East Meath - North Dublin Grid Upgrade Environmental Impact Assessment Report (EIAR): Volume 2

Chapter 3 – Consideration of Reasonable Alternatives

EirGrid

March 2024

Contents

3. Consideration of Reasonable Alternatives

3.1 Introduction

The East Meath – North Dublin Grid Upgrade (hereafter referred to as the Proposed Development) has been developed in accordance with EirGrid's Framework for Grid Development. The six-step approach in the Framework for Grid Development involves detailed studies and assessments and provides a framework for the comparison of reasonable and relevant options for the Proposed Development.

This Chapter has been written in line with the requirements of Directive 2014/52/EU of the Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (hereafter referred to as the EIA Directive) and the Environmental Protection Agency (EPA) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) (i.e., "*a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects").*

Image 3.1 illustrates the sequence of alternative options that exist. The applicant is required to describe the reasonable alternatives examined during the design process with an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

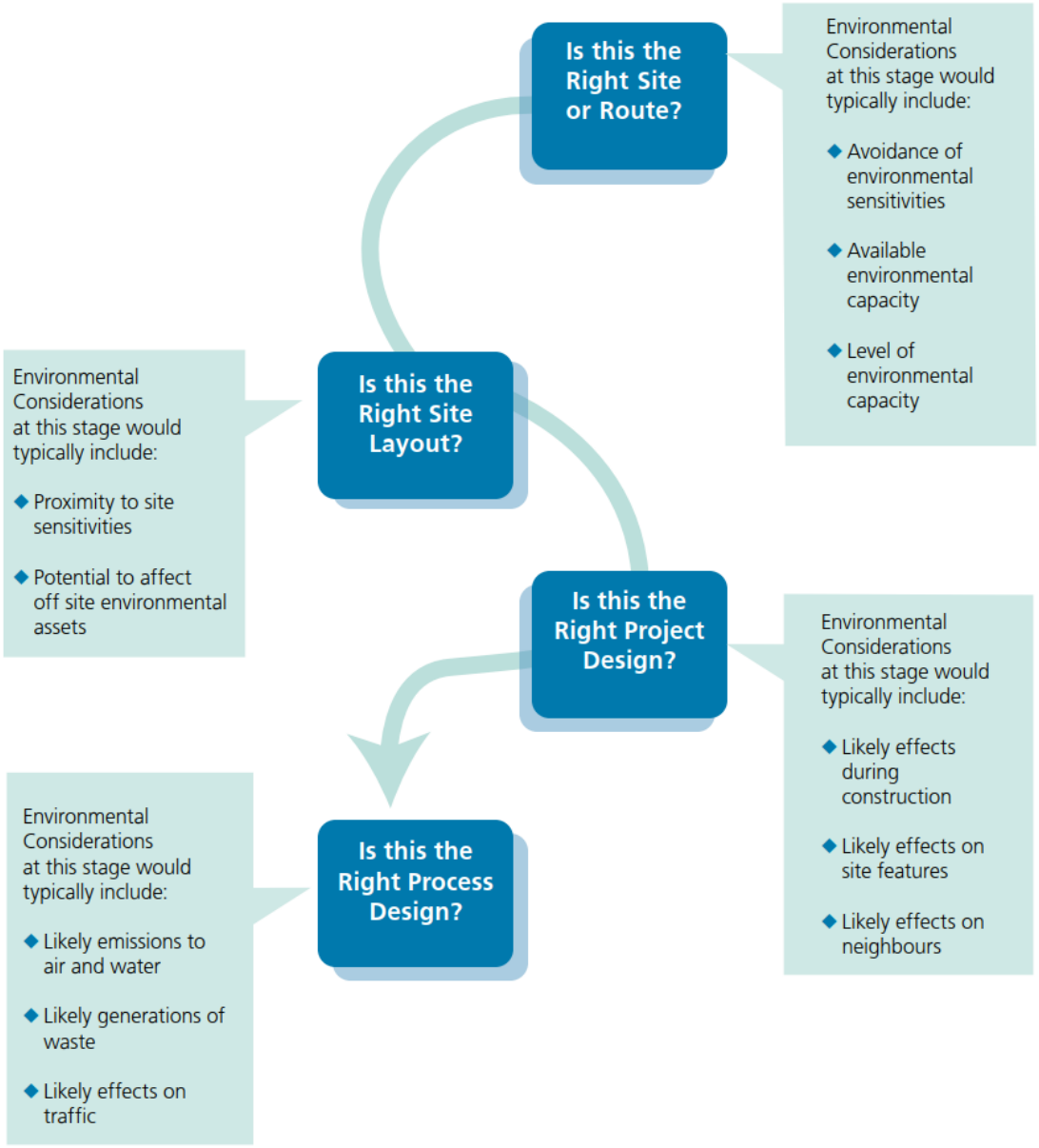


Image 3.1: Consideration of Reasonable Alternatives in an EIAR (adapted from EPA 2022)

The following sections provide a summary of the alternatives considered during the previous steps of this Framework for Grid Development, which consider the elements outlined in Image 3.1 above. Further detail is provided in the individual reports produced for each Step (Steps 1 to 4). These reports are available from the EirGrid website (EirGrid 2024a) and are also included in Volume 5 (Supporting Documents) of this EIAR.

3.2 EirGrid's Framework for Grid Development

EirGrid follows a six-step approach to identify a need to develop the transmission network and determine solutions to any identified transmission network problem (refer to Image 3.2). This six-step approach is described in Have Your Say (EirGrid 2017a) which is published on EirGrid's website.

Each step has a distinct purpose with defined deliverables and together they represent a lifecycle of a development from conception through to implementation and energisation. EirGrid's Framework for Grid Development also provides a framework for the consideration of reasonable alternatives, as required under

the EIA Directive, as it includes a comparison of potential environmental impacts, as part of multi-criteria analysis (MCA) process.

The Proposed Development has been in development since 2017 when its need was identified and confirmed at Step 1 of EirGrid's Framework for Grid Development. This Chapter outlines the process of developing the Proposed Development through Step 1 to Step 5 of the Framework for Grid Development, and details the alternatives considered in Step 3 and Step 4.

The Proposed Development is now at Step 5 which includes the preparation and submission of the planning application for approval to An Bord Pleanála (ABP).

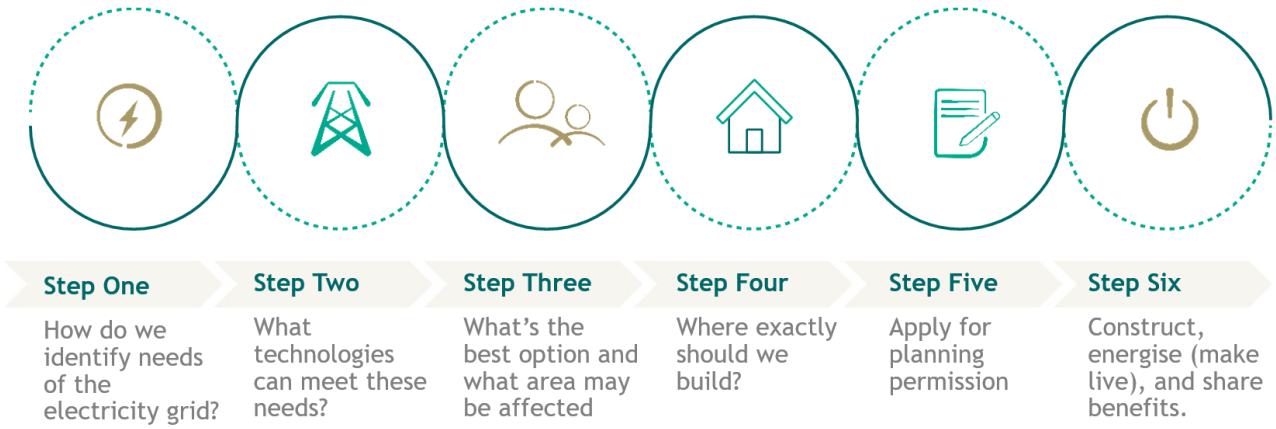


Image 3.2: EirGrid's Six-Step Framework for Grid Development (Proposed Development is at Step 5) (EirGrid 2017a)

EirGrid's Framework for Grid Development ensures that development of the Proposed Development occurs in a consistent and structured manner, with adequate and appropriate opportunities for public and stakeholder participation in decision-making.

The consideration of reasonable alternatives for the Proposed Development, as per the requirements of the EIA Directive, must be understood as occurring in the context of, and from the early stages of, the Framework for Grid Development.

In accordance with the Framework for Grid Development, a comprehensive and consistent MCA was applied (see Image 3.3) to decision making within each of the steps of the development, including in considering a number of technical and routing alternatives. The MCA facilitated a balanced consideration of the following criteria relating to the development of the Proposed Development:

- Environmental;
- Socio-Economic;
- Technical;
- Deliverability; and
- Economic.

