# DRAFT Transmission Development Plan Northern Ireland 2023-2032

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## DOCUMENT STRUCTURE

The structure of the document is as follows:

The **Abbreviations and Glossary of Terms** provides a glossary of terms used in the document.

The **Executive Summary** gives an overview of the main highlights of the document and presents the plan in summary terms.

**Section 1: Introduction:** our statutory and legal obligations are introduced. The purpose and context of the Transmission Development Plan Northern Ireland (TDPNI) is outlined.

**Section 2: Strategy for Developing the Grid:** describes the overall strategy followed when developing the grid and the key strategic considerations when identifying reinforcements.

**Section 3: General Approach to Developing the Grid**: describes our approach to the network planning process and how we plan the development of the transmission network.

**Section 4: Implementation:** describes how the strategy for developing the grid will be implemented. This section is based on policies and objectives derived from Section 3.

**Section 5: Investment Needs**: the drivers of network development are introduced and discussed, as are the needs of the network which result from these drivers. The needs

are identified through the application of the transmission development approach discussed in Section 2.

**Section 6: Planned Network Developments:** summarises the development projects that are currently in progress. These are the transmission projects which solve the network needs identified and discussed in Section 3.

**Section 7: Project Description:** summarises and categorises the development projects that are currently in progress by location.

**Section 8: Summary of Environmental Appraisal Report:** summarises the mitigation measures from the Environmental Appraisal Report of the TDPNI 2022-2031.

**Appendix A: Project Terms**

**Appendix B: Planned Network Developments**

**Appendix C: Northern Ireland Projects in European Plans**

**Appendix E: References**

# ABBREVIATIONS and GLOSSARY OF TERMS

## Abbreviations

| | |
|---|---|
| AA | Appropriate Assessment |
| CT | Current Transformers |
| CVT | Capacitor Voltage Transformers |
| DSO | Distribution System Operator |
| EAR | Environmental Appraisal Report |
| EC | European Commission |
| ECD | Estimated Completion Date |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Statement |
| ENTSO-E | European Network of Transmission System Operators for Electricity |
| ER | Environmental Report |
| EU | European Union |
| GCS | Generation Capacity Statement |
| GIS | Gas Insulated Switchgear |
| GW | Gigawatt |
| HV | High Voltage |
| HVDC | High Voltage Direct Current |
| IBT | InterBus Transformer |
| MW | Megawatt |
| NIE Networks | Northern Ireland Electricity Networks |
| NIS | Natura Impact Statement |
| PA | Transmission Project Agreement |

| | |
|---|---|
| PFC | Power Flow Controllers |
| RegIP | Regional Investment Plan |
| RES | Renewable Energy Sources |
| RGNS | Regional Group North Sea |
| RIDP | Renewable Integration Development Project |
| SAC | Special Area of Conservation |
| SEA | Strategic Environmental Assessment |
| SEO | Strategic Environmental Objectives |
| SONI | System Operator Northern Ireland |
| SPA | Special Protection Areas |
| TDP | Transmission Development Plan |
| TSO | Transmission System Operator |
| TO | Transmission Owner |
| TSSPS | Transmission System Security and Planning Standards |
| TYNDP | Ten-Year Network Development Plan |
| TYTFS | Ten Year Transmission Forecast Statement |
| UR | Utility Regulator |

## Glossary of Terms

| | |
|---|---|
| **Bay** | A bay is a connection point to a busbar and comprises switchgear and measurement equipment. |
| **Busbar** | An electrical conductor located in a station that makes a common connection between several circuits. |
| **Capacitor** | An item of plant normally used on the electrical network to supply reactive power to loads (generally locally) and thereby support the local area voltage. |
| **Circuit** | A line or cable, including associated switchgear, which carries electrical power. |
| **Circuit Breaker** | A device used to open a circuit that is carrying electrical current. |
| **Constraint** | A change in the output of generators from the market schedule due to transmission network limitations - specifically the overloading of transmission lines, cables, and transformers. |
| **Contingency** | An unexpected failure or outage of a network component, such as a generation unit, transmission line, transformer, or other electrical element. |
| **Coupler** | This is a device which can be used to either connect or disconnect sections of busbars. A coupler increases security of supply and flexibility under both fault and maintenance conditions. A coupler can also be known as a Sectionalising Circuit Breaker. |
| **Deep Reinforcement** | Refers to network reinforcement additional to the shallow connection that is required to allow a new generator or demand to operate at maximum export or import capacity respectively. |

