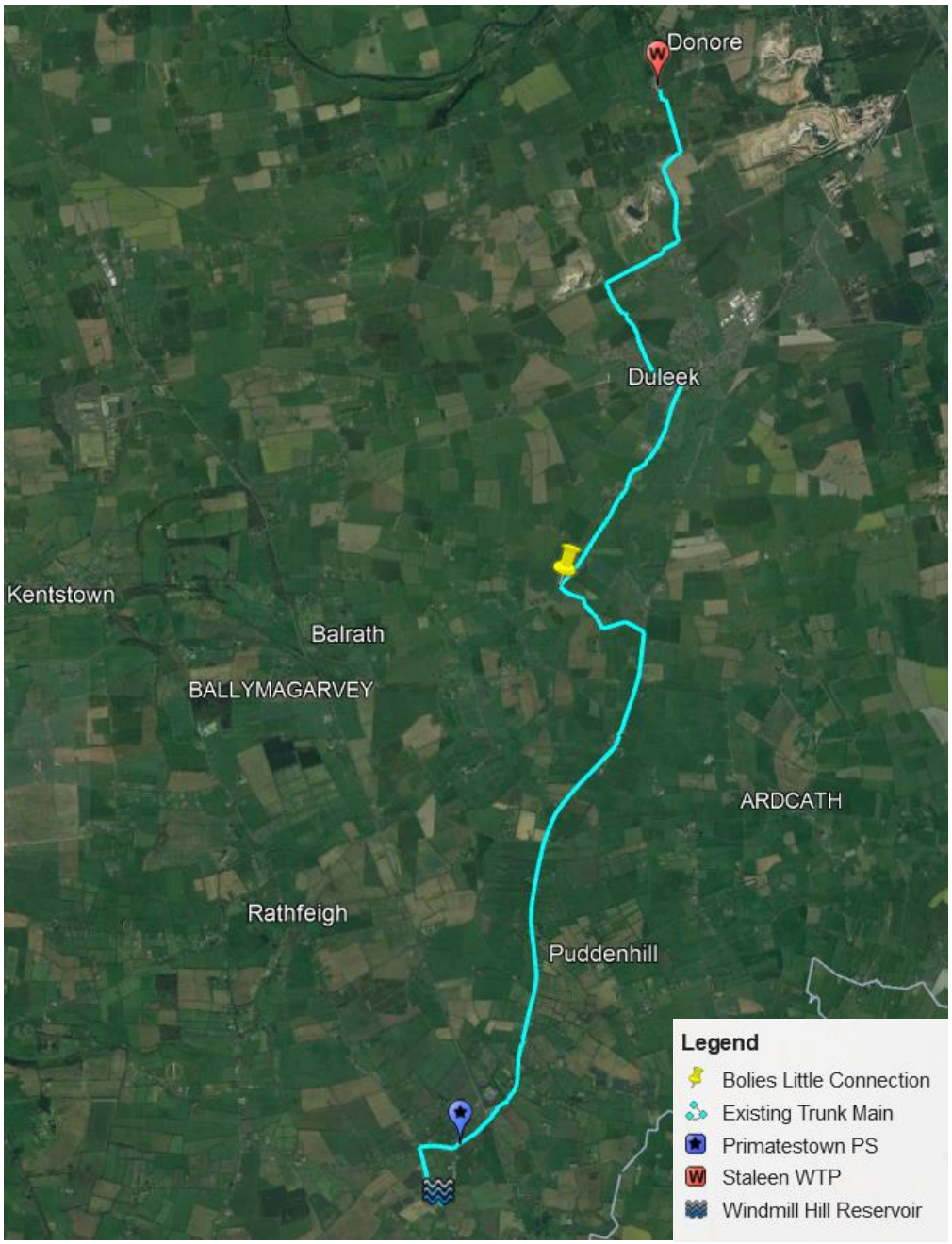

Figure 1-1: Existing Staleen WTP to Primatestown Trunkmain

The purpose of the project is to provide new trunk watermain which will:

- Improve the security of supply & provide greater network resilience across East Meath and South Louth Water Supply Zones (WSZs).
- Increase the capacity of the existing strategic network to cater for existing and future residential and commercial development.
- Enable the long-term social and economic development of the wider Co. Meath & Co. Louth area.

The project is required to meet Uisce Éireann's Water Services Strategic Plan (WSSP) objective to build resilience and network connectivity with water resource zones on a national basis to ensure consistency in supply and drinking water quality.

The existing 16 km trunk main from Staleen WTP to Windmill Hill Reservoir, which supplies treated water to the entire East Meath region, has a significant history of burst incidents. Since 2008 this trunk main has failed 38 times, each causing prolonged water supply interruptions to over 26,000 people across East Meath, from Duleek to Ashbourne.

The preferred solution is to replace the 16 km uPVC existing trunk watermain from Staleen WTP to Windmill Hill and increase its diameter from 400mm to 700mm & 800mm, sized to enable the future water supply demand of the East Meath region.

This project involves the replacement and upsizing of the initial section of the trunk main, extending from Staleen WTP to Bolies Little Connection, and is referred to as the Staleen WTP to Duleek Trunk Main. The subsequent section, from Bolies Litte Connection to Windmill Hill Reservoir, will be upgraded as part of a later phase.

1.2 Purpose of this Report

Uisce Éireann commissioned Nicholas O'Dwyer Ltd. to complete a Route Selection Report for the Staleen WTP to Duleek Trunk Main.

This report aims to identify and evaluate potential route options and determine the preferred route for the construction of the 700mm trunk main from Staleen WTP to Duleek. The route options assessment process shall evaluate each route against key criteria outlined in Uisce Éireann's "A Guide to Route and Site Selection, Document No. IW_AD_PD_GL-008, Rev. 2.0" including:

- Environment and Social Impacts
- Constructability
- Potential Operational Issues
- Programme
- Cost
- Risks

The subsequent sections of this report detail the route selection methodology (Section 2), scope requirements (Section 3), study area identification (Section 4), constraints analysis (Section 5), the assessment process for the trunk mains (Section 6 to Section 7), and the conclusions and recommendations (Section 8).

1.3 Reference Datum

All levels in this report referred to Ordnance Datum Malin Head and all dimensions are metric unless otherwise stated.

2 OPTIONS ASSESSMENT PROCESS AND CRITERIA

2.1 Introduction

A 5-step options assessment process was identified and progressed which is based on Uisce Éireann's "A Guide to Route and Site Selection, Document No. IW_AD_PD_GL-008, Rev. 2.0". The evaluation steps involved in the option assessment process are outlined in sequence below:

- Step 1 – Project Scope
- Step 2 – Study Area
- Step 3 – Initial Screening and Identification of Potential Options
- Step 4 – Shortlisting of Potential Routes
- Step 5 – Detailed Assessment

Step 1 will set out the project scope and is based on the "Needs Brief" that was issued to Nicholas O'Dwyer. Step 2 of the route option selection process will identify the study area for the Trunk Main where the assessment will be carried out. Step 3 and Step 4 above will identify and shortlist potential options which are detailed elsewhere in this report. Step 5 involves a comparative evaluation process to identify the preferred option, using the Qualitative Rating System below.

2.2 Qualitative Rating System

The method selected to rank the routes is a qualitative rating system based on Uisce Éireann's "A Guide to Route and Site Selection, Document No. IW_AD_PD_GL-008, Rev. 2.0" document. The qualitative rating system is a non-numeric system which compares pipeline route options under several criteria which are outlined in Section 2.3.

Table 2-1: Qualitative Rating System

Qualitative Rating System	
Green:	Preferred i.e., Least Constrained
Amber:	Potential Constraint
Unmarked:	No disparity between the routes in relation to that particular criterion i.e., it is not preferred or does not have potential constraints.

This qualitative rating system is used to identify the 'least constrained route'. This approach allows an iterative process for the elimination of potential routes less favourable than other routes. It should be noted that for each iteration of the assessment, any Sub-Criteria which are not considered to be differentiators for the remaining routes will be removed from the matrix and each of the remaining sub-criterion will be reassessed in comparison with the remaining routes. It is anticipated that the assessment matrix is refined with each progressive step undertaken, with routes being eliminated or being identified as less favourable.

2.3 Assessment Criteria

The primary assessment criteria for the sections of trunk mains were determined based on Uisce Éireann's "A Guide to Route and Site Selection, Document No. IW_AD_PD_GL-008, Rev. 2.0" document and through consideration of the particular characteristics of the study area. The primary criteria (split into further detail below) used were as follows:

- Planning
- Technical / Economic
- Environmental

Each primary criterion was further subdivided into a number of relevant secondary criteria. The list of primary criteria and secondary criteria adopted is shown in Table 2-2:.