Image 3.3: EirGrid's Assessment Criteria

Several key documents providing information about the development of the Proposed Development through this six-step process are available from the EirGrid website (EirGrid 2024a) and are also included in Volume 5 (Supporting Documents) of this EIAR. These documents, organised depending on which stage (step) of the Proposed Development they refer to in EirGrid's Six Step Framework for Grid Development, are as follows:

- Step 1 – How do we identify needs of the electricity grid?:
  - Step 1 - Needs Report (EirGrid 2017b).
- Step 2 – What technology can meet these needs?:
  - Step 2 Part A - Options Report (including the long-list of options) (EirGrid 2019); and
  - Step 2 Part B - Options Report (including the short-list of options) (EirGrid 2021).
- Step 3 – What's the best option and what area may be affected?:
  - Step 3 - Final Report (EirGrid 2022a).
- Step 4 – Where exactly should we build?:
  - Step 4A – Analysis of Route Options Report (EirGrid 2023a); and
  - Step 4B – Route Options and Evaluation Report (EirGrid 2023b).
- Stakeholder Engagement:
  - Step 4 Consultation and Engagement Summary Report (EirGrid 2023c);
  - Engagement Summary Report – Step 4 Emerging Best Performing Option (M-CO 2023); and
  - Step 1 to Step 5 Summary Engagement Report (M-CO 2024).

3.3 'Do-Nothing' Alternative

For the 'Do-Nothing' alternative, the Proposed Development would not be constructed and the existing network would be maintained in line with normal practice. From an environmental perspective, this would mean no change to the existing environment. Existing land management practices in the area would continue and any planning development would occur regardless of the Proposed Development.

In 2019 the Irish Government published its first Climate Action Plan 2019 (Government of Ireland 2019) setting out the Irish State's climate objectives including to achieve at least 70% of electricity from renewables by 2030. This figure has since increased with the publication of the latest Climate Action Plan 2024 (Government of Ireland 2023) and the government are now expecting up to 80% of electricity to come from renewables by 2030. The enactment of the Climate Action and Low Carbon Development (Amendment) Act

2021 has now put Ireland on a legally binding path to net zero emissions no later than 2050. Should the Proposed Development not proceed then it will result in an impact to the achievement of climate action targets through the lack of continued integration of renewable generation into the grid. Technically, the 'Do-Nothing' alternative could result in EirGrid failing to adhere to their legal obligation under S.I. No. 445/2000 – European Communities (Internal Market in Electricity) Regulations, 2000 (as amended) and compliance with the Transmission System Security and Planning Standards (TSSPS) (EirGrid 2016). To ensure transmission system reliability and security, the performance of the network is compared with the requirements of the TSSPS which are available on the EirGrid website (EirGrid 2024b).

The system analysis indicates that the network is experiencing significant violations of compliance with the TSSPS. The violations occur for the unplanned loss of either of the two existing 220kV circuits between Woodland, Corduff and Clonee Substations which will overload the remaining parallel circuit. Reductions in available generation in Dublin, or increases in demand connections in North Dublin, are shown to make the thermal overload violations worse.

Consequently, EirGrid must develop the grid in response to increased demand in North Dublin and low generation in Dublin. Low generation in Dublin would be expected to occur when the existing generators in Dublin are likely to be overtaken in the merit order by newer, more efficient, conventional generators and increasing levels of renewable generation located outside of Dublin.

In line with the above, as part of Step 1 of EirGrid's Framework for Grid Development, EirGrid identified the need for a solution in November 2017, with the publication of the Step 1 - Needs Report (EirGrid 2017b). The conclusion of the Step 1 analysis into the system needs in the North Dublin Corridor highlighted the increasing dependence on generation in the Dublin area and the need to ensure continued security of supply if demand were to continue to grow.

For the reasons set out above, and having regard to the environmental and climate considerations in particular, a 'Do-Nothing' alternative is not considered to be a viable reasonable alternative relative to the outcomes which can be realised by the Proposed Development.

3.4 Route Alternatives

This Section sets out the route alternatives which were considered as part of the process to establish the Proposed Development (as per the 'Is this the Right Site or Route' requirements outlined in Image 3.1).

3.4.1 Initial High-Level Route Alternatives

3.4.1.1 Step 2 of the Framework for Grid Development

As part of Step 2 of EirGrid's Framework for Grid Development, EirGrid compiled a short-list of best performing technical options which were published for public consultation between October and December 2020.

Step 2 was carried out in two parts (Part A and B), and during the initial Step 2 Part A process, a long-list of 21 viable and technically feasible solution options was presented. During this high-level stage of the process, options that make use of the existing assets as well as new circuit options were considered and evaluated, in addition to a number of technological options. The technologies that were evaluated were:

- High voltage Alternating Current (AC) solution options: AC is the standard technology that is used throughout the Irish and International electricity networks and a solution based on this would integrate well into the existing grid. High voltage Direct Current (DC) is an alternative technology that is used to transport electricity over long distances, but was not considered appropriate for the Proposed Development as DC is not easily converted to higher and lower voltages, in comparison to AC;

- Underground cables and overhead lines; and
- 220 kilovolt (kV) and 400kV voltage levels. Another alternative voltage (110kV) was not considered an appropriate alternative for the Proposed Development as this voltage level would not deliver the capacity required to solve the identified system needs.

By combining a number of strong connection points on the electricity grid with the technology options identified above, the long-list of 21 viable and technically feasible solution options was generated, and these solution options were assessed based on two criteria; technical performance and economic performance. The aim of the assessment in Step 2 Part A was to compare the options and reduce the number of solution options that would be brought forward for a more detailed evaluation. Based on this analysis, the long-list was refined to seven solution options and these were carried forward to Step 2 Part B to be assessed under the MCA, as outlined in Section 3.2 (refer to the Step 2 Part A Options Report (long-list of options) (EirGrid 2019) in Volume 5 (Supporting Documents) of this EIAR for full details).

As outlined in Section 3.2, the MCA approach facilitates a balanced consideration of the technical, economic, environmental, socio-economic and deliverability aspects of a project. The overall evaluation using the MCA is based on expert judgement which is informed by various tools such as publicly available datasets and established guidelines, as well as feedback received from consultation and engagement. The seven options included a mix of overhead line and underground cable technological solutions, and the possibility of a new transmission route between Woodland Substation and either, Corduff, Finglas or Belcamp Substations. The seven route options were:

- 400kV overhead line circuit between Woodland and Corduff Substations;
- 400kV underground cable circuit between Woodland and Corduff Substations;
- 220kV overhead line circuit between Woodland and Corduff Substations;
- 220kV overhead line circuit between Woodland and Finglas Substations;
- 400kV underground cable circuit between Woodland and Finglas Substations;
- 400kV overhead line circuit between Woodland and Finglas Substations; and
- 400 kV overhead line circuit between Woodland and Belcamp Substations.

Following on from the MCA process and related consultation held in 2020, EirGrid identified four best-performing options to explore in Step 3 (refer to the Step 2 Part B Options Report (short-list of options) (EirGrid 2021) in Volume 5 of this EIAR for full details). The four options comprised:

- Option 1 - 400kV overhead line between Woodland and Finglas Substations;
- Option 2 - 400kV underground cable between Woodland and Finglas Substations;
- Option 3 - 400kV overhead line between Woodland and Belcamp Substations; and
- Option 4 - 400kV underground cable between Woodland and Belcamp Substations.

3.4.2 Route Option Assessment

3.4.2.1 Step 3 of the Framework for Grid Development

As part of Step 3 of EirGrid's Framework for Grid Development, EirGrid re-confirmed the need for the Proposed Development and assessed the feasibility of, and constraints which may impact upon, the shortlisted technology options from Step 2 Part B to strengthen the electricity network in East Meath and North Dublin.

In order to identify the Emerging Best Performing Option (EBPO), each of the four route options were considered under the MCA, and subsequently updated to incorporate consultation feedback and any new information received during the process. Image 3.4 provides a summary of the performance of each option against the five MCA criteria and the resulting overall combined performance. The effect on each criterion

parameter was qualitatively determined using expert judgement and professional experience, which continued to be informed by various tools such as publicly available datasets and established guidelines, as well as feedback received from engagement.

A colour coded scale, along a range from 'more significant' / 'more difficult' / 'more risk' to 'less significant' / 'less difficult' / 'less risk' was applied. The key decision-making tool in the MCA approach is the performance matrix which uses the standard set of criteria to assess all options by means of colour coding from less constrained (yellow) to more constrained (blue). Image 3.5 illustrates the colour coded scale that was applied. Evidence substantiating the colour coded matrix is also documented in the Step 3 Final Report (EirGrid 2022a) (refer to Volume 5 (Supporting Documents) of the EIAR for the full report). This ensures visibility and transparency in the evaluation process.