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| **Demand** | The amount of electrical power that is consumed by a customer and is measured in Megawatts (MW). In a general sense, the amount of power that must be transported from transmission network connected generation stations to meet all customers' electricity requirements. |
| **Demand-Side Management** | The modification of normal demand patterns usually through the use of financial incentives. |
| **Deterministic** | The deterministic methodology is often referred to as the N-1 criterion. This means that the system must have sufficient capacity so that in the eventuality of a probable system outage, there are no resulting system problems such as overloading, under-voltage, over-voltage, or instability. |
| **Distribution System Operator (DSO)** | In the electrical power business, a distribution system operator is the licensed entity responsible for:<br>• operating and ensuring the maintenance and development of the distribution system in a given area (and its interconnections), if necessary and where applicable; and<br>• ensuring the long-term ability of the system to meet reasonable demands for electrical power.<br>The DSO in Northern Ireland is Northern Ireland Electricity Networks (NIE Networks). NIE Networks is also the asset owner of the Northern Ireland distribution system. |
| **EirGrid** | The independent statutory electricity Transmission System Operator in Ireland. |

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| **Embedded Generation** | Refers to generation that is connected to the distribution network or at a customer's site. |
| **Gas Insulated Switchgear (GIS)** | A compact form of switchgear where the conductors and circuit breakers are insulated by an inert gas (that is, $SF_6$). |
| **Generation Dispatch** | The configuration of outputs from the connected generation units. |
| **Grid** | A network of high voltage lines and cables (275 kV and 110 kV, and in future 400 kV) used to transmit bulk electricity supplies around Northern Ireland. The terms grid, electricity transmission network, and transmission system are used interchangeably in this Development Plan. |
| **Interconnector** | The electrical link, facilities and equipment that connect the transmission network of one balancing zone to another. |
| **Network Development Driver** | A factor, based on national and European energy policy objectives, that influences or "drives" the investment in the transmission network. |
| **Network Development Need** | A deficiency or problem on the network which arises as a result of one or a number of network development drivers. Network reinforcement is required to solve a network development need. |
| **Power Flow** | The physical flow of electrical power. It is typically measured in Megavolt-Amperes (MVA) which is the product of both 'active' and 'reactive' electrical power. The flow of 'active' power is measured in Megawatts (MW); the flow of 'reactive power' is measured in Megavars (Mvar). |

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| **Phase Shifting Transformer (PST)** | A type of plant employed on the electrical network to control the flow of active power. |
| **Reactive Compensation** | The process of supplying reactive power to the network to compensate for reactive power usage at a point in time. |
| **Reactive Power** | Reactive power is that portion of electricity that establishes and sustains the electric and magnetic fields of alternating current equipment. Reactive power is measured in Megavars (Mvar). |
| **Reactor** | An item of plant comprising a coil of electrical wire. Depending on its installation and configuration, it is typically employed on the electrical network to either:<br>• limit short circuit levels; or<br>• prevent voltage rise. |
| **Shallow Connection** | Shallow Connection means the local connection assets required to connect a customer, or customers, to the transmission network. These types of connections are typically for the specific benefit of that particular customer or group of customers. |
| **SONI** | The electricity Transmission System Operator in Northern Ireland. |
| **Summer Valley** | The annual minimum electrical demand that usually occurs in August. Annual minimum demand is typically 30 % of the winter peak. |
| **Summer Peak** | The week-day peak electrical demand value between March and September, inclusive, which is typically 79 % of the winter peak. |