Table 2-2: Option Selection Assessment Criteria

Ref	Planning Criteria	Sub-Ref	Planning Sub Criteria
1.0	**Land Use**		
		1.1	Number of landowners affected
		1.2	Potential constraints concerning operational and maintenance access to the pipeline
		1.3	Temporary severance of lands affecting access to residential or commercial properties.
		1.4	Impact on amenity areas
2.0	**Planning Policy**		
		2.1	Uisce Éireann strategic programme risk
		2.2	Meath Co-development plan local objectives and policies
Ref	**Technical Criteria**	**Sub-Ref**	**Technical Sub Criteria**
3.0	**Engineering and Design Constraints**		
		3.1	Length and route of pipeline
		3.2	Complexity of construction of pipeline route
		3.3	Diversion of utilities within pipeline route
		3.4	Potential physical constraints concerning construction of pipeline
		3.5	Hydraulic Impacts
4.0	**Capital and Operational Costs**		
		4.1	Estimated Capex Cost of the pipeline
5.0	**Safety**		
		5.1	Construction Safety Risk associated with construction of pipeline
6.0	**Traffic**		
		6.1	Traffic Management
Ref	**Environmental Criteria**	**Sub-Ref**	**Environmental Legislation Sub Criteria**
7.0	**Ecology**		
		7.1	Does the route overlap any European Designated Sites (SPAs, SACs)
		7.2	Designated Sites immediately adjacent or in the vicinity of the routing
		7.3	Does the route overlap any other Designated Sites (pNHAs, NHAs)
		7.4	Sensitive habitat types (including water courses, forests etc.)
		7.5	Impact on existing hedgerows or ditches
8.0	**Cultural Heritage**		
		8.1	Potential to impact on Recorded Monuments and Places

		8.2	Potential to impact on Protected Structures
9.0	**Hydrology & Hydrogeology**		
		9.1	Is routing associated with an area at risk to flooding
		9.2	Groundwater Protection Zone
10.0	**Soils & Geology**		
		10.1	Soil and Subsoil Classification
		10.2	Potential for Karstified Areas
		10.3	Contaminated Land
11.0	**Air, Noise and Vibration**		
		11.1	Potential impacts on human beings/dwellings during construction
		11.2	Potential impacts on non-dwelling Sensitive Receptors (e.g., Schools, Hospitals, Nursing Homes etc.)

3 STEP 1 – PROJECT SCOPE

3.1 Project Scope

The project scope entails replacing and upsizing the 7.9km of the existing trunk main from Staleen WTP to Duleek, which is the initial segment of the existing DN400 uPVC trunk main that supplies water from Staleen WTP to Windmill Hill Reservoir.

The existing Staleen WTP to Windmill Hill Reservoir trunk main is a critical asset that supplies treated water to the entire East Meath region, extending from Duleek to Ashbourne. The pipeline has a history of significant bursts, having failed 38 times since 2008, with each incident leading to a prolonged loss of water supply across the East Meath region and directly impacting a population above 26,000 persons.

This trunk main is a critical asset that cannot be taken out of service for in-situ replacement using trenchless methods. Furthermore, an increase in its size is required to enable the supply of the future water demand of the East Meath region. Thus, the preferred solution is to replace the existing trunk main from Staleen WTP to Windmill Hill Reservoir by constructing a new trunk main and increasing its diameter to cater for future demand. This project involves the replacement and upsizing of the initial segment of the trunk main, which extends from Staleen WTP to Bolies Little Connection and is referred to as the Staleen WTP to Duleek Trunk Main. The subsequent section, from Bolies Little Connection to Windmill Hill Reservoir, will be upgraded at a later phase.

This report addresses the route options assessment to identify the preferred route for the new DN700 trunk main Staleen WTP to Duleek while adhering to the Uisce Éireann assessment criteria.

3.2 Technical Pipeline Requirements

The pipeline corridor requirements are the minimum dimensions, clearances, and land use constraints necessary to ensure, with reasonable confidence that the objective of protection of pipelines against damage is achieved, and that adequate access and working space are available for pipeline construction, future inspection and repair. Significant local restrictions and obstacles inevitably determine the extent to which these requirements are achieved over the entire length of the route. At such locations, special construction and pipeline protection measures will be required.

One of the key technical requirements is that the pipeline gradients must facilitate water supply by gravity (refer to hydraulic analysis section 3.2.1.)

3.2.1 Hydraulic Analysis

Hydraulic analysis has been carried out to identify the maximum elevation of the new pipeline within the Study Area to allow for gravity feed of the Bolies Little. The analysis is based on the following parameters:

- Staleen WTP Reservoir Bottom Water Level: 107.6mOD (Malin) (source: as-built drawing 429/16/31, November 1983, levels converted from Poolbeg Datum).
- Pipeline Length: 7.94km Staleen WTP till Bolies Little
- Pipeline Diameter: 700mm
- Pipeline Colebrook-White Pipe Roughness coefficient: K = 0.6mm
- Flow rate: 11,253 m^3 over 20 hours (source: Uisce Éireann Demand Assessment)
- Minimum Pressure: 10 m water head

The calculation of the head losses along the pipeline based on these assumptions is summarized on Table 3-1. It is seen that the total head loss expected through the watermain is approximately 2.2 m.

Table 3-1: Head Loss Calculation Along the Trunkmain

Pipe Segment	Flow (m^3/20h)	Pipe Length (Km)	Total Head Loss (m)
Staleen WTP to Bollies Little Connection	11,253	7.9	2.2

Considering the head losses of 2.2m, the minimum residual pressure head along the trunk main is established at 105.4 mOD, calculated for the BWL at the Staleen WTP reservoir. Given this pressure and the requirement for a minimum pressure of 10m throughout the pipeline, the proposed maximum ground level for laying the water main for this assessment is set at 95 mOD contour. This elevation ensures a minimum of 10m head along the full route and mitigates the risk associated with negative pressures. Any elevation above this level is very close to the minimum acceptable pressure.

3.2.2 Standard Corridor and Special Crossings

The dimensions and widths required for trunk mains through private lands are illustrated in Figure 3-1.

Where pipelines are constructed in private lands a single pipeline corridor requires a working wayleave width of up to 35m, comprising of a permanent wayleave width of 10m (Sterilised width) and a temporary working area of 25m.

The width of the working corridor may vary from the standard corridor in certain locations. Special crossings will be required in sections where multiple pipelines are laid together, where major obstacles must be traversed, or where standard corridor requirements cannot be met. These crossings will require site-by-site detailed design for construction and long-term maintenance and protection measures.

Detailed designs for these special crossings (i.e., ditches/stream crossing, road crossings, etc.) shall be developed following a detailed assessment of the preferred route.

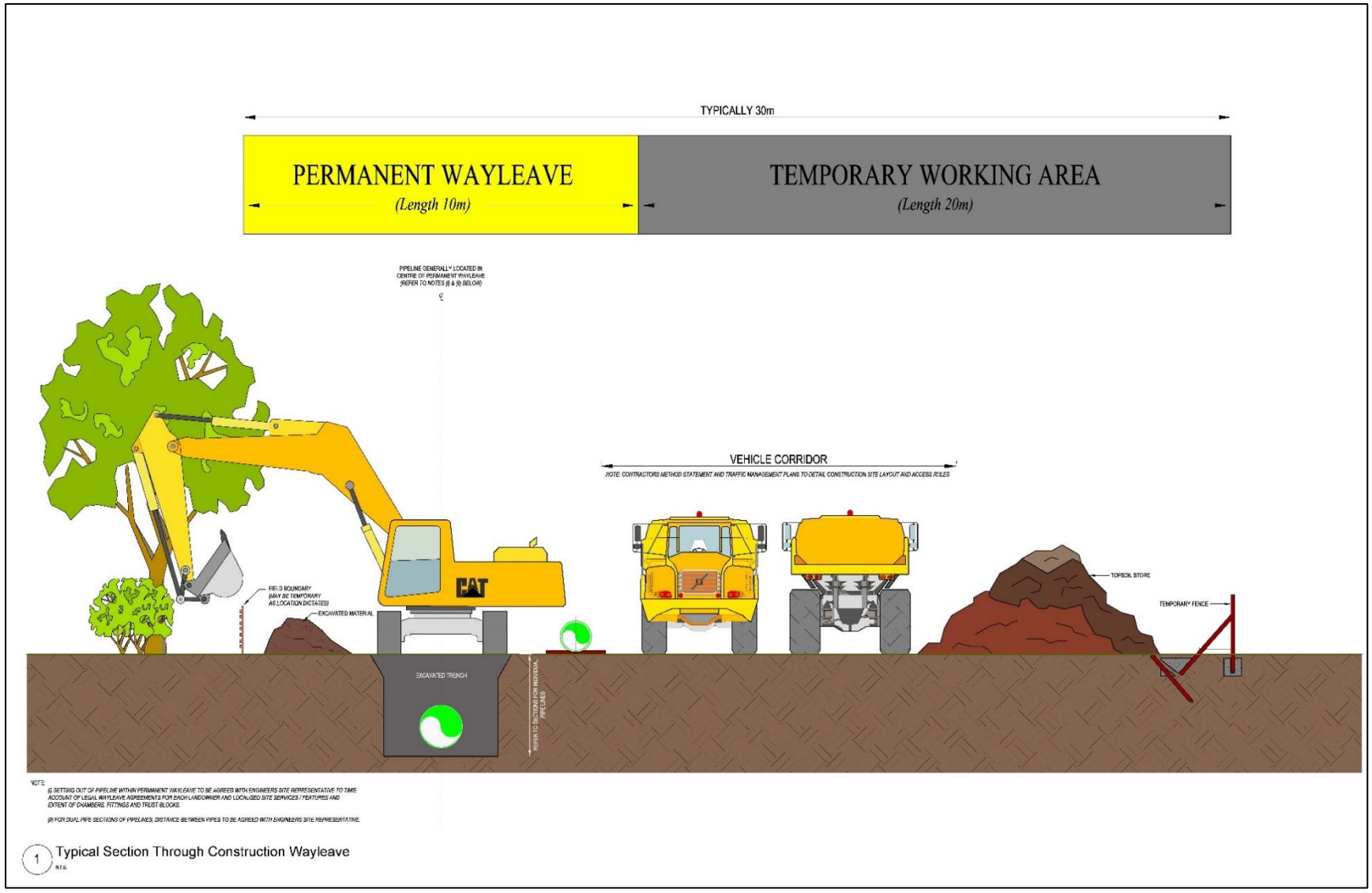

Figure 3-1: Standard Working Corridor for Private Lands

3.2.3 Public Road Corridor

The dimensions and widths required for a trunk main through public roads are illustrated in Figure 3-2 and Figure 3-3. Where a public road is not sufficiently wide to allow this corridor to be achieved then a road closure or routing of the pipeline through private land is considered instead.