	Option 1 Woodland – Finglas OHL	Option 2 Woodland – Finglas UGC	Option 3 Woodland – Belcamp OHL	Option 4 Woodland – Belcamp UGC
Technical Performance				
Economic Performance				
Deliverability				
Environmental				
Socio-Economic				
Combined Performance				

Image 3.4: Overall Comparison of Options Applying the MCA in Step 3

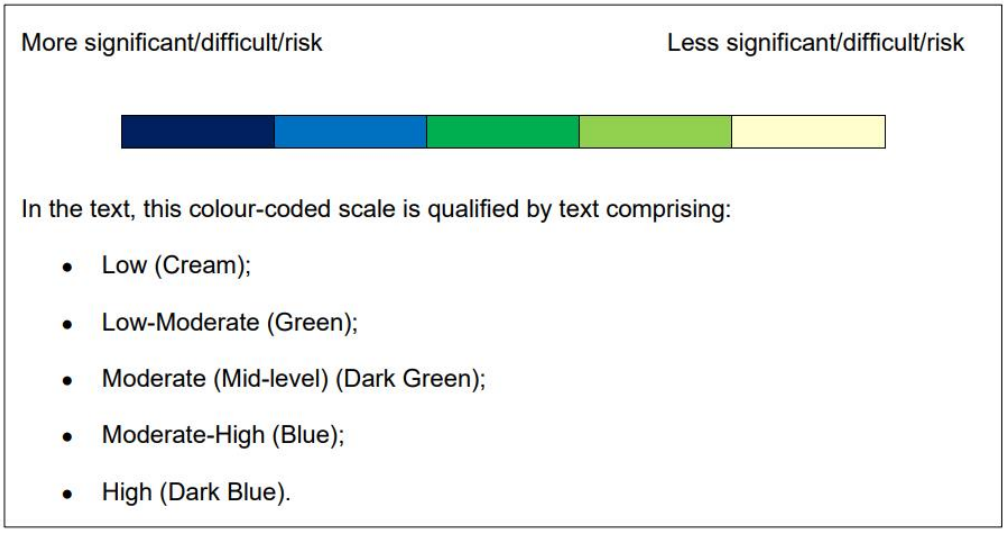


Image 3.5: Colour Coded Scale

3.4.2.1.1 How Environmental Factors Influenced the Choice of the Route

Under each headline criterion, a set of sub-criteria were used to comparatively evaluate the options. For the Environment criterion, the sub-criteria of biodiversity, soil and water, materials assets (land use and planning), landscape and visual, cultural heritage, noise and vibration and climate change were considered in the assessment to inform the Best Performing Technical Option (BPTO) (refer to the CP1021 Environmental Constraints Report (EirGrid 2022b) in Volume 5 (Supporting Documents) of the EIAR). The main environmental constraints determined during this MCA process were identified under the sub-criteria of biodiversity, landscape and visual, cultural heritage and climate change. Option 1 and Option 3 (both overhead line options) had the least favourable ratings based on the identified constraints.

For Option 1, a moderate to high risk of significant impacts on biodiversity was assessed. This was based on the following considerations:

- The potential for impacts on protected sites as all of the water bodies in the study area are hydrologically connected to European designated sites on the east coast;
- The potential for permanent / temporary loss of habitat within the footprint of the pylons and as a result of a loss of some mature trees.; and
- The potential collision risk to birds migrating across the study area.

For Option 3, a high risk of significant impacts on biodiversity was assessed. There would be potential for impacts on protected sites as all of the water bodies in the study area are hydrologically connected to European designated sites on the east coast at relatively close proximity. In particular, a connection approaching Belcamp Substation that would be routed from the north across the estuary at Malahide, which is a designated Special Area of Conservation and Special Protection Area, would have the potential for a significant impact. There would have been a permanent loss of habitat within the footprint of the pylons and as a result of a loss of some mature trees and there is a collision risk to birds migrating across the study area, particularly Brent Geese coming inland to feed. These risks were assessed to be greater than for Option 1 as the route would be longer and would be closer to designated sites and bird migratory routes.

For Option 1, there would be a moderate to high risk of significant impacts on landscape and views due to the presence of pylons and overheads lines. For Option 3, a high risk of significant impacts on landscape and views was assessed due to the increased length of the route requiring an overhead line, and the high number of viewpoints which had the potential to be affected.

The assessment of Option 3 also found that there would be a moderate to high risk of significant impacts on cultural heritage and climate change, which were not deemed to be as high a risk for Option 1. For Option 3, there would be a combined impact of the potential to encounter unknown archaeological assets during construction and the potential to impact the setting of built heritage assets during operation. Of these two potential impacts, however, the more significant impacts would be likely to arise on the setting of heritage features during operation.

3.4.2.1.2 Conclusion of Step 3 Process

Following the consideration of environmental constraints, Option 2 and Option 4 (both underground cables) were deemed to be the preferred options. Therefore, the two options were assessed under the other MCA criterion to determine any other constraints.

Option 4, the new 400kV underground cable (UGC) from Woodland 400kV Substation to Belcamp 220kV Substation, performed well from a technical, environmental and socio-economic perspective, and while some deliverability difficulties were foreseen, the conclusion of the Step 3 assessment was that these difficulties could be effectively mitigated with appropriate design solutions. Option 4 was given an overall performance of moderate significance / difficulty / risk (Dark Green). This was the most preferable option of the four, as Option 1, Option 2, and Option 3 each had a combined overall performance of High significance / difficulty / risk (Dark Blue). The Step 3 assessment identified the following significant challenge for Option 2 (refer to the Step 3 Final Report in Volume 5 (Supporting Documents) of the EIAR for full details):

- In the existing Finglas Substation, there is not enough physical space to support the additional equipment required for either a 400kV overhead line or underground cable. The restricted physical space on this brownfield site impacts both this and future developments at this location. Also, the use of Finglas Substation would require lengthy equipment outages during construction which are difficult to grant while ensuring security of power supply to the Dublin area.

In April 2022, EirGrid brought forward the 400kV underground cable option between Woodland and Belcamp Substations as the BPTO to progress for this Proposed Development into Step 4. This was communicated to stakeholders through a Public Engagement Awareness Campaign from May to June 2022, during which time feedback was encouraged through the project website, webinars and through mobile information units in the study area.

3.4.2.2 Step 4A of the Framework for Grid Development

The Step 4A – Analysis of Route Options Report was published in March 2023 (EirGrid 2023a) (refer to Volume 5 (Supporting Documents) of the EIAR for the full report) and presented an analysis of four proposed route options for the BPTO (Option 4) carried forward from Step 3.

The design of the proposed route options at Step 4 was based on the application, where reasonably practicable, of the following routing principles:

- Avoid motorways;
- Maximise the use of regional and local roads;
- Avoid town centres and industrial estates;
- Avoid going off-road, through private land and through agricultural land where possible;
- Avoid sensitive natural and built heritage locations;
- Minimise impact on communities where possible; and
- Minimise the overall length of the route.

In addition to these routing principles, the following types of routing constraints were considered:

- Width and quality of the road;
- Existing services in the road such as water, gas and drainage;
- Environmental constraints such as European and National protected areas for biodiversity, invasive and protected species and other important biodiversity areas (including undesignated habitats);
- Relevant Development Plans and Local Area Plans; and
- Areas of Amenity.

These routing principles and the consideration of constraints align with EirGrid's five key MCA criteria (i.e. environmental, socio-economic, technical; economic; and deliverability). In addition, through the publication of the Climate Action Plan 2024 (Government of Ireland 2023), the Government has confirmed the use of the road infrastructure for grid projects, like this one, as a measure to deliver the emissions ceilings. This helps to confirm that the routing principles for the Proposed Development were a sound approach.

By following the routing principles, improved route options were designed, with environmental considerations embedded in the process.

The study area for Step 4A was refined by considering a wide variety of factors. These included stakeholder and community feedback as well as technical requirements of the development, road network presence, settlements, presence of existing electrical utilities, physical constraints such as motorway, river or rail crossings and environmental constraints.

The four route options identified following consideration of the routing principles and high level constraints are as follows, and as presented in Image 3.6:

- Option A (Red);
- Option B (Green);
- Option C (Yellow); and
- Option D (Blue).

The common elements for all four route options were the commencement of all route options at Woodland Substation in County Meath, the termination of all route options at Belcamp Substation in North Dublin, all routes crossing the M3, M2 and M1 Motorways, and all routes requiring off-road corridors.