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| **Switchgear** | A combination of electrical equipment such as disconnects and/or circuit breakers used to isolate equipment in or near an electrical station. |
| **Transformer** | An item of electrical equipment that allows electrical power to flow between typically two different voltage levels in an alternating current (AC) power system. |
| **Transmission Losses** | A small proportion of energy is lost as heat or light whilst transporting electricity on the transmission network. These losses are known as transmission losses. |
| **Transmission Peak** | The peak demand that is transported on the transmission network. The transmission peak includes an estimate of transmission losses. |
| **Transmission System Security and Planning Standards (TSSPS)** | The set of standards that the transmission system is designed to meet. The criteria are deterministic as is the norm throughout the world. They set out objective standards which have been found to deliver an acceptable compromise between the cost of development and the transmission service provided. |
| **Transmission Owner (TO)** | In the electrical power business, a transmission asset owner is the entity which owns all of the assets associated with the transmission system, including substations, cables, overhead lines and associated structures. The TO is responsible for the condition of transmission assets and thus all maintenance and asset replacement projects. The TO in Northern Ireland is Northern Ireland Electricity Networks. |
| **Transmission System Operator (TSO)** | A transmission system operator is a licensed entity that is responsible for: |

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|---|---|
| | • operating and ensuring the maintenance and development of the transmission system in a given area (and its interconnections), if necessary and where applicable; and<br>• ensuring the long term ability of the system to transmit electrical power from generation plants to transmission connected demand and regional or local electricity distribution operators.<br><br>SONI shares this role with NIE Networks and Moyle Interconnector Ltd in Northern Ireland. |
| **Uprate** | To increase the capacity or rating of electrical equipment. |
| **Winter Peak** | This is the maximum annual system demand. It occurs in the period October to February of the following year, inclusive. Thus, for transmission planning purposes the reference to winter 18 covers the period from October 2018 to February 2019. The winter peak figures take account of the impact of projected Demand-Side Management initiatives. |

# EXECUTIVE SUMMARY

## Introduction

SONI is the electricity transmission system operator for Northern Ireland.

Our role is to operate the transmission system, or the electricity grid as it's better known, every minute of every day to ensure electricity can flow from where it is generated to where it is needed at the lowest price possible for the Northern Ireland consumer.

The transmission grid safely brings power from generators and sends it to NIE Networks' distribution system. They then supply electricity to every home, farm, community and business in Northern Ireland.

However, SONI also has the crucial responsibility of planning and delivering a transformation of the power system to enable a cleaner energy future. This includes interconnection to neighbouring grids and running the wholesale electricity market.

In this respect, SONI has a crucial role to play in the implementation of Northern Ireland's Energy Strategy and climate change legislation which sets a target of an average of at least 80% of our electricity coming from renewable sources by 2030.[1] [2]

SONI has set out a plan-led approach to achieving this ambition via our Shaping Our Electricity Future Roadmap[3]. A key pillar of this Roadmap is the development of the transmission system and network.

The transmission grid and its infrastructure need to be made stronger and more flexible to transport the increases in clean energy generation which we expect to see this

[1] Department for the Economy, The Energy Strategy: Path to Net Zero, https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy

[2] Climate Change (Northern Ireland Act) 2022, https://www.legislation.gov.uk/nia/2022/31/contents/enacted

[3] https://www.soni.ltd.uk/the-grid/shaping-our-electricity-f/

decade. It also needs to be secure so that consumers have the high quality and reliable electricity supply they have come to expect.

This infrastructure upgrade is the most significant in its scale and impact since rural electrification and it is a mission-critical step on the journey to net-zero carbon emissions by 2050.

Delivering this transformation to enable a cleaner energy future is our defining mission.

The projects outlined in this document will ensure the transmission grid is fit for the future, providing for Northern Ireland's environmental, societal and economic aspirations. They are critical enabling infrastructure in the realisation of the Northern Ireland Energy Strategy and Climate Change Act.

Given the importance of this Plan in meeting Northern Ireland's energy and climate change ambitions, the views and feedback from the energy industry, local and national government and other key stakeholders on its details are of vital importance.