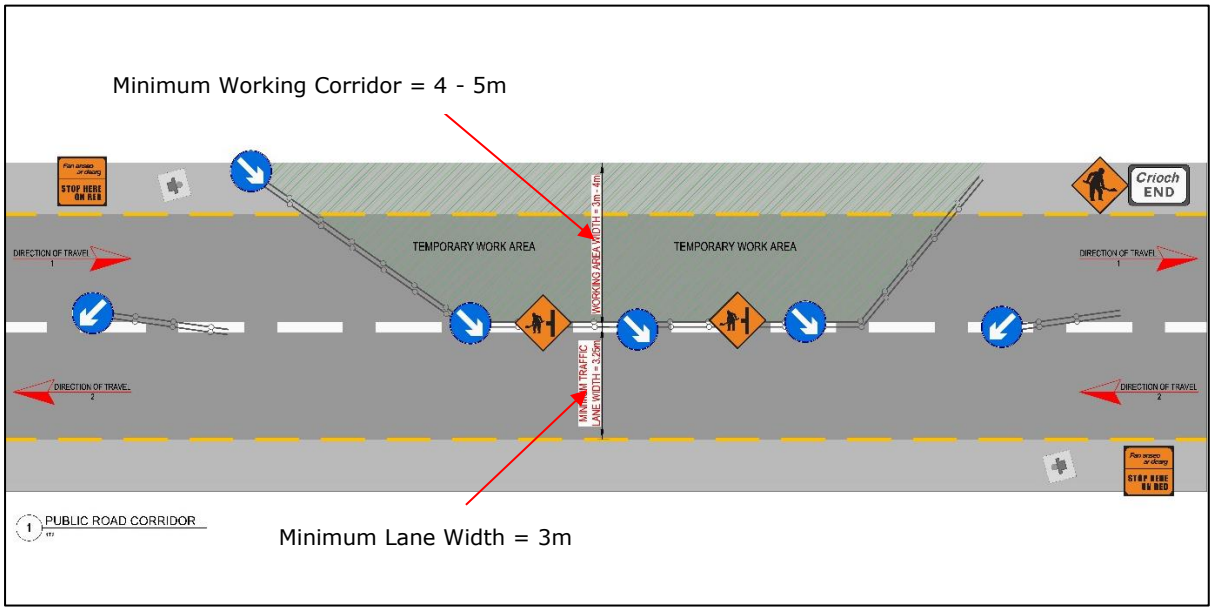

Figure 3-2: Working Corridor for Public Road

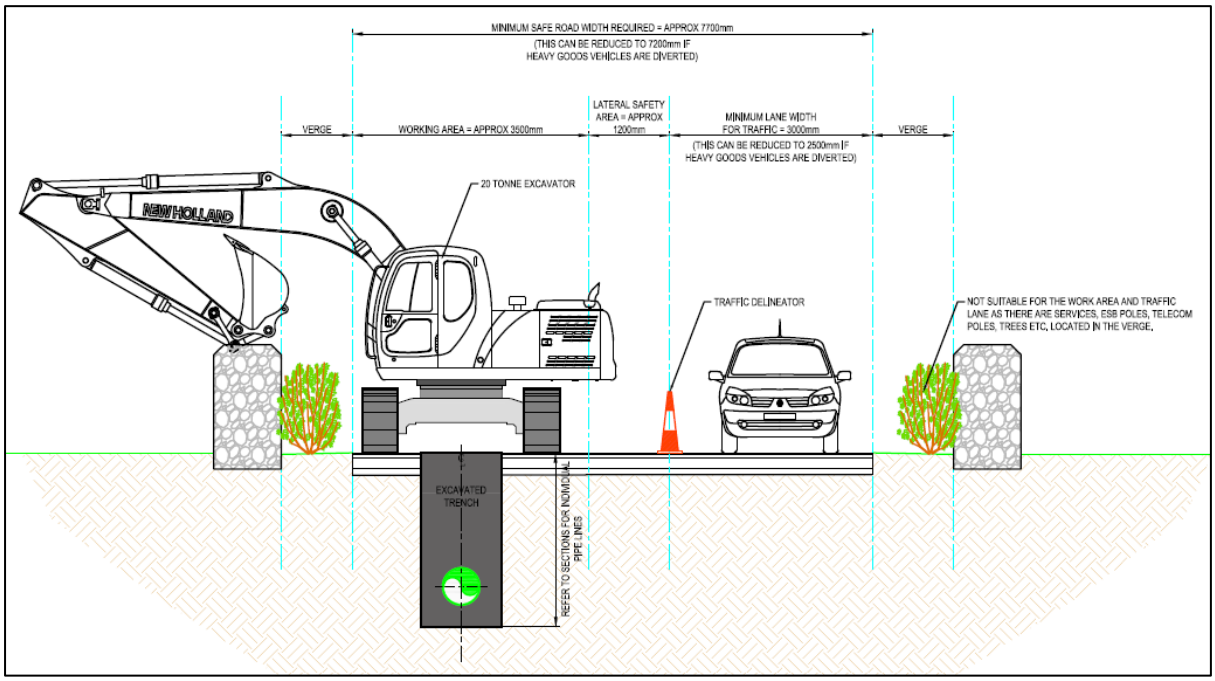

Figure 3-3: Typical Public Road Corridor

4 STEP 2 - STUDY AREA

This section of the report establishes the study area for the route assessment for the new DN700 trunk main from Staleen WTP to Duleek.

A desktop review was undertaken to define the study area, considering the following factors:

- A direct route from the starting point, i.e. Staleen WTP, to the endpoint, i.e. Bolies Little Connection, with an offset on each side, based on constraints (noted below)
- The hydraulic requirements to ensure supply by gravity.
- Existing and natural boundaries, such as roads and streams

The resultant study area is shown in Figure 4-1 below. It comprises a corridor approximately 1.1 km to the west and 1.96 km to the east of a straight line connecting Staleen WTP to Bolies Little Connection.

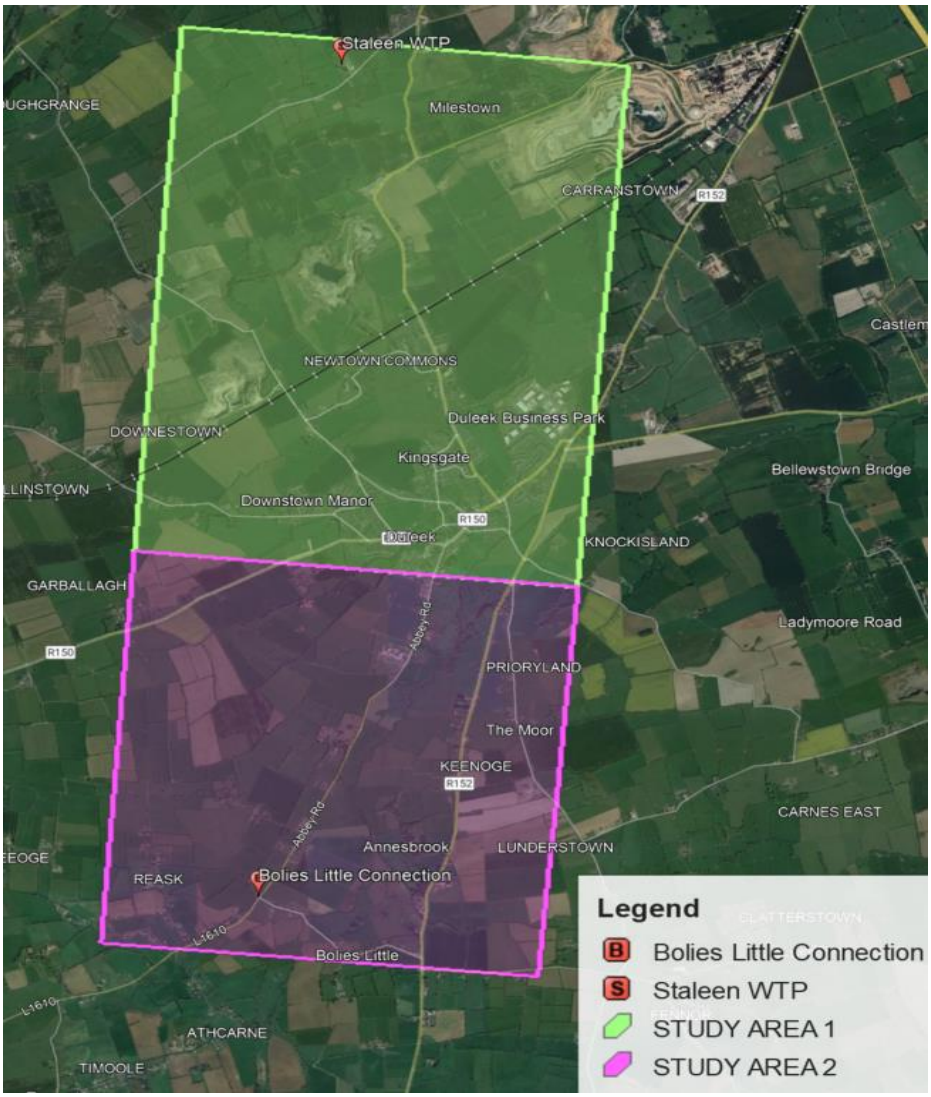

Figure 4-1: Study Area for the Staleen WTP to Duleek

As is seen from the figure above, the study area has been divided into two sections to facilitate route identification and assessment.