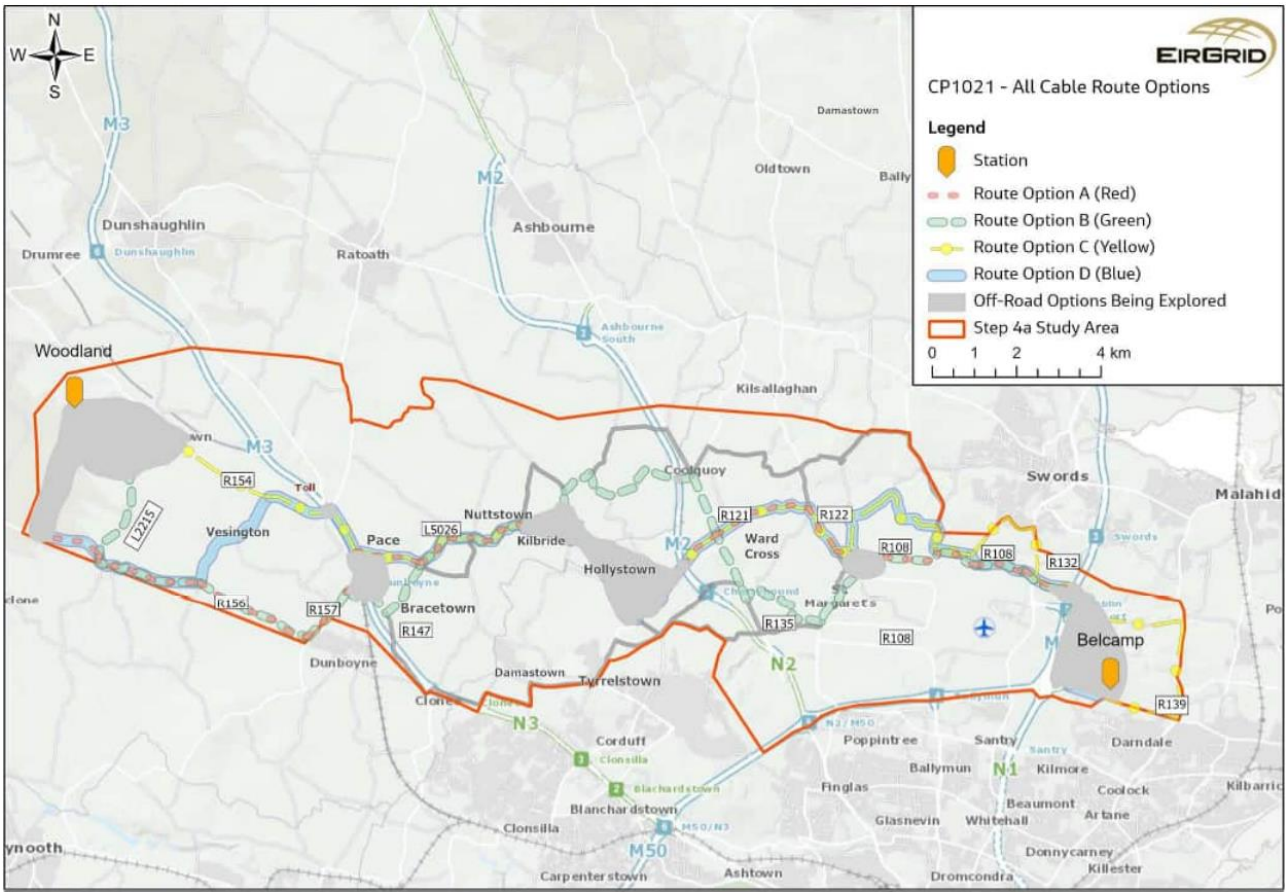


Image 3.6: Step 4A Route Options (A to D)

Each of the four route options were assessed against the five MCA criteria, and the same colour coded scale, along a range from 'more significant' / 'more difficult' / 'more risk' to 'less significant' / 'less difficult' / 'less risk', as outlined under Step 3, was applied.

In addition to the MCA, the four route options were presented for public consultation between 7 September and 30 November 2022. Public consultation was promoted through Community Forum meetings, on-site engagement in the project area, stakeholder engagement, public webinars, multi-channel advertisements, social media and a project website.

A total of 24 responses were received during the public consultation (refer to Volume 5 (Supporting Documents) of this EIAR for consultation summary reports. Public consultation has been an integral part of the Proposed Development, with each response being considered in the routing of the Proposed Development. Stakeholders expressed concerns about disruption, particularly traffic disruption, with one stakeholder questioning whether the construction works would affect the road on which they live, close to Kilbride Village. This feedback was provided to the design team and ultimately informed the design process.

3.4.2.2.1 How Environmental Factors Influenced the Choice of the Route

As with the process described for Step 3, under each headline criterion, a set of sub-criteria were used to comparatively evaluate the options. For the Environment criterion, more detailed sub-criteria were considered in the assessment to inform the BPTO. The sub-criteria were biodiversity, soils and geology, surface water and flood risk, planning policy and land use, landscape, archaeology, architectural and cultural heritage, noise and vibration, and air quality. The main environmental constraints determined during this MCA process were identified under the subheadings of planning policy and land use, and archaeology,

architectural and cultural heritage. Option C had the least favourable ratings of the four options, based on the identified environmental constraints.

For Option C, the potential for Malahide Road to become unviable as a route as a result of Metrolink and NISA connections, would have increased the risk to the Proposed Development. Therefore, as an end to end option, Option C (Yellow) was assigned a moderate to high risk in terms of planning policy and land use. In addition, a moderate to high risk was assessed for archaeology, architectural and cultural heritage due to the fact that this route option was the longest of the four and would therefore present the greatest risk of the potential to encounter previously unknown archaeological remains that may be present within the land required for Option C (Yellow).

All other options were assessed to have the same overall environmental rating of low to moderate, and as such, the scores for the other MCA criteria were considered for Option A, B and D, in order to determine the preferred option.

The overall results of this assessment are illustrated in Image 3.7 using the colour coded scale described in Image 3.5.

Option	Environment Score	Socio-economic Score	Technical Score	Deliverability Score	Economic Score
Option A (Red)	Low-Moderate	Low-Moderate	Low	Moderate	Low
Option B (Green)	Low-Moderate	Low-Moderate	Low	Moderate-High	Low
Option C (Yellow)	Moderate	Moderate	Low	Moderate-High	Moderate-High
Option D (Blue)	Low-Moderate	Moderate	Low	Moderate-High	Moderate

Image 3.7: Summary of Step 4A Route Options Assessment

3.4.2.2.2 Emerging Best Performing Option

Route Option A (Red) was selected as the EBPO, following the assessment of each option against the five key MCA criteria. Option A (Red) had a lower environmental impact than Option C (Yellow), a lower socio-economic impact than Option C (Yellow) and Option D (Blue), a lower deliverability impact than all other options and a lower economic impact than Option C (Yellow) and Option D (Blue). The lower deliverability impact means that there would be less disruption to road users and local communities during the delivery of Option A (Red), when compared to other options.

Whilst Option A (Red) was the shortest route option, it has the longest length of off-road sections when compared to the other three options. However, based on feedback from initial landowner engagement, there was a relatively high degree of confidence that the necessary permits and wayleaves could be arranged for these off-road sections, and these sections would primarily be required for technical reasons such as avoiding impacts to existing utilities. Option A (Red) is presented in Image 3.8. The majority of the route (shown as the red dashed line) follows existing roads. A buffer for the off-road areas (orange areas) was included in the EBPO to allow for further investigation, and continued engagement with stakeholders, to be facilitated as part of Step 4B to determine the most preferred off-road route options.