We would like to thank all stakeholders and interested parties who respond to the Transmission Development Plan Consultation. Your feedback is important to us. We look forward to your consultation responses on the proposals contained in this document.

Please visit consult.soni.ltd.uk for access to our consultation portal where you can review all associated documents and make a digital submission.

TDPNI consultation responses can also be emailed to info@soni.ltd.uk or via Post to TDPNI Consultation 2023, SONI Ltd, 12 Manse Road, Belfast, BT6 9RT.

The consultation opens 29 September 2023 and closes 22 December 2023.

## Background context and our role

Our purpose is to transform the power system for future generations. The environment and our society are at the heart of what we do and as such, we are committed to delivering a clean energy system as a direct response to the climate crisis.

SONI is an independent entity, with no vested interest in the generation or selling of electricity. We don't own the grid infrastructure and have no self interest in adding to it. We work every day with NIE Networks who build, own and maintain the grid transmission assets.

As a monopoly service provider, we are regulated by the Utility Regulator for Northern Ireland. Our funding is provided through a rigorous price control process and each project proposed in this document will be subject to funding approval by the Utility Regulator, either on a project specific basis or via NIE Networks price controls[4].

In 2022, the Assembly passed the Climate Change Act (Northern Ireland), setting goal to 80% of electricity consumed to come from renewable resources. We believe this is achievable if industry, government, communities, and landowners collaborate to make it happen.

In order to achieve the target, we need to add more energy from renewable sources to the power system. This means that the electricity grid will need to carry more power from energy sources that vary depending on the weather. This power will also need to be carried over longer distances.

As a result, we need to make the grid stronger and more flexible. The projects outlined in this document will ensure Northern Ireland's grid is fit for the future and ensure Northern Ireland continues to have a reliable and high-quality power supply.

Northern Ireland's electricity system is world leading when it comes to the integration of renewable energy and SONI's innovation and operations are a key part of that success. In 2022. In 2022, our energy system was the first in the world capable of having

[4] The asset replacement projects listed here are covered by NIE Networks' RP6, RP7 & RP8.

75% of electricity flowing through our grid at any point in time coming from variable renewable sources.

To build on this momentum we need a strong, resilient, and flexible transmission grid. Our corporate strategy outlines our commitment to transforming the power system for future generations[5].

While SONI has a unique role to play in making the grid ready for Northern Ireland's low carbon future, we are also responsible for security of supply for consumers. We manage the balance between supply and demand on a second-by-second basis and model medium and long-term adequacy in order to prepare industry and the market for what will be required to keep the lights on.

We have a wealth of natural resources and expect to see an increase in onshore wind and solar as well as offshore wind, battery technology, new interconnection and a cleaner more efficient gas plant coming online in the coming decade and beyond. Northern Ireland can import and export electricity via the Moyle Interconnector. In addition, the All-Island Grid is supported by the East West Interconnector between Wales and Ireland. Interconnection is a critical pillar of today's power system and market operation.

## Shaping Our Electricity Future

In 2021, SONI published the *Shaping Our Electricity Future Roadmap*, available on the SONI website[6], which set out a plan to achieve an at the time assumed target of 70% RES-E in Northern Ireland by 2030. The roadmap was informed by an extensive consultation which sought the views of all stakeholders. A number of the projects in this TDPNI were identified as being critical for delivering the 70% RES-E target.

Since the publication of the roadmap, the 2030 target in Northern Ireland was changed in law to 80% RES-E by 2030 in the Climate Change Act (Northern Ireland), which came in to force in June 2022.

In response to this, SONI has updated its *Shaping Our Electricity Future Roadmap*. This builds upon the original roadmap by outlining what further changes are required to the

[5] SONI, Strategy 2020-25, https://www.soni.ltd.uk/about/strategy-2025/

[6] LINK

electricity system to ensure Northern Ireland can deliver 80% RES-E by 2030. The updated roadmap was published in July 2023, and is available on the SONI website[7].