Study Area 1: This area of approximately 11.9 km^2 starts at Staleen WTP and ends on the south border of Duleek Village. The northern part consists of agricultural fields and three quarries, while the southern part is mainly residential.

Study Area 2: This area is approximately 8.77 km^2. It starts after Study Area 1 and ends just below the junction between L1004 and R152. Study Area 2 is rural, consisting of agricultural fields and a few residential developments along the regional roads.

5 STEP 3 – INITIAL SCREENING CRITERIA

The first step of the selection process was to identify zones which are to be excluded from further consideration (i.e., domestic dwellings, protected structures, environmentally protected areas etc.). The objective of this step is to narrow down the study areas to a suitable number of routes which will be brought forward for further assessment i.e., Steps 4 and 5. It should be noted that the constraints map for this particular study has been used to aid in the selection of generally suitable routes for the location of the trunk mains. The constraints maps are based on excluding existing and consented future residential and commercial developments, ecologically sensitive areas, areas of significance with regard to archaeological, cultural and architectural heritage, critical transport infrastructure and areas containing ESB overhead lines and gas mains. The constraints map used for this analysis has no legal status preventing future development in the areas.

Information sources used in the detailed assessment are represented in Table 5-1.

Table 5-1: Information Gathering

Screened Areas	Information Source
Residential & commercial premises	Geo-directory database
Planning consents for future residential & commercial developments	Meath website
Ecologically sensitive areas	National Parks and Wildlife Service
Areas of significance with regards to archaeological, cultural & architectural heritage	National Monuments Service
Critical transport infrastructure	Existing Strategic Development Plans
Areas containing ESB high voltage cables, fibre optic cables, gas main, etc.	Existing utility records

5.1 Existing/Proposed Developments

The first areas to be excluded from the study were those on which there are currently residential, agricultural, and commercial developments or where approval has been granted for development based on information from the Geo-Directory database, and the planning website of Meath County Council. Areas excluded from further consideration can be seen in the drawings attached in Appendix 1.

5.2 Environmental Issues

The first consideration under environmental issues was to screen out any designated areas located within the study area taken from the National Parks and Wildlife Service. These areas, such as Special Areas of Conservation (SAC), Natural Heritage Areas (NHA) etc., were excluded, where practicable, to avoid any direct negative impact on the protected habitats, species, and birds.

5.3 Archaeological, Cultural & Architectural Heritage

Another important consideration during Step 3 was the archaeological, cultural & architectural heritage of the study area. Any areas of archaeological or cultural significance within the study area that were identified from the National Monuments Service register were considered constraints as part of the pipeline routing.

5.4 Development Plans/Zones

This element of the screening exercise involved identifying lands which are part of the Meath County Council Development Plan 2021 to 2027. Where possible, development areas identified as residential were excluded from pipeline routes. For areas such as commercially zoned lands etc. attempts were made to route the pipeline adjacent to the land's boundary to avoid significant impact on these areas.

5.5 Technical Issues

A desktop study of all the available utility services in the area was undertaken including those provided by ESB, Gas Networks Ireland, EIR etc. As part of this exercise, primary utilities such as gas transmission mains, medium and high voltage ESB mains, arterial water and sewer mains were identified within the study area. Where the routing of the pipeline was parallel or adjacent to these primary utilities an exclusion zone from the centreline of the utility was created in which the routing of the trunk mains would not normally be permitted. It is also noted that the proposed trunk mains may cross the utility exclusion zones perpendicular to the utility.

Table 5-2: Utility Exclusion Zones

Utility	Exclusion zone width (From centreline of Utility)
Gas Transmission Mains	10m
ESB Medium Voltage Mains	6m
ESB High Voltage Mains	10m
Eirgrid East-West Interconnector	10m
Water Arterial Mains	1m

5.6 Flood Zones

A desktop study of the available flood zones was carried out for the routing of the pipeline. Where possible the routing of the pipeline would try avoiding flood zones or the length of the pipeline within a flood zone would be minimised. The identified flood zones can be seen in Appendix 1.

5.7 Results of Step 3 – Constraint Map

Having regard to the exclusion zones identified a combined constraints map has been developed for the Trunk Main (Refer to Appendix 1). Any area not covered by a coloured buffer zone is considered an area in which the location of a pipeline routing could be considered further. Using this constraint map a variety of pipeline route options were identified as set out in Step 4.

6 STEP 4 –IDENTIFICATION AND SHORTLISTING OF POTENTIAL ROUTES

As set out in the Uisce Éireann Guide to Route and Site Selection; Step 4 entails the identification and qualitative assessment of route corridors within the residual land not subject to constraints and to narrow options to be advanced for more details assessment. The input to this stage is the constraints map prepared as part of Step 3. The output is the selection of routes for further detailed assessment in Step 5.

6.1 Identification of Potential Route Options

6.1.1 Study Area 1

4 No. potential routes have been identified. Refer to drawing 20814.2-NOD-01-XX-DR-C-01250 in Appendix 1 and Figure 6-1 below.

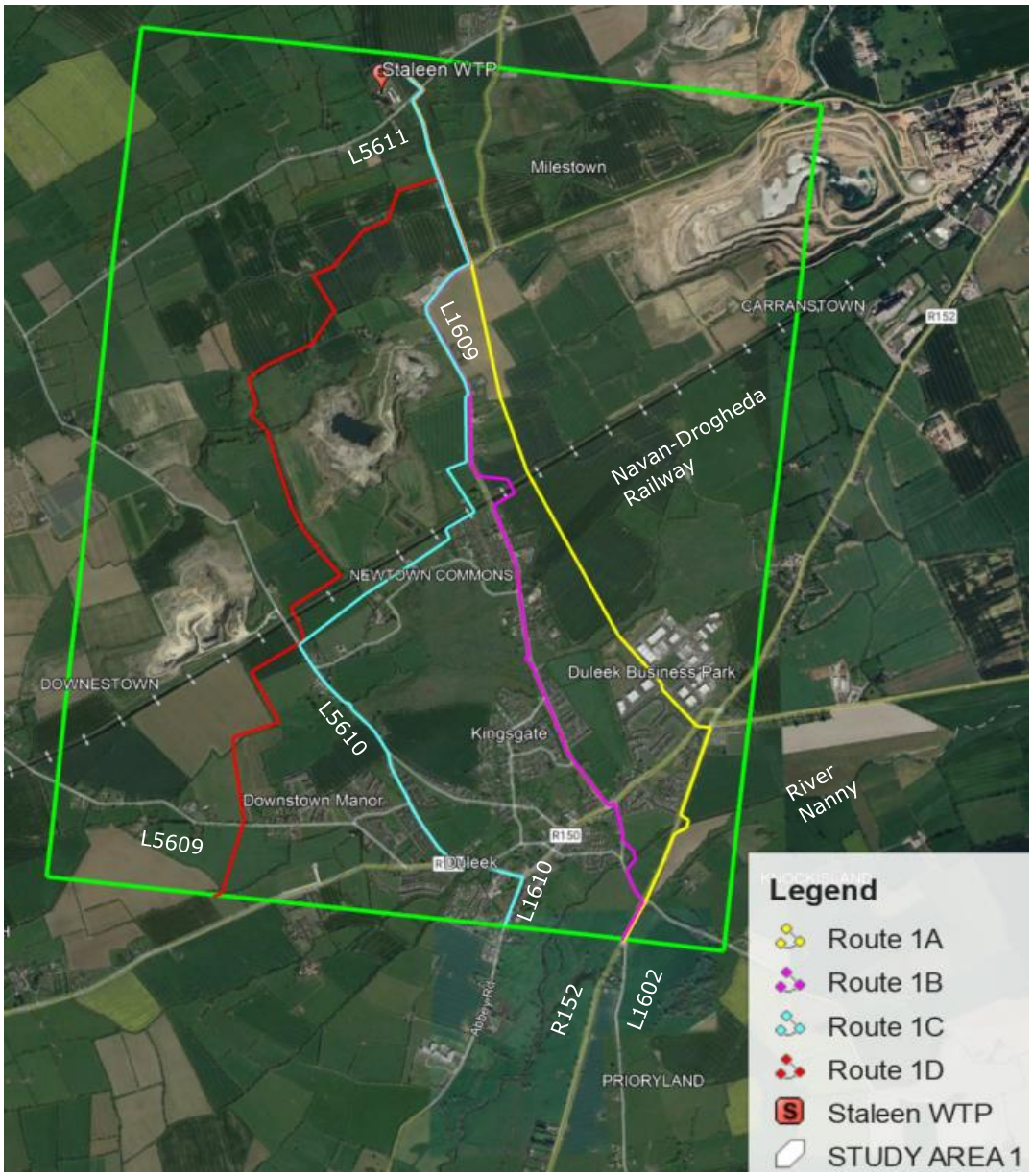

Figure 6-1: Route Options for Study Area 1

These pipeline options are as follows:

- **Route 1A:** Approximately 25% of this route option is routed on private and public roads, while the rest is through private lands. It starts at Staleen WTP and is routed south in agricultural lands following the existing trunk main as far as L1609. Then, it continues south in agricultural lands until Duleek Business Park, where it is routed along the Business Park's private road. Afterwards, it crosses R150 and continues along R152 until the end of Study Area 1. This route has a railway and a river crossing.
- **Route 1B**: Approximately 90% of this route option is routed along public roads and the rest through private lands. It starts at Staleen WTP and is routed south in agricultural lands following the existing trunk main as far as L1609. Then, it continues along L1609 going through the centre of Duleek till it reaches R152. It continues for a few meters along R152 until the end of Study Area 1. This route has a railway and two stream/river crossing.
- **Route 1C:** Approximately 46% of this route option is routed along public roads, and the rest through private lands. It starts at Staleen WTP and is routed south through agricultural lands as far as L1609. It then continues along L1609 for about 750m before diverting westward through agricultural lands and continuing south until crossing the railway near a housing estate. From there, it is routed west parallel to the railway line, initially along the housing estate road and then through agricultural fields until reaching L5610. The route then continues along the public roads L6610, R150 and L1610 until the end of Study Area 1. This route has a railway crossing and two stream/river crossings.
- **Route 1D:** Almost the entire route is through agricultural fields, except the three road crossings. It starts at Staleen WTP and is routed south in agricultural lands following route options 1A, 1B, and 1C for around 670 meters. Then, it continues westwards and southwards through agricultural fields surrounding the Keegan quarry until crossing the railway. Afterwards, it continues southwest through private lands until the end of Study Area 1, crossing L5610 and L5609 along the route. This route has a railway and a stream crossing.

6.1.2 Study Area 2

4 No. potential routes have been identified. Refer to drawing *20814.2-NOD-01-XX-DR-C-*01251 in Appendix 1 and Figure 6-2 below.

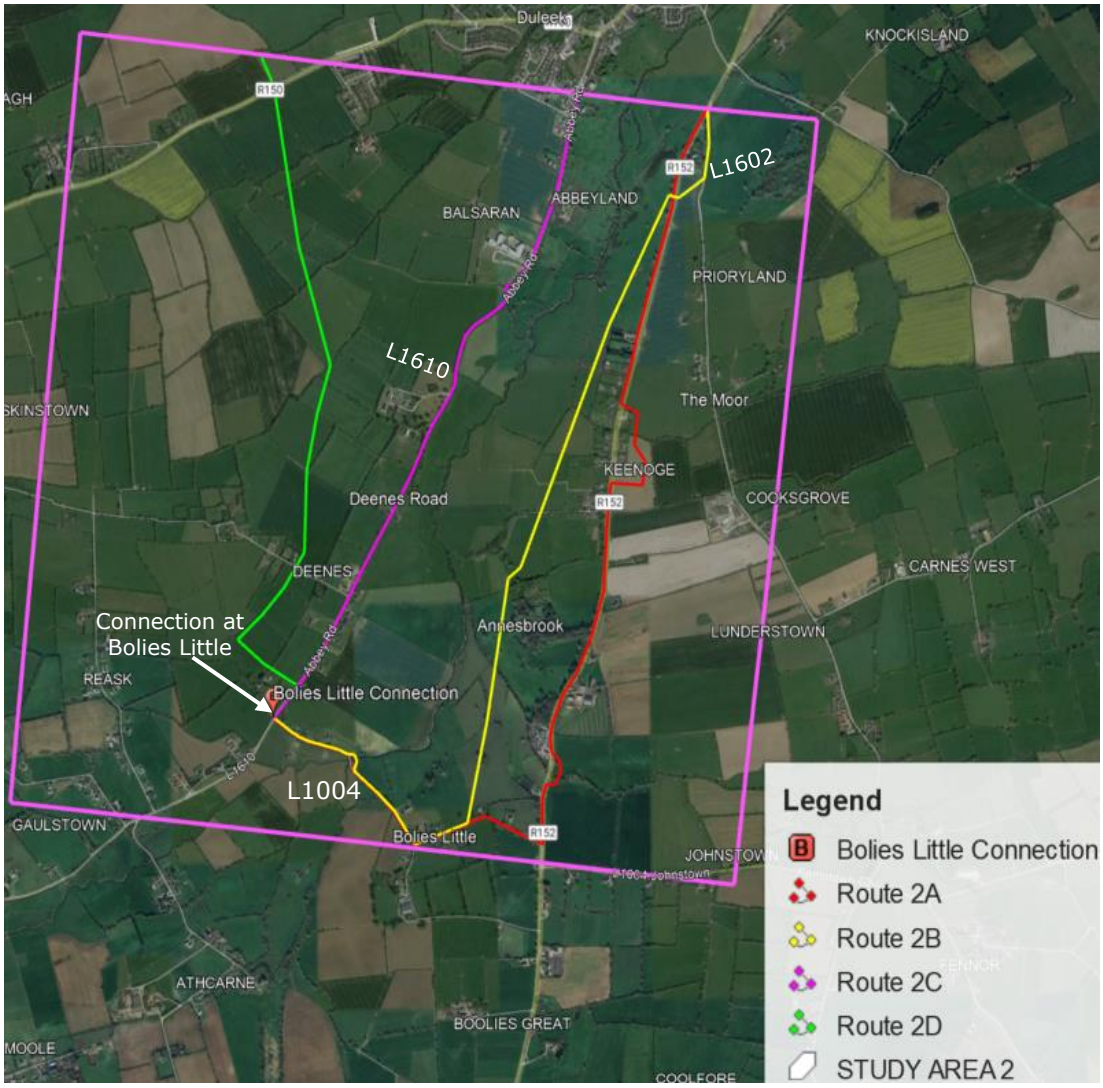

Figure 6-2: Route Options for Study Area 2

These pipeline options are as follows:

- **Pipe Route 2A**: Approximately 82% of this route option is routed along R152 and L1004, and the rest through agricultural fields. Route 2A starts at the end of Study Area 1 and continues along R152 until the junction with L1004, diverting through agricultural fields only at two stream crossings. From this point, the pipe continues along L1004 for approximately 1 km until it reaches the Bolies Little connection. It has one river and two stream crossings.
- **Pipe Route 2B**: Approximately 70% of this route option is routed through private lands, and the rest along L1602 and L1004. Route 2B starts at the end of Study Area 1, continues along L1602 for approximately 270m and then diverts south through private lands until reaching L1004. Afterwards, it continues along L1004, same as Route 2A, until the Bolies Little connection. It has two streams and a River crossing.
- **Pipe Route 2C**: Approximately 97% of this route option is routed along L1610, and the rest through agricultural fields. Route 2C starts at the end of Study Area 1 and is routed along L1602 until it reaches the Bolies Little connection, with only a short deviation through agricultural fields near a stream crossing. It has only a stream crossing.

- **Pipe Route 2D**: Approximately 94% of this route option is routed through private lands, and the rest along L1610. Route 2D starts at the end of Study Area 1 and continues south and southwest through agricultural lands until reaching L1610. Then it continues along L1610 for around 152 meters until it reaches Bolies Little connection. The route has 2 stream crossings.

6.2 Shortlisting of Potential Route Options

In the following paragraphs, the initial technical evaluation of each route is described based on its main features, such as routing direction, pipeline length, route rationales, area description, land ownership, existing networks, and constructability. Afterwards, the decision to shortlist the route for the next step was taken.

6.2.1 Study Area 1

The initial technical evaluation of the routes identified for Study Area 1 is described in the following sections.

6.2.1.1 Route 1A

Routing Direction: This route option (see Figure 6-3) starts at Staleen WTP and is routed south in agricultural lands following the existing trunk main as far as L1609. Then, it continues south in agricultural lands until Duleek Business Park, where it is routed along the Business Park's private road. Afterwards, it crosses R150 and continues along R152 until the end of Study Area 1.

Figure 6-3: Image of Route 1A

Description route area: Approximately 25% of this route option is routed on private and public roads, while the rest is through private lands. It is routed east of the Duleek Residential Area and does not affect the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 1A is circa 4.68km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- It avoids the centre of Duleek and most urban roads occupied with existing services.
- Most of the working corridor is through the private lands, which are relatively unconstrained.