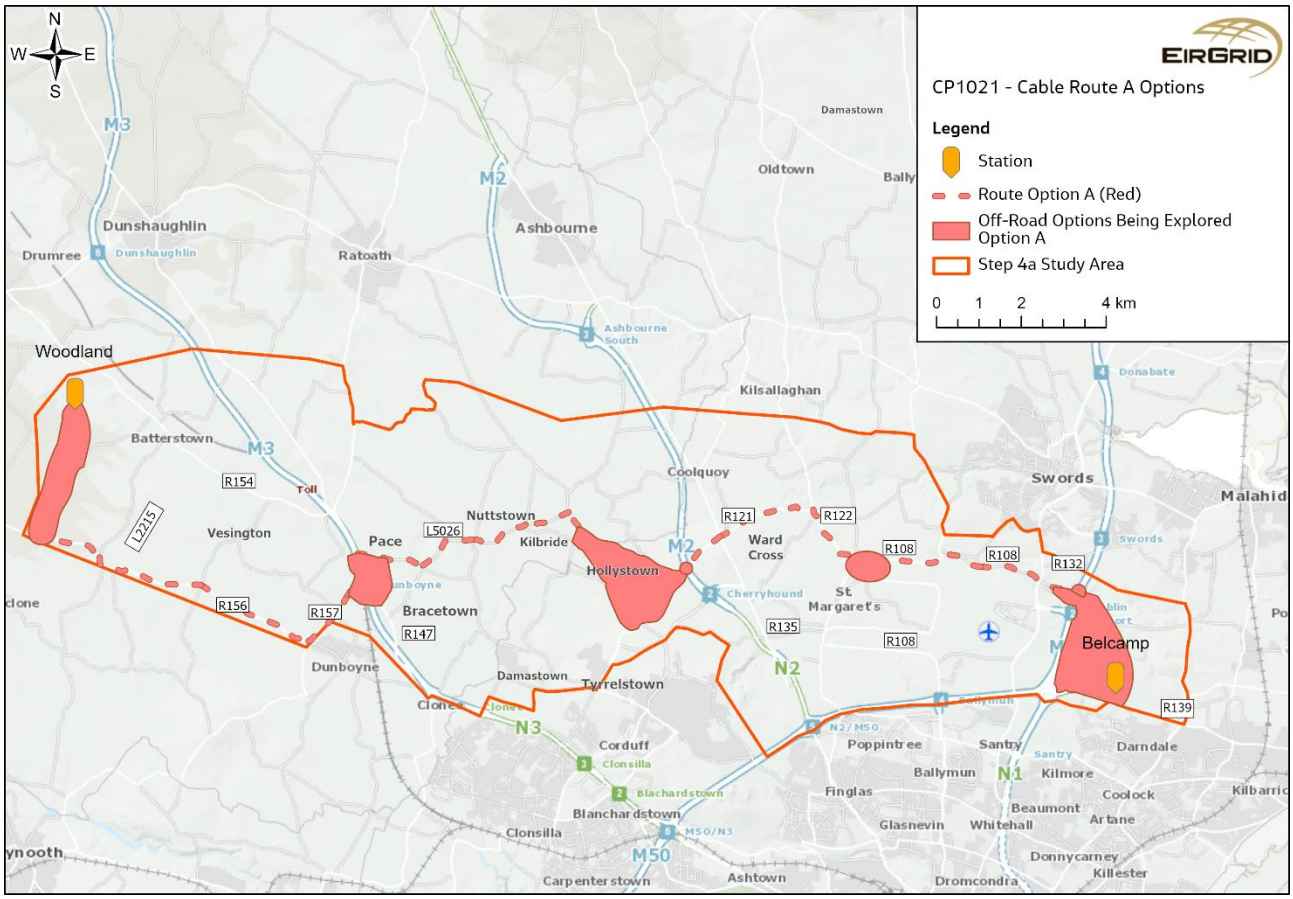


Image 3.8: EBPO - Option A (Red)

Option A (Red) was assessed to have moderate potential for impacts on some environmental sub-criteria (biodiversity, flood risk and cultural heritage), and as a result, it was deemed necessary to complete further surveys, consultation, design and assessment as part of Step 4B and Step 5 to reduce or avoid these potential impacts, and details of how these further influenced the design are outlined in Section 3.5.

Following the announcement of the EBPO and the publication of the Step 4A – Analysis of Route Options Report (EirGrid 2023a), EirGrid held its seventh Community Forum on 19 April 2023. The EBPO was promoted for three weeks, including through local and regional press titles and radio, and on social media sites. EirGrid corresponded with stakeholders throughout this period, including through emails, telephone calls, and information published on the EirGrid website to advise them of the Step 4A – Analysis of Route Options Report and the EBPO.

EirGrid also engaged with a number of stakeholders through in-person open days and door-to-door visits. Members of the EirGrid Project Team discussed the Step 4A – Analysis of Route Options Report and the EBPO during these engagement days.

A Step 4 Engagement and Consultation Summary Report was prepared and published in February 2023 and is available on the project website (EirGrid 2024a). Image 3.9, which is an extract from this report, provides a summary of key issues raised and how the project team have considered the comments.

Feedback Theme	Project Team Response
What is the construction timeline?	The timelines for Step 5 and Step 6 will be confirmed following the completion of Step 4.
What measures will be taken to reduce disruption?	As part of Step 4B of the project development process, traffic survey data has been acquired and a traffic study will assess delays and disruption due to traffic management during the construction phase. We are also working with local communities and landowners to identify suitable site construction compounds and to identify appropriate haul routes and abnormal load routes. Where possible we are seeking to avoid routes through towns, villages and other residential areas while also seeking to minimise disruption to farms and other businesses in the area.
Will road closures be required ?	Wherever possible we seek to avoid road closures however we expect that some narrow roads may require temporary road closures.
What is the decision making process?	We will continue to engage with local communities and stakeholder during Step 4 and Step 5. Following the publication of the planning submission and statutory orders in Step 5 a statutory public consultation process will also be undertaken as part of the statutory approval process.
How will this enable other energy projects?	This upgrade will strengthen the electricity grid in the east of Meath and the north of Dublin to improve the transfer of power across the existing transmission network. This will facilitate further development of renewable energy generation, onshore and offshore.
Will this work with other utilities?	We have undertaken surveys of existing utilities to assess the feasibility of the route. In some locations diversions of existing utilities may be required and in other locations off-road sections are required to avoid excessive disruption to local communities due to the utility diversions that would be required.
Could this impact health (i.e. due to EMF)?	The consensus from health and regulatory authorities is that extremely low frequency EMFs do not present a health risk. Further information is available on the EirGrid website: https://www.eirgridgroup.com/about/health-and-safety/ In addition, EirGrid's design standards require all underground cables to operate within existing public exposure guidelines from the International Commission on Non-Ionising Radiation Protection (ICNIRP) and as such there will be no effect from EMFs in terms of human health or interference to other electrical devices and systems.

Image 3.9: Post Step 4A Engagement Summary

3.5 Design Alternatives

3.5.1 Development of the Best Performing Option

3.5.1.1 Step 4B of the Framework for Grid Development

The Step 4B – Route Options and Evaluation Report (EirGrid 2023b) was published in September 2023. At Step 4B, the EBPO (Option A (Red)) was re-examined to refine the route, as far as possible, to remove the

need for any wider areas and to provide more certainty on the specific location, in line with the 'Is this the Right Site Layout' requirements outlined in Image 3.1. There were five wider areas shown at Step 4A (refer to Image 3.8), as these locations included off-road sections which required further discussions with relevant stakeholders and landowners. Further surveys and assessment work were also required to determine the best location for the proposed cable route within these wider areas.

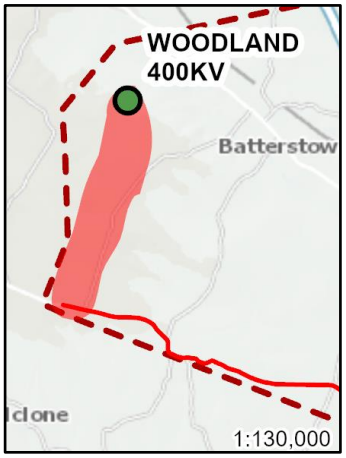
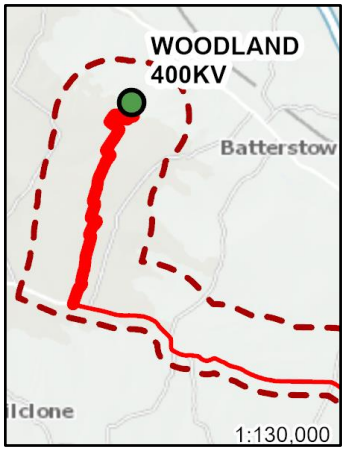
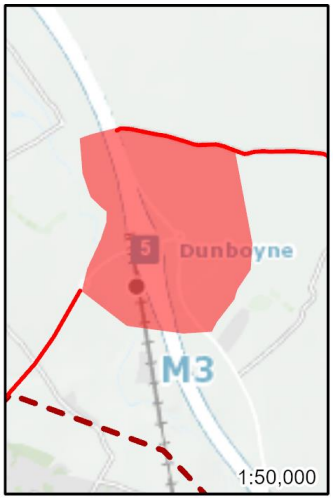
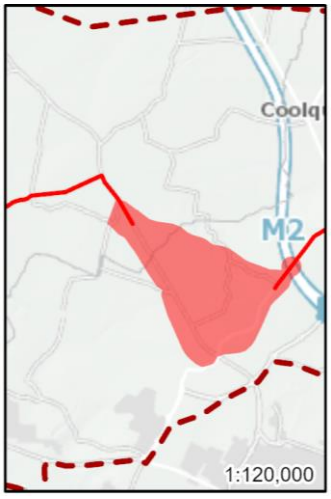
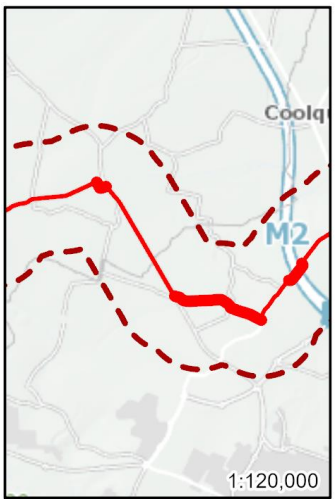
Option A (Red) from Step 4A provided a framework for the routing process at Step 4B. While it was explained in the Step 4A – Analysis of Route Options Report (EirGrid 2023a) that route changes were a possibility because of further surveys and assessment, the Project Team sought to avoid significant changes. However, the Step 4B process identified several areas where changes would result in an improved route. The vast majority of changes are in the off-road wider areas as shown in Image 3.8. The changes were made for a number of reasons, such as reducing potential environmental impacts, or avoiding private lands. As a result, the route located within the wider areas added during Step 4A, could now be determined as part of Step 4B.