**The Transmission Development Plan Northern Ireland 2023-2032**

This document, The Transmission Development Plan Northern Ireland (TDPNI) 2023-2032 is the blueprint for the asset replacement and development of the transmission network and interconnection over the next ten years.

This ten-year plan presents projects that are expected to meet the operational needs of the transmission network. The plan also outlines future needs that may drive future potential projects.

At SONI, we understand that local communities, businesses and landowners must be at the heart of the energy transition. That is why "Engagement" is a core pillar of the Shaping Our Electricity Future Roadmap.

Before we develop or add to the grid, we work closely with those who may be affected by our plans to ensure they have an opportunity to shape them at the earliest possible stage.

Our *Three-Part Grid Development and Engagement Process* puts public engagement at the heart of how we develop the transmission grid. On each project, we want to engage with local communities, local businesses, elected representatives and other key stakeholders at the earliest possible stage with a goal of finding the best possible solution.

In order to provide a balanced solution, we aim to ensure that our approach minimises costs to the consumer whilst also contributing to Northern Ireland's clean energy targets and also supporting security of supply. By working with these principles at our core, we can transform the power system to deliver for consumers and our economy, while keeping Northern Ireland's switch to clean energy on track.

[7] LINK

## Deliverability Assessment and Project Prioritisation

Following adoption of the new 80% target, SONI and NIE Networks took part in a number of workshops to assess the deliverability of the key projects for decarbonisation. The outage requirements and project interdependencies were identified, and consequently a number of projects were reprioritised in order to meet the 2030 targets and timescales.

From this work it was clear that, to ensure a continued reliable, secure supply of electricity to the Northern Ireland consumer, there are limited opportunities for sufficient outages to upgrade the existing network on the scale required to onboard the increased renewable generation we require without newbuild infrastructure.

Newbuild infrastructure can be constructed offline and is not subject to the same onerous outage requirements as uprates. Six newbuild projects have been identified as key enablers for 80% by 2030. Completion of these projects is critical to meeting (and then exceeding) the 2030 targets.

These projects are:

- North – South Interconnector
- Mid Antrim Upgrade
- Mid Tyrone Project
- Moyle Interconnector Capacity Increase
- North Sperrin Generation Substation
- North West of NI 110 kV Reinforcement

As well as these six projects, there are others, particularly circuit uprates, which will enhance the capability of the grid to carrying increased quantities of renewable power. We anticipate that this program of circuit uprates will continue beyond 2030.

## Risks to the Plan

The 80% RES-E by 2030 is a very challenging target and will require close co-operation between the renewables industry, SONI, NIE Networks, the Utility Regulator, local Councils, and the Department for the Economy and Department for Infrastructure.

Delivery of the six projects above is possible by 2030 but is dependent on continued enabling government policy, an efficient and robust planning policy and system and both SONI and NIE Networks having sufficient resources to complete projects in a timely manner.

The Energy Strategy Action Plan for 2023 noted the key action to *issue a consultation on the draft regional strategic planning policy for renewable and low carbon energy*.[8] In our assessment, and in line with the emerging industry consensus, delivery of this action (and subsequent improvements to the Planning process) will be critical to ensuring the projects detailed within this Plan can be delivered by the 2030 target.

In addition, external and unforeseen issues, such as the supply chain shocks arising from the Covid pandemic and the Russian invasion of Ukraine have implications for project delivery, as does the high degree of competition for production capacity for key equipment arising from the worldwide push for renewable electricity and associated grid development.

SONI will continue to work closely with all key stakeholders to identify risks to the plan at an early stage and put in place mitigation measures.

**NIE Networks RP7 Business Plan**

NIE Networks launched its business plan for the six-year period from 1 April 2025 - 31 March 2031 in March 2023. This will be NIE Networks' seventh regulatory price control period (Regulatory Period 7 or RP7) since it was privatised in 1993.