Land Ownership: Based on a review of the Landdirect mapping, 14 No. folios and 1 No. unregistered property will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- This route crosses under a Gas pipeline and medium and high voltage overhead ESB lines.
- The route crosses a floodplain at the southern end of the study area.
- There are some existing services, such as water mains, telecom cables, gas distribution pipes, and MV ESB lines, along the road sections to be avoided.
- Some sections of the route do not have access gates near roads to reduce the right of way.
- This pipeline option involves a difficult crossing of the R150. This crossing is in a relatively narrow corridor between houses and a sculpture on an elevated ground, constrained by several existing utilities.
- The route crosses the railway and Nanny River.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.1.2 Route 1B

Routing Direction: *Routing Direction:* This route option (see Figure 6-4) starts at Staleen WTP and is routed south in agricultural lands following the existing trunkmain as far as L1609. Then, it continues along L1609 going through the centre of Duleek till it reaches R152. It continues for a few meters along R152 until the end of Study Area 1.

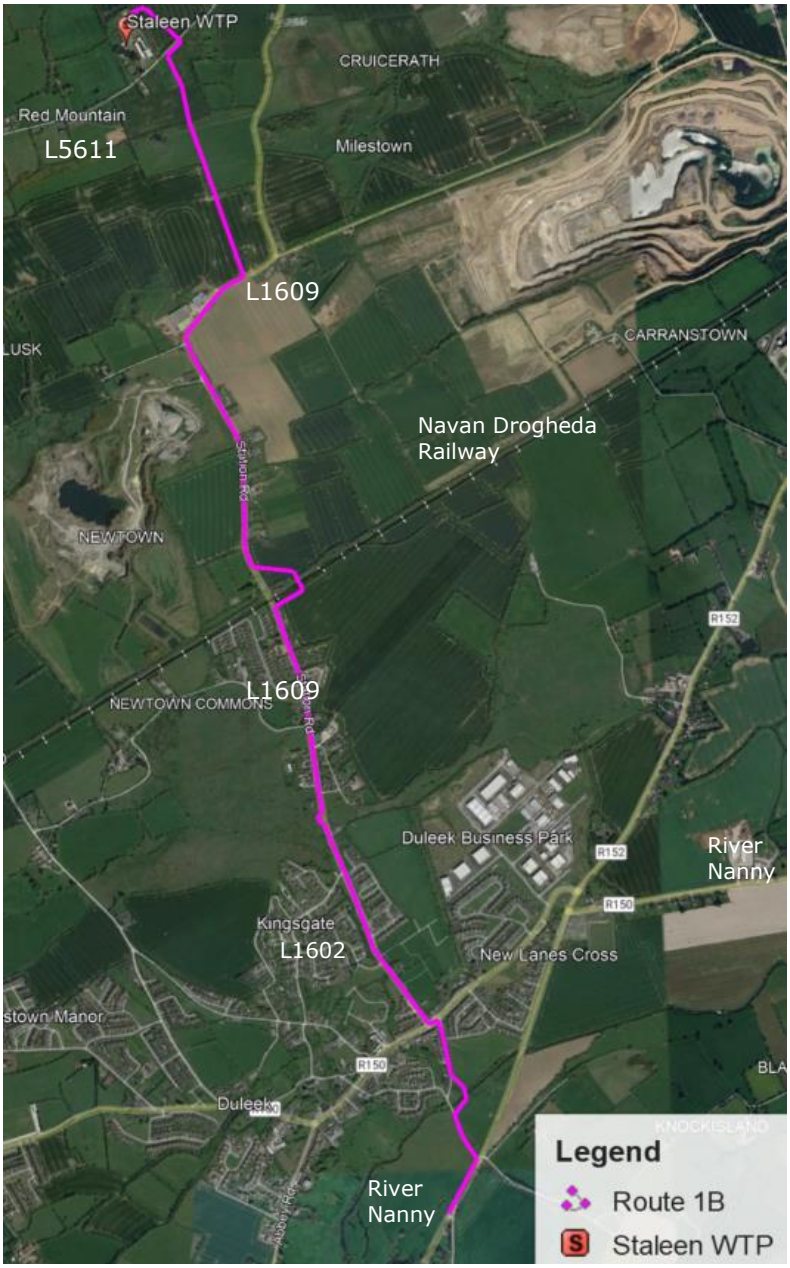

Figure 6-4: Image of Route 1B

Description route area: Approximately 90% of this route option is routed along public roads and the rest through private lands. The River Nanny crossing for this route affects two development zones classified as High Amenity and Open Space as per the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 1B is circa 4.79km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- The pipeline route is routed mostly along public roads and avoids private lands. The roads have short diversion routes.

Land Ownership: Based on a review of the Landdirect mapping, 9 No. folios and 1 No. unregistered property will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- This route crosses under a Gas pipeline and medium and high voltage overhead ESB lines.
- The route crosses a floodplain at the southern end of the study area.
- There are some existing services, such as water mains, telecom cables, sewer pipes, and MV ESB lines, along the road sections to be avoided.
- Most of the road sections along the route are 5 to 6 meters wide. Depending on the presence of road verges, road closures may be necessary. However, short diversion routes are available to minimize traffic disruption.
- The route goes through the Duleek residential area.
- The route crosses the Navan-Drogheda railway line, a stream and the Nanny River.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.1.3 Route 1C

Routing Direction: This route option (see Figure 6-5) starts at Staleen WTP and is routed south through agricultural lands as far as L1609. It then continues along L1609 for about 750m before diverting westward through agricultural lands and continuing south until crossing the railway near a housing estate. From there, it is routed west parallel to the railway line, initially along the housing estate road and then through agricultural fields until reaching L5610. The route then continues along the public roads L6610, R150 and L1610 until the end of Study Area 1.

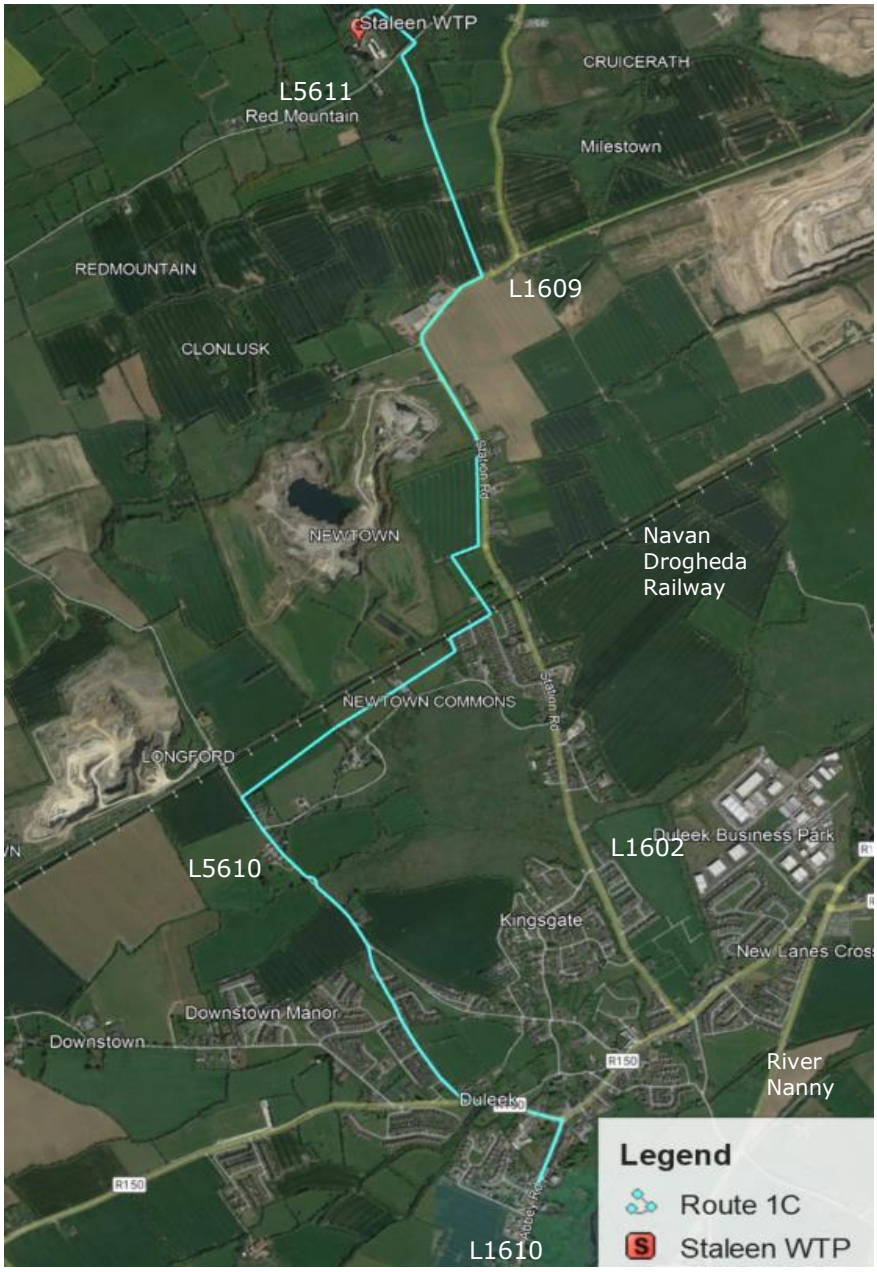

Figure 6-5: Image of Route 1C

Description route area: Approximately 46% of this route option is routed in agricultural fields, and the rest along public roads. It goes through the Duleek Centre but does not affect the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 1D is circa 5.28km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- Half of the route is on private lands and avoids some road constraints.
- The roads will require a road closure. However, they have relatively short diversion options.