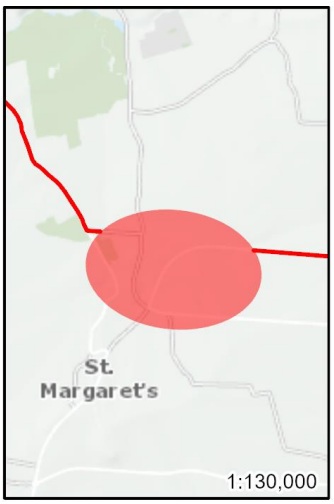
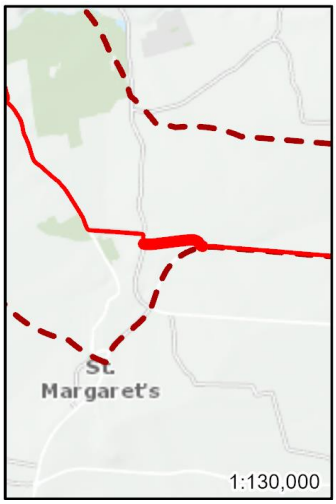
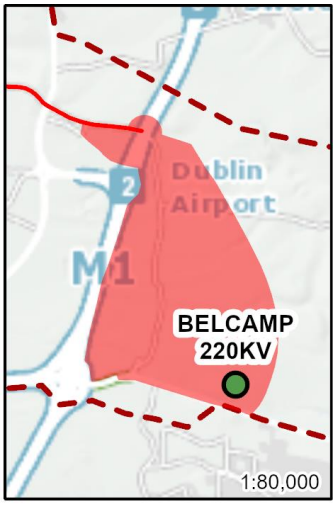
The Step 4B process involved close cooperation between all members of the Project Team (agricultural liaison officers, and specialists in the fields of deliverability, technical, economic, environmental and socio-economic factors). This multi-disciplinary team, along with input from stakeholders, landowners and the community ensured that the Best Performing Option (BPO) would be selected through consideration of all relevant issues.

Extensive engagement was carried out with a number of potentially affected landowners. This allowed landowner input into the potential routing and provided more information on ground conditions, environmental constraints, and farming practices that were considered in the routing process. At this time, further surveys and assessments were undertaken to determine how the route could be refined in order to avoid or reduce the potential environmental and social impacts, and to take account of technical issues. Issues such as the cable rating and the need to maintain the structural integrity of the cable (i.e. the cable must bend and not make 90° (degree) turns) have been factored into the routing. This process also included technical assessment of the roads affected by the cable, for example, masonry arch bridges on existing roads that may not be suitable to accommodate the proposed cable circuit (also referred to as the proposed cable route). This is because the depth of the bridges below the roads are generally quite shallow. In these cases, off-road watercourse crossings adjacent to the bridges have been assessed to be the best solution, subject to the crossing methods, including site-specific environmental mitigation.

Table 3.1 includes a summary of the changes to the wider areas, following the consideration of feedback from stakeholders and landowners, in addition to further surveys and assessment work.

Table 3.1: Summary of Changes to Wider Areas of the Step 4A EBPO (taken from Step 4B – Route Options and Evaluation Report (EirGrid 2023b)

Emerging Best Performing Option	Reason for the Change	BPO
Woodland to R156 Regional Road 	This is now an off-road section approximately 3km in length through agricultural land. The use of the local road network in this area was technically challenging due to two existing masonry arch road bridges on the Red Road that were unsuitable. An off-road corridor would also minimise the risk of disrupting access to the Woodland Substation and converter station. The BPO also optimises a corridor shared with another EirGrid project, CP966.	
M3 Motorway Crossing 	Feasible route options have been developed at this location. However, the route remains subject to ongoing engagement with key stakeholders and local landowners and will be confirmed during Step 5 (i.e. the Proposed Development now assessed in this EIAR).	
Hollystown 	This is now an off-road section approximately 1.4km in length through agricultural land. The use of the local road through the village of Hollystown was considered challenging from a deliverability perspective due to potential disruption during construction and the presence of numerous existing utilities. An off-road corridor will minimise disruption to the local community, businesses and road users.	

Emerging Best Performing Option	Reason for the Change	BPO
St. Margaret's 	This is now an off-road section approximately 0.5km in length through agricultural land. The use of the local road network in this area was considered to be technically challenging due to potential risk of disruption to strategic infrastructure associated with the airport (i.e. runway landing lights). An off-road corridor will minimise risk.	
M1 Motorway to Belcamp 	This is now an off-road section approximately 3.5km in length through agricultural and industrial land. The use of the local road (Stockhole Lane) was identified to perform less successfully against the other options due to potential disruption during construction and the presence of numerous existing utilities. An off-road corridor will minimise disruption to the local community, businesses and road users. Feasible route options have been developed at this location. However, the route remains subject to ongoing engagement with key stakeholders and local landowners and will be confirmed during Step 5 (i.e. the Proposed Development now assessed in this EIAR). The potential for this off-road section to become a wider 'transmission cable corridor' has been discussed with affected landowners on the approach to Belcamp Substation and continues to be investigated and assessed, for potential development under future EirGrid projects.	

3.5.2 Amendments to the Best Performing Option at Step 5

In the Step 4B – Route Options and Evaluation Report (EirGrid 2023b), it was identified that further design, survey, assessment, and consultation would be undertaken at Step 5 and refinements to the BPO would be possible. These refinements have now been completed for the Proposed Development, in line with the 'Is this the Right Project and Process Design' requirements outlined in Image 3.1. This process is normal practice for infrastructure projects and allowed for further engagement with landowners to be taken into consideration and for the results of additional surveys and design work to be incorporated into the Proposed Development.

The key changes between Step 4B and Step 5 are identified below.

3.5.2.1 M3 Motorway Crossing

In the townlands of Bennetstown and Pace, approximately 12.5km along the proposed cable route east of Woodland Substation, the proposed cable route from the R157 to the R147 Regional Road will intersect the

M3 Motorway at Junction 5 (Dunboyne). The proposed cable route will be required to negotiate several significant constraints including the River Tolka, areas of land subject to planned development, agricultural land, the M3 Parkway rail station, car park and rail line, and the M3 Motorway.

At Step 4A, a wider area, as shown in Table 3.1, was situated around the M3 Motorway crossing. The reason for the wider area was that the surrounding area is subject to planned development and engagement with local landowners and other interested parties was ongoing in order to determine the proposed cable route in this location. Several technically feasible options were developed and assessed against environmental constraints. The options were discussed with relevant landowners and key stakeholders, including Irish Rail and Transport Infrastructure Ireland (TII). The selected option will cross the M3 Motorway to the north of the motorway junction. This option was selected primarily for technical reasons in particular to minimise the potential risk of impact on rail operations.

The route will cross the River Tolka to the west of the motorway junction and will traverse land that is subject to planned development before crossing under the rail line and motorway. To the east of the motorway, the route will cross agricultural land before joining the R147 Regional Road. This section of the route is illustrated in Image 3.10.

Image 3.10: Step 5 Amendment at M3 Motorway Crossing

3.5.2.2 M1 Motorway to Belcamp Substation

In the townlands of Cloghran, Glebe, Baskin, Stockhole, Middletown and Clonshagh, the route will travel approximately 3km north to south from the M1 Motorway to Belcamp Substation. The proposed cable route will be required to negotiate several significant constraints including agricultural land, Baskin Lane, the planned Greater Dublin Drainage Project orbital sewer and the River Mayne watercourse.

At Step 4A, a wider area, as shown in Table 3.1, was situated from the M1 Motorway to Belcamp Substation. As part of Step 4B, several routing options were considered in-line with the routing principles for the

Proposed Development. The option of an in-road section using the L2051 (Stockhole Lane) was considered. However, this was not preferred due to the presence of several existing and planned utilities and the potential need for utility diversion works. This would likely require full road closures that would lead to significant levels of disruption to road users, the local community and local businesses. These issues required the Project Team to identify an alternative off-road route.

Engagement with landowners between the M1 Motorway and Belcamp Substation helped to identify a viable route for the cable which was also technically achievable. Potential impacts to the affected area have been considered and the route has sought to minimise these effects. The potential for this off-road section to become a wider 'transmission cable corridor' has been discussed with affected landowners on the approach to Belcamp Substation, and continues to be investigated and assessed for potential development under future EirGrid projects. This approach is in collaboration with other strategic infrastructure providers and in response to stakeholders who have requested a joined up approach to minimise the impact on communities in the future.

The route will cross Baskin Lane, several field boundaries that include field drains along hedgerows and treelines, agricultural land, the planned Greater Dublin Drainage Project orbital sewer and the River Mayne watercourse before turning to the east and connecting to Belcamp Substation. This section of the route is illustrated in Image 3.11.