The RP7 plan sets out to invest almost £2.6bn over the RP7 period, or well in excess of £3bn over the next 10 years (2023 to 2032). This is the required level of investment on both the transmission and distribution networks that NIE Networks believe is needed to allow the homes and businesses of Northern Ireland to invest in electric vehicles and electric heating to the scale needed to meet Northern Ireland's climate change commitments. It includes our (SONI's) view on the level of investment required to ensure the transmission network remains fit for purpose. While SONI is responsible for

[8] Department for the Economy (2023), Energy Strategy Action Plan 2023, https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-Path-Net-Zero-Energy-2023-Action-Plan.pdf

the planning and high-level design of transmission load-related projects needed to ensure the transmission network remains fit for purpose, the delivery of these projects sits with NIE Networks and therefore the associated NIE Networks costs are included in their RP7 plan.

The plans for RP7 are to deliver a smarter, more flexible and integrated energy system for all customers so that they can decarbonise their lives at least cost. To achieve this NIE Networks has set out that they must expand their capabilities, evolve their existing roles and take on new functions as a Distribution System Operator (DSO).

In addition to increased development on both the transmission and distribution systems to deliver the RES-E targets, another factor driving increased investment is maintaining the reliability, resilience and safety of the existing ageing network. The initial development of the electricity network in Northern Ireland occurred primarily in the 1950s and 1960s, and much of the original network that was built all those decades ago remains in place today. These assets are now upwards of 60 years old or more and need, or will soon need, replacement in order to maintain reliability of supply. So, during RP7 NIE Networks will need to undertake a comparatively larger programme of network renewal than ever before.

**Drivers of Transmission Network Development**

This report has been prepared in accordance with Article 51 of European Directive 944/2019, the Withdrawal Agreement between the UK and the European Union (EU), and Conditions 18, 20 and 40 of the SONI Transmission System Operator Licence.

The development of the Northern Ireland electricity sector is guided by a number of national and EU rules and strategic objectives. These objectives guide investment in the Northern Ireland transmission network and are summarised as follows:

- Ensuring the security of electricity supply;
- Ensuring the transmission system is an economical system; and
- Ensuring the long-term sustainability of electricity supply.

In order to achieve these strategic objectives, we must invest in the planning, and operation of the electricity transmission network. Drivers of investment include:

- Securing transmission network supplies;
- Promoting market integration; and
- Facilitating the economic and efficient integration of RES-E, low carbon technologies, and complementary thermal generation.

As demand or generation changes, or as the transmission network becomes more interconnected with neighbouring transmission networks[9], the flow of electrical energy throughout the transmission network changes. To accommodate these changes in power flows it is often necessary to modify or strengthen the transmission network to ensure performance and reliability levels are upheld. SONI and NIE Networks are obliged to develop an economic, efficient and coordinated transmission system.[10]

In addition, the condition of transmission network assets is a factor. The timely maintenance or replacement of assets is required to provide the necessary level of security of supply. This is the responsibility of NIE Networks.

Reinforcement drivers and needs can be separated into a number of categories:

- Reinforcements required to support changes in, or connection of new generation or new system service providers;
- Reinforcements related to interconnection;
- Reinforcements to facilitate inter-regional power flows
- Investments to address the condition of existing assets; and
- Reinforcements required to support changes in, or connection of new demand

SONI has updated the way we develop the grid through the production of 'Tomorrow's Energy Scenarios Northern Ireland' (TESNI)[11], a recent approach which involves

[9] The European electric power transmission networks are interconnected, so as to be able to transmit energy from one jurisdiction to others.
[10] The Electricity (Northern Ireland) Order 1992, Article 12
[11] SONI, the Electricity System Operator for Northern Ireland, publishes Tomorrow's Energy Scenarios Northern Ireland 2020 final report

developing a range of possible energy scenarios dealing with renewables and the electrification of heat and transport.

In the process of developing the range of energy scenarios, key policy makers, industry experts, and stakeholders are asked how they see the energy landscape changing over time. The final scenarios are published and reviewed periodically. These scenarios act as an input to our grid development process, aid in the identification of system needs and the practicality and merit of different solutions. The first TESNI was published in 2020 and can be seen on the SONI website[12]. The second iteration is currently in progress and is due for publication later in 2023.