Land Ownership: Based on a review of the Landdirect mapping, 10 No. folios and 2 No. unregistered properties will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- This route crosses under a Gas pipeline and medium and high voltage overhead ESB lines.
- The route crosses a floodplain in the centre of the study area.
- The route goes through the Duleek residential area.
- There are some existing services, such as water mains, telecom cables, sewer pipes, and MV ESB lines, along the road sections to be avoided.
- Most of the road sections along the route are 5 to 6 meters wide. Depending on the presence of road verges, road closures may be necessary. However, short diversion routes are available to minimize traffic disruption.
- Some sections of the route do not have access gates near roads to reduce the right of way.
- The railway crossing is situated within a residential housing estate's green area, constrained by an existing gas main. Additionally, the pipeline runs parallel to the gas main for about 150 meters in a narrow corridor between the gas main and the railway.
- The route crosses the railway and two streams. One of the river crossings is in the heart of Duleek Village along the R150.
- Significant sections of road closures are required.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.1.4 Route 1D

Routing Direction: This route option (see Figure 6-6) starts at Staleen WTP and is routed south in agricultural lands following route options 1A, 1B and 1C for around 670 meters. Then, it continues westwards and southwards through agricultural fields surrounding the quarry until crossing the railway. Afterwards, it continues southwest through private lands until the end of Study Area 1, crossing L5610 and L5609 along the route.

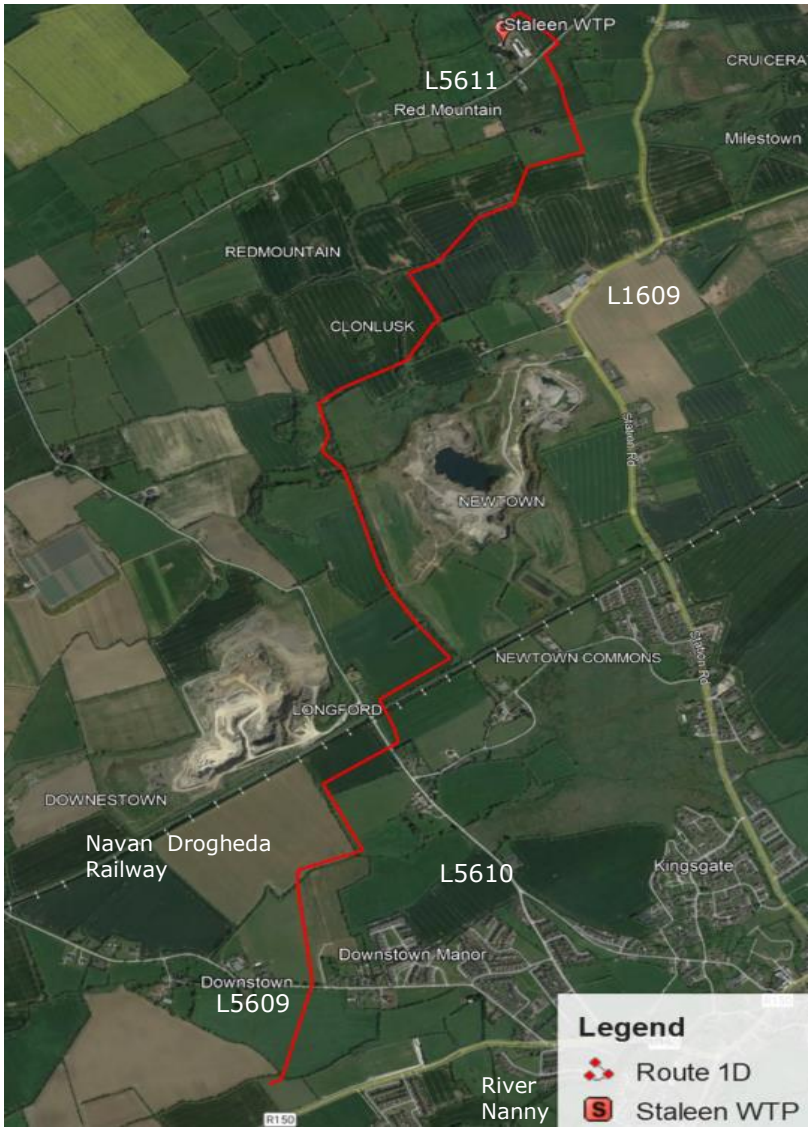

Figure 6-6: Image of Route 1D

Description route area: Approximately 100% of this route option is routed in agricultural fields. It is routed west of Duleek and does not interfere with the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 1D is circa 5.13 km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- It avoids the centre of Duleek and roads occupied with existing services.
- Almost 100% of the working corridor is through private lands, which are relatively unconstrained.

Land Ownership: Based on a review of the Landdirect mapping, 11 No. folios and 1 No. unregistered property will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- This route crosses under a Gas pipeline and medium and high voltage overhead ESB lines.
- The route crosses a floodplain in the centre of the study area.

- Some sections of the route do not have access gates near roads to reduce the right of way.
- The route is along the southeast boundary of a solar farm that recently got planning permission.
- The route crosses the Navan-Drogheda railway and a stream.

Preliminary Assessment Summary
None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.2 Study Area 2

The initial technical evaluation of the routes identified for Study Area 2 is described in the following sections.

6.2.2.1 Route 2A

Routing Direction: Route 2A starts at the end of Study Area 1 and continues along R152 until the junction with L1004, diverting through agricultural fields only at two stream crossings. From this point, the pipe continues along L1004 for approximately 1 km until it reaches the Bolies Little connection.

Figure 6-7: Image of Route 2A

Description route area: Approximately 82% of this route option is along R152 and L1004. It is routed through rural areas and does not interfere with the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 2A is circa 4.55km.

Pipeline Route Rationale: This route has been chosen since it mostly follows roads and avoids private lands.

Land Ownership: Based on a review of the Landdirect mapping, 5 No. folios and 1 No. unregistered property will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- Most of the road sections along the route are 5 to 6 meters wide. Depending on the availability of road verges, road closures may be necessary.
- A section is routed along regional road (R152), which plays a significant role in local connectivity. Any disruption to this road should be carefully evaluated.
- There are two existing water mains along L1004 that need to be avoided.
- The route crosses under medium voltage overhead ESB lines,
- The route crosses floodplain areas.
- The route crosses River Nanny and 2 streams.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.2.2 Route 2B

Routing Direction: This route option commences starts at the end of Study Area 1, continues along L1602 for approximately 270m and then diverts south through private lands until reaching L1004. Afterwards, it continues along L1004, same as Route 2A, until the Bolies Little connection.

Figure 6-8: Image of Route 2B

Description route area: Approximately 70% of this route option is through private lands. It is routed through rural areas and does not interfere with the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 2B is circa 4.00km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- Majority of the route is through private lands/fields avoiding road related constraints.
- The sections in private lands can be easily accessed from R152

Land Ownership: Based on a review of the Landdirect mapping, 12 No. folios will be affected by this route. Further assessment of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- Most of the road sections along the route are 5 to 6 meters wide. Depending on the presence of road verges, road closures may be necessary. However, relatively short diversion routes are available to minimize traffic disruption.
- There are two existing water mains along L1004 that need to be avoided.
- The route crosses under medium voltage overhead ESB lines,
- The route crosses floodplain areas
- The route crosses River Nanny and 2 no. Streams.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.2.3 Route 2C

Routing Direction: This route option commences at the end of Study Area 1 and is routed along L1602 until it reaches the Bolies Little connection, with only a short deviation through agricultural fields near a stream crossing.

Figure 6-9: Image of Route 2C

Description route area: Approximately 97% of this route is along L1610. It is routed through rural areas and does not interfere with the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 2C is circa 2.78km.

Pipeline Route Rationale: This route has been chosen for the following reasons:

- It follows L1610 in a direct route towards the connection point and avoid private lands.
- It follows the same route as the existing trunk main,

Land Ownership: Based on a review of the Landdirect mapping, 2 No. folios will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- Most of the road sections along the route are 5 to 6 meters wide. Depending on the presence of road verges, road closures may be necessary. However, relatively short diversion routes are available to minimize traffic disruption.
- There are two existing water mains and telecom lines along L1004 that need to be avoided.
- The route is near Duleek Boys National School, which might limit the pipeline construction outside the school terms.
- The route crosses under medium voltage overhead ESB lines,
- The route crosses flood plain areas,
- The route crosses one stream.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

6.2.2.4 Route 2D

Routing Direction: This route option starts at the end of Study Area 1 and continues south and southwest through agricultural lands until reaching L1610. Then it continues along L1610 for around 152 meters until it reaches Bolies Little connection.