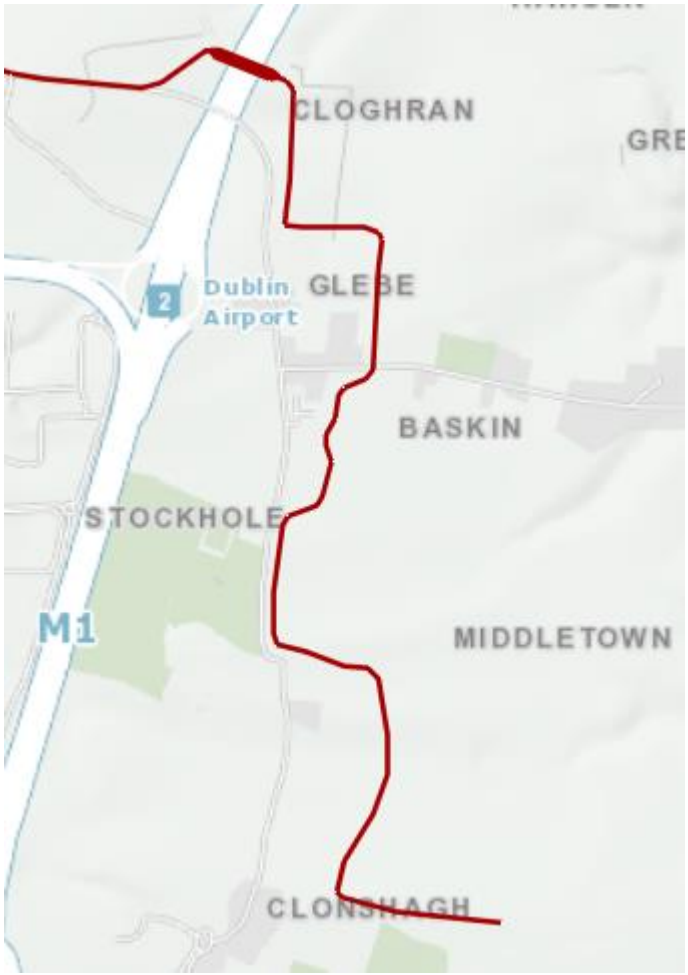


Image 3.11: Step 5 Amendment at M1 Motorway to Belcamp Substation

3.5.2.3 Watercourse Crossings

During Step 4B and Step 5, further technical assessment of the roads affected by the underground cable circuit was undertaken. At numerous locations, the underground cable circuit will cross watercourses via

existing bridge structures and culverts. However, at certain watercourse crossings, such as existing masonry arch bridges, the structures have been found to be unsuitable to accommodate the proposed cable circuit due to technical and engineering considerations. This is typically due to insufficient depth below the road surface and it may not be feasible to upgrade the bridge due to adjacent constraints such as existing properties.

In these cases, off-road watercourse crossings were assessed to be the preferred option, considering technical and social considerations based on surveys, assessment, and engagement with statutory bodies and landowners.

These off-road watercourse crossings are described below, and further refinements due to environmental considerations are outlined in Section 3.5.2.4.

3.5.2.3.1 Off-Road Watercourse Crossing in Stokestown

In the townland of Stokestown, the route of the Proposed Development will follow the L1010 Local Road and will be required to cross over two tributaries of the Pinkeen watercourse. The existing bridges have been assessed and found to be unsuitable to accommodate the proposed cable circuit due to engineering and technical considerations.

Engagement with local landowners helped to identify a suitable alternative route for the proposed cable circuit, as illustrated in Image 3.12.

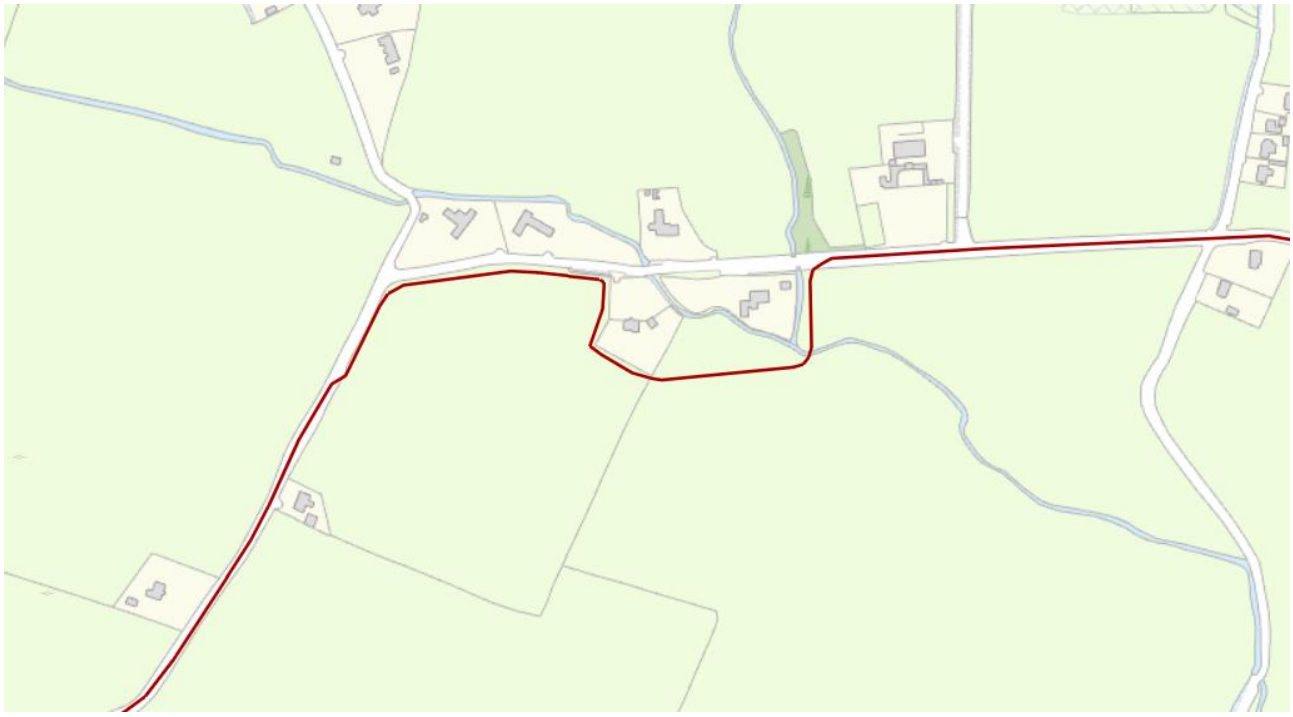


Image 3.12: Step 5 Amendment at a Watercourse Crossing in Stokestown

3.5.2.3.2 Off-Road Watercourse Crossing in Priest Town

In the townland of Priest Town, the route of the Proposed Development will follow the L1010 Local Road and will be required to cross over the Ward watercourse. The existing bridge has been assessed and found to be unsuitable to accommodate the proposed cable circuit due to engineering and technical considerations.

Engagement with local landowners helped to identify a suitable alternative route for the proposed cable circuit as illustrated in Image 3.13.

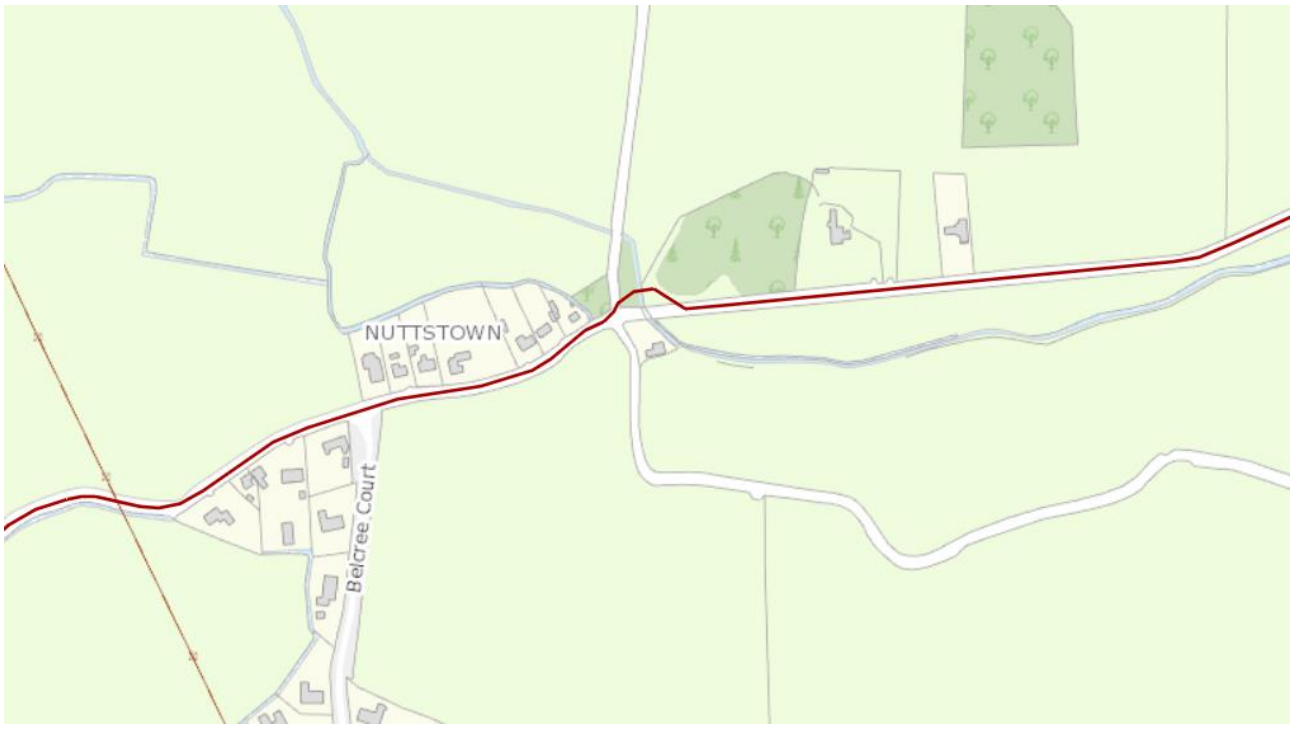


Image 3.13: Step 5 Amendment at a Watercourse Crossing in Priest Town

3.5.2.3.3 Off-Road Watercourse Crossing in Court

In the townland of Court, the route of the Proposed Development will follow the L1007 Local Road and will be required to cross over the Ward watercourse. The existing bridge has been assessed and found to be unsuitable to accommodate the proposed cable circuit due to engineering and technical considerations.