**Transmission Network Reinforcements**

A total of 78 planned projects are included in this development plan. Of these, 41 are NIE Networks asset replacement projects and 37 are network development projects. Since publication of the TDPNI 2021-2030:

- 5 new projects have been included
    - Cam Cluster Substation;
    - Coolkeeragh – Limavady – Coleraine 110 kV Uprate;
    - Larne Transformer Replacement;
    - Limavady Transformer Replacement; and
    - North Sperrin Generation Substation.
- 6 projects have been cancelled;
- 3 projects have been renamed, had a change in scope, or been incorporated into other project scopes; and
- 2 projects have been completed.

Details of these projects can be seen in Section 1.7.

[12] SONI, the Electricity System Operator for Northern Ireland, publishes Tomorrow's Energy Scenarios Northern Ireland 2020 final report

The network development projects are shown by region and project category in Table E-1 below.

Table E-1: Summary of Number of Network Development Projects in Progress by Region and Project Category

| Network Development Projects by Planning Area | | | | |
|---|---|---|---|---|
| **Project Category** | **North and West** | **South-East** | **Projects in Both Areas** | **TOTAL** |
| **New Build** | 6 | 7 | 0 | 13 |
| **Uprate/ Modify** | 10 | 9 | 2 | 21 |
| **Refurbish/ Replace** | 0 | 0 | 0 | 0 |
| **Combination** | 0 | 2 | 0 | 2 |
| **TOTAL** | 16 | 18 | 2 | 36 |

As well as the project categories detailed in Table E-1, Appendix B highlights the drivers and needs of each project. Changes to projects including costs are described in Section 7.

**Capital Expenditure**

SONI's expenditure on transmission development projects due for completion over the period 2023 – 2032 is estimated at £61.4 million, of which £13.7million has been spent already. This figure is the amount required to bring projects to the point of handover to NIE Networks and to support NIE Networks during the construction and commissioning phase. The projects are subject to the Utility Regulator through the Transmission Network Preconstruction project (TNPP) process and SONI's governance procedures. Estimated TO costs associated with these projects are £571.2 million. The Utility Regulator will determine the amount that can eventually be recovered from customer and generator tariffs for these projects.

The Utility Regulator has already approved expenditure for asset replacement of £43.3 million for NIE Networks for the period 2017-2024[13]. NIE Networks have published their plans for the period 2025-2031 (RP7)[14] and a decision by the Utility Regulator is expected later in 2023.

There are three further asset replacement projects sitting outside this mechanism with indicative costs estimated at £73.9 million[15]. Total estimated asset replacement costs over the ten years covered by this plan are approximately £177.5 million.

The total estimated cost of all projects described in the TDPNI 2023-2032 is £810.1 million[16].

### Data Management

The Transmission network development plan is updated regularly. To allow for comparison of network development projects on a year-on-year basis, data is represented at a fixed point in time – the data freeze date. The data freeze date of TDPNI 2023 is 1 May 2023.

### Strategic Environmental Assessment

The TDPNI 2023-2032 has been subject to Strategic Environmental Assessment[17] (SEA) and Appropriate Assessment[18] (AA) (see section 3.5.3).

## Responding to the TDPNI consultation – we want to hear your views

[13] See the NIE Networks RP6 final determination: https://www.uregni.gov.uk/nie-networks-rp6. Please note that the costs reported in the RP6 final determination are from 2015-16 and have been adjusted for inflation in this TDPNI for 2023.

[14] https://www.nienetworks.co.uk/rp7-business-planno -

[15] Coolkeeragh – Magherafelt 275 kV refurbishment, Ballylumford – Eden 110 kV Refurbishment and Ballylumford 110 kV switchboard replacement

[16] Note that this does not include the North Sperrin Generation Substation project, as costs and funding mechanisms for this project have not yet been determined

[17] EU Directive (2001/42/EC) Strategic Environmental Assessment is a requirement for certain plans and programmes.