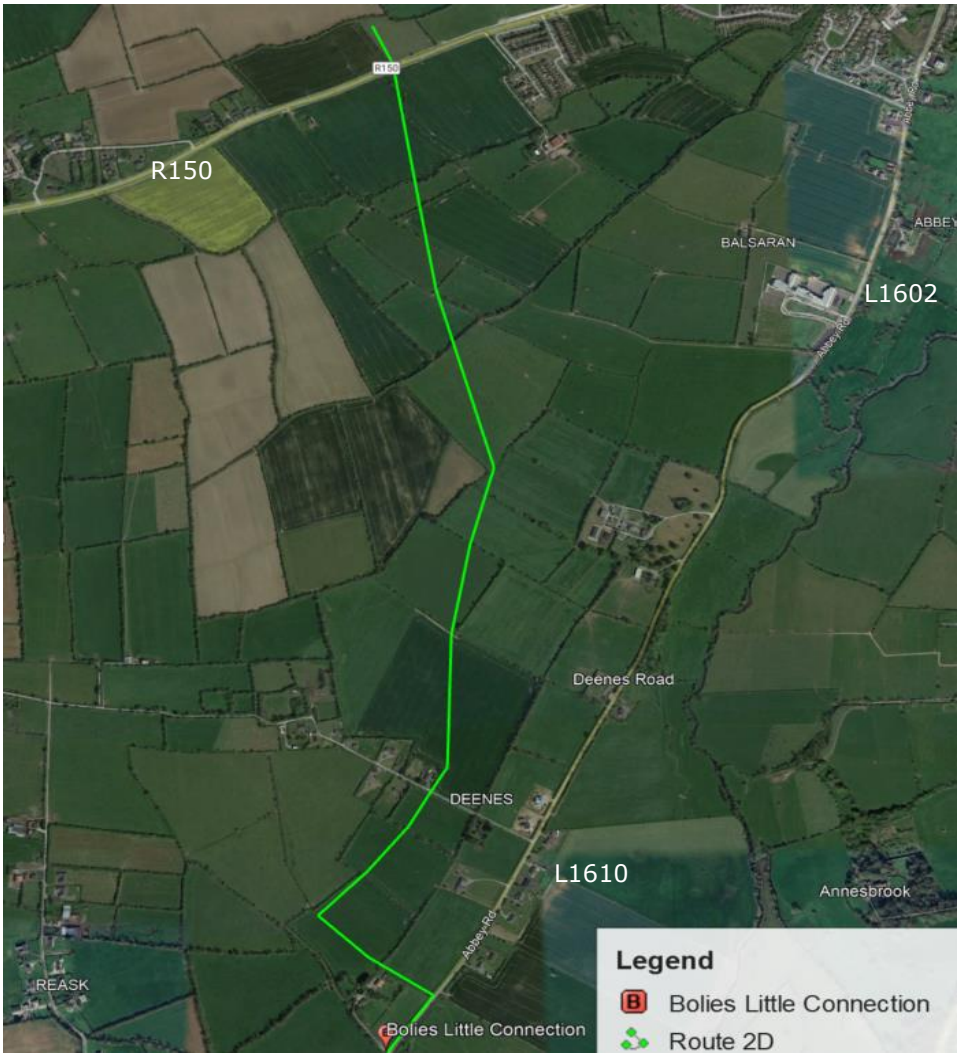

Figure 6-10: Image of Route 2D

Description of route area: Approximately 94% of this route option is through private lands. It is routed through rural areas and does not interfere with the development zones of the Meath County Council Development Plan 2021 – 2027.

Length of Pipeline Route: The overall length of Route 2D is circa 2.83km.

Pipeline Route Rationale: This route has been chosen since it follows unconstrained private lands in a relatively direct route towards the connection point.

Land Ownership: Based on a review of the Landdirect mapping, 5 No. folios will be affected by this route. Further analysis of this will be required if it is determined to be the preferred pipeline option.

Constructability of the Pipeline Option: The following is to be considered during the Assessment of Criteria for this pipeline option:

- The pipeline crosses roads and will require traffic management,
- The route crosses under medium voltage overhead ESB lines,
- Some sections of the route do not have access gates near roads to reduce the right of way.
- The route crosses floodplain areas,
- The route crosses two streams.

Preliminary Assessment Summary

None of the constraints identified on this route are significant enough to prevent further detailed assessment. This route progressed to a detailed selection criteria assessment.

7 STEP 5 – ASSESSMENT OF CRITERIA

7.1 Summary of Step 5 Process

The Step 4 technical evaluation identified the potential route options. As per the Uisce Éireann Guide to Route and Site Selection, the purpose of Step 5 is to evaluate and compare the shortlisted routes taking into account a wide range of environmental, planning, technical and economic criteria to identify the least constrained option (the emerging preferred option).

Within Step 5 each of the route options is compared using the qualitative rating system as detailed in Section 2.2. This evaluation was done as an iterative process using the assessment matrix outlined in Section 2.3. During each iteration, the route with the most potential constraints is identified and excluded from the next evaluation step. This qualitative assessment is documented in Appendix 2.

A brief summary of the Step 5 evaluation is set out below for each of the four study areas.

7.1.1 Study Area 1 – Ranking of Routes

Each of the four routes (1A to 1D) were assessed by the criteria listed in Section 2.3 and each criterion was compared across the four routes. The results of the assessment are summarized in Table 7-1. This table shows the total number of "amber" ratings assigned to pipelines for each iteration. The "amber" ratings represent the least advantageous route or the route with more potential constraints relative to the other routes.

Table 7-1: Results of the Detailed Assessment for Study Area 1

Routes	Number of iterations	
	Iteration 1	Iteration 2
Route 1A	2	11
Route 1B	12	-
Route 1C	11	-
Route 1D	3	3

After the first iteration of this process, "amber" ratings were assigned to relative potential constraints. Route 1B and 1C were identified as having the most potential constraints and were not carried forward in the second. The main reason for this was that they are mostly routed along roads, which add technical, cost, traffic, heritage (town centre), and human impact constraints. In particular the lengths along urban/residential roads (L5610 and L1609) on these routes add significant constraints in relation to disruption and traffic management, avoiding buried services, and difficulties accessing the pipeline without road closure for operation and maintenance.

The second and final iteration assessed Routes 1A and 1D. Route 1A was identified as the most constrained route. This was mainly because it has a longer length in roads with associated constraints (costs, safety, technical and human impact), has a longer length in flooding areas, and impacts more dwellings. Route 1D was identified as the least constrained route. Since this option is routed entirely on private lands, it avoids major constraints and risks related to traffic and existing services.

Based on the detailed assessment results for Study Area 1, it was determined that Route 1D is the least constrained and most preferred route (refer to Appendix 2 for details).

7.1.2 Study Area 2 – Ranking of Routes

Each of the four routes (2A to 2D) was assessed by the criteria listed in Section 2.3 and each criterion was compared across the four routes. The results of the assessment are summarized in Table 7-2. This table shows the total number of "amber" ratings assigned to pipelines for each iteration. The "amber" ratings represent the least advantageous route or the route with more potential constraints relative to the other routes.

Table 7-2: Results of the Detailed Assessment for Study Area 2

Routes	Number of Potential Constraints		
	Iteration 1	Iteration 2	Iteration 3
Route 2A	10	-	-
Route 2B	7	10	-
Route 2C	6	7	7
Route 2D	1	1	5

After the first iteration of this process, "amber" ratings were assigned to relative potential constraints. Routes 2A was identified as having the most potential constraints and was not carried forward to the iteration 2 process. The main reason for Route 2A having more amber items was the length routed along roads, which added technical, cost, and traffic constraints.

The second iteration assessed Routes 2B, 2C and 2D. Route 2B was identified as having more constraints compared to routes 2C and 2D, due to its greater length, higher cost, impact on a larger number of landowners, and the requirement to cross River Nanny. As a result, the 2B route was not carried forward to the third iteration.

The third and final iteration assessed routes 2C and 2D. Route 2C was determined to be more constrained, primarily due to its alignment along roads and its proximity to Duleek Boys National School. The route length along roads is associated with additional technical, traffic, and human impact constraints.

Based on the detailed assessment results for Study Area 2, it was determined that Route 2D is the least constrained and most preferred route (refer to Appendix 2 for details).

7.2 Emerging Preferred Routing for the Trunk Supply Trunk Main

Based on the above evaluations the following routes were identified to be the least constrained for each section:

- Study Area 1: Route 1D
- Study Area 2: Route 2D

The overall emerging preferred route for the Staleen WTP to Duleek Trunk Main is a combination of routes 1D and 2D (see Figure 7-1).

Figure 7-1: Image of the emerging preferred route

Key reasons for this route emerging as the preferred route are:

- Of all the possible routes it is the shortest and most direct route. The overall length is 7.96km.
- The entire route is on private lands, with only a few road crossings, minimizing traffic management requirements.
- It avoids a river crossing, reducing the requirement for trenchless pipe-laying methods.
- The route avoids going through Duleek and has a minimal impact on dwellings.

The key constraint that needs some further assessment is access options from the public road to the wayleaves for this route.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

As per Section 7.2, the emerging preferred routing for the proposed trunk main is the most direct route available avoiding constraints.

The conclusion is based on initial desktop studies assessments. The conclusions of this report will be subject to refinement following discussions with relevant stakeholders and following the ultimate completion of site surveys and investigations including site investigations, environmental reviews, site walkover etc.

8.2 Recommendations

Firstly, it is recommended that the following surveys be undertaken for the proposed pipe route:

- Site Investigation and Topography Survey;
- Environmental and Invasive Survey;
- Archaeological Walkover Survey;
- Site walkover.

Secondly, it is recommended that appropriate consultations be commenced by Uisce Éireann with relevant stakeholders regarding the works and routing of the proposed pipeline.

APPENDIX 1 – CONSTRAINTS MAPPING AND PIPELINE ROUTES

APPENDIX 2 – ASSESSMENT OF CRITERIA