Engagement with local landowners helped to identify a suitable alternative route for the proposed cable circuit as illustrated in Image 3.14.

Image 3.14: Step 5 Amendment at a Watercourse Crossing in Court

3.5.2.3.4 Off-Road Watercourse Crossing in Kilreesk

In the townland of Kilreesk, the route of the Proposed Development will follow the L3030 Local Road and will be required to cross over the Ward watercourse. The existing bridge has been assessed and found to be unsuitable to accommodate the proposed cable circuit due to engineering and technical considerations.

Engagement with local landowners helped to identify a suitable alternative route for the proposed cable circuit as illustrated in Image 3.15.

Image 3.15: Step 5 Amendment at a Watercourse Crossing in Kilreesk

3.5.2.4 Refinements to Off-Road Sections

As part of the refinement process for the off-road sections of the proposed cable route, detailed arboricultural surveys were carried out to inform the final design in order to minimise the loss of hedgerow, vegetation and trees. A desk-based mapping study was undertaken to produce a series of heat maps of trees based on height, canopy size and a combined weighting of both. This gives an indication of the location of the 'important' trees in the Planning Application Boundary. Root protection mapping was also undertaken to consider the relationship between the Proposed Development and the retained trees to identify what precautions are necessary and proportionate. In addition, ground truthing walkover surveys by qualified arboriculturists were also carried out. The purpose of this survey was to check the whole study area for 'significant' trees which may have been missed due to the limitations of the desk-based assessment.

The early desk-based analysis of the existing tree stock, including the generation of indicative Root Protections Areas and subsequent site surveys to identify significant trees has fed into iterations of the proposed cable route design and its various elements at Step 5. There has been a considered effort at Step 5 to design out impact on trees, wherever possible.

With regards to watercourse crossings required in off-road sections, when laying the proposed cable route during the Construction Phase, for a number of design measures were considered including trenchless methodologies such as Horizontal Directional Drilling (HDD) and open cut trench methodologies. Open cut was assessed as the preferred option as there is a greater footprint required for HDD tunnelling compounds on either side of a watercourse, in addition to the requirement to use lubricating substances such as bentonite. This would result in a larger amount of temporary land take during construction, with the potential

for a greater impact as a result of habitat loss and severance and potential impacts to the watercourse itself in the event of accidental release of substances or increased sediment from runoff.

In addition, a number of design options for open cut crossings were assessed by the Project Team, and in consultation with Inland Fisheries Ireland (IFI), to-date. The options considered were temporary watercourse diversions, fluming and over pumping. An exercise was undertaken to look at the required space needed to temporarily realign the channels during construction and this concluded that temporary realignment would not be feasible within the footprint of the Proposed Development due to the limited space available within the planning application boundary and / or the presence of nearby infrastructure. Following consultation with IFI to-date, fluming was agreed to be the preferred option to over pumping. Image 3.16 includes an example graphic of a typical flume pipe crossing.

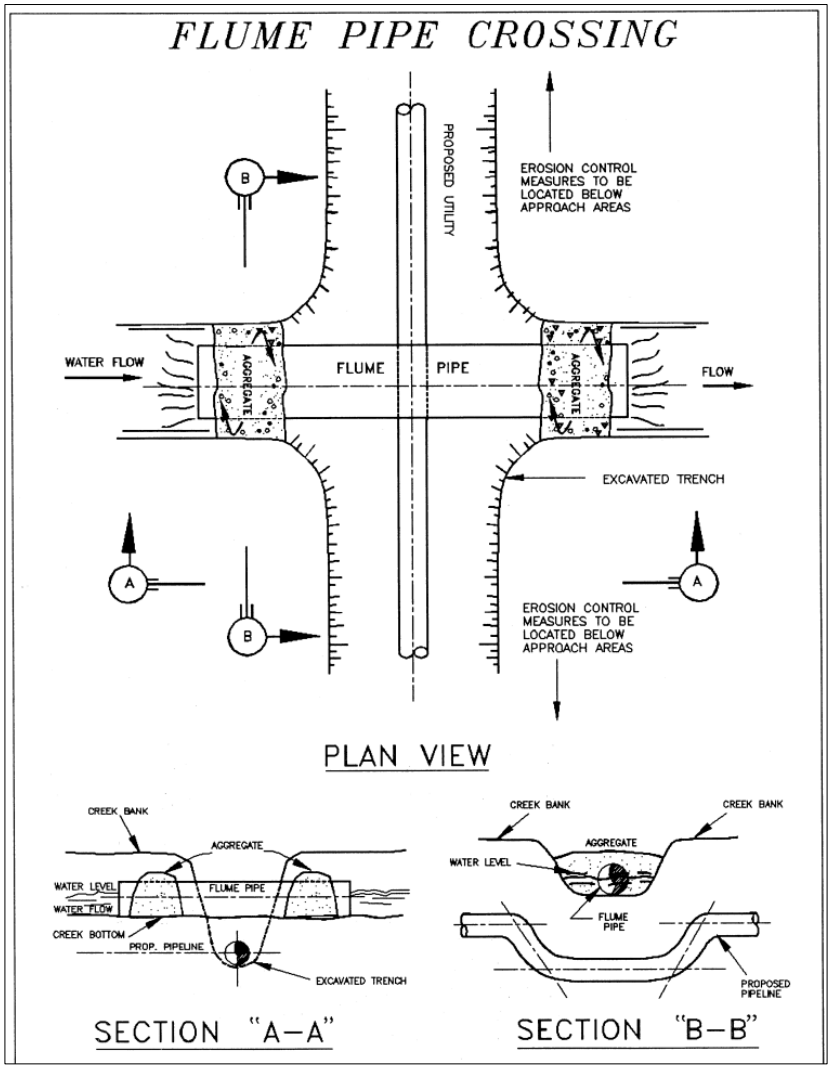


Image 3.16: Example Diagram of a Flume Pipe Crossing (Construction Industry Compliance Assistance Centre 1992)

3.6 Conclusion

The Proposed Development has been the subject of a systematic and comprehensive assessment of reasonable alternatives during the course of its development, informed by extensive engagement with local authorities, landowners and other interested stakeholders, public representatives and the general public.

As described in this Chapter and the supporting documents in Volume 5 of this EIAR, a significant range of alternatives have been considered at three levels:

- Strategic alternatives (Section 3.3);
- Route alternatives (Section 3.4); and
- Design alternatives, incorporating local level design development (Section 3.5).

The assessment of alternatives took account of environmental impacts, alongside other relevant factors including the economy, safety and accessibility, at all stages of the process.

3.7 References

Construction Industry Compliance Assistance Centre (1992). STD & SPEC 3.25 Utility Stream Crossing. [Online] Available at https://www.cicacenter.org/bmp/0591.pdf.pdf

EirGrid (2016). Transmission System Security and Planning standards

EirGrid (2017a). Have Your Say

EirGrid (2017b). Step 1 - Needs Report

EirGrid (2019). Step 2 Part A - Options Report

EirGrid (2021). Step 2 Part B - Options Report

EirGrid (2022a). Step 3 - Final Report

EirGrid (2022b). CP1021 Environmental Constraints Report

EirGrid (2024a). EirGrid website. [Online] Available at https://www.eirgrid.ie/community/projects-your-area/east-meath-north-dublin-grid-upgrade

EirGrid (2024b). EirGrid website. [Online] Available at https://www.eirgrid.ie/publications

EirGrid (2023a). Step 4A – Analysis of Route Options Report

EirGrid (2023b). Step 4B – Route Options and Evaluation Report

EirGrid (2023c). Step 4 Consultation and Engagement Summary Report

EPA (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports

Government of Ireland (2019). Climate Action Plan 2019

Government of Ireland (2023). Climate Action Plan 2024

M-CO (2023). Engagement Summary Report – Step 4 Emerging Best Performing Option

M-CO (2024). Step 1 to 5 Summary Engagement Report

Directives and Legislation

Climate Action and Low Carbon Development (Amendment) Act 2021

Directive 2014/52/EU of the Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

S.I. No. 455/2000 - European Communities (Internal Market in Electricity) Regulations, 2000