[18] EU Habitats Directive: Council Directive 92/43/EEC of 21st May 1992 on the conservation of natural habitats and of wild fauna and flora

We would like to thank all stakeholders and interested parties who respond to the Transmission Development Plan Consultation. Your feedback is important to us. We look forward to your consultation responses on the proposals contained in this document.

The consultation closes XX/XX/XXXX.

You can provide a response in the following ways:

- To provide a digital response, please visit consult.soni.ltd for access to our consultation portal where you can review all associated documents and make a digital submission.
- Consultation responses can also be emailed to info@soni.ltd.uk or via Post to TDPNI Consultation 2023, SONI Ltd, 12 Manse Road, Belfast, BT6 9RT.

**Next Steps**

Following the consultation process, the next steps are as follows:

- Produce and publish a report on the TDPNI and SEA consultations
- Update the TDPNI based on responses
- Issue updated TDPNI document to the Utility Regulator, including copies of consultation responses
- Utility Regulator will undertake a further consultation after part of their approval process

# 1 INTRODUCTION

The Northern Ireland transmission system is a network of 275 kV and 110 kV (and in future 400 kV) high voltage lines and cables. It is the backbone of the power system; efficiently delivering large amounts of power from where it is generated to where it is needed, safely and reliably.

Electricity supply is essential to everyday life and to the local economy, and a reliable electricity network is the means by which we move electricity around Northern Ireland. The development of transmission network infrastructure is, therefore, of strategic importance.

This TDPNI outlines the:

- Drivers of transmission network development;
- Transmission network investment needs; and
- Projects required to address these needs.

## 1.1 Statutory and Legal Requirements

Regulations that are relevant to planning the transmission network include:

### 1.1.1 Statutory and Licence Requirements

- The Electricity Order (Northern Ireland) 1992:
  - Article 12
  - Article 32
- The Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012.
- The Construction (Design and Management) Regulations (NI) 2016.
- SONI's TSO Licence:
  - Condition 18 – Transmission Interface Arrangements
  - Condition 20 – Operation of the Transmission System and the System Security and Planning Standards
  - Condition 40 – Transmission Development Plan NI
- NIE Networks Transmission Licence:

- Condition 17 – Transmission Interface Arrangements
- Condition 19 – Developing and Maintaining the Transmission System

### 1.1.2 European Statutory Requirements

- Withdrawal Agreement between the UK and EU:
  - Article 9 of the Protocol on Ireland/Northern Ireland
  - Annex 4 of the Protocol on Ireland/Northern Ireland
- Regulation (EC) No 943/ 2019 on conditions for access to the network for cross-border exchanges in electricity:
  - Article 28; Article 30 paragraph 1(b); Article 34.
- Directive 2019/ 944/ EC concerning common rules for the internal market in electricity:
  - Paragraphs 1 and 4 of Article 51.
- Regulation (EC) No 943/2019 on the promotion of the use of energy from renewable sources:
  - Article 13 paragraph 5; Article 12 paragraph 2 and 6
- Regulation (EC) No 943/2019 on energy efficiency:
  - Paragraph 4 and 6 of Article 13.

The Withdrawal Agreement between the UK government and the EU provides for the continuation of the Single Electricity Market on the island of Ireland and the continued application of European legislation that relates to the wholesale electricity market[19]. Therefore, the format of the TDPNI will remain consistent with previous editions, with no change to the legal basis upon which it is prepared.

SONI is responsible for the planning and operation of the transmission network within Northern Ireland. We have a licence obligation to produce a TDPNI and as per European requirements we contribute to a European Ten-Year Network Development Plan[20] (TYNDP) every two years.

[19] Withdrawal Agreement between the UK government and the EU can be found here: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12019W/TXT

[20] TYNDP 2022 is available here: https://2022.entsos-tyndp-scenarios.eu/wp-content/uploads/2022/04/TYNDP2022_Joint_Scenario_Full-Report-April-2022.pdf

NIE Networks is responsible for the development and maintenance of the transmission system[21], including asset replacement projects, in accordance with the Transmission Interface Arrangements (TIA)[22]. SONI reviews all asset replacement proposals and these are incorporated in this Plan.

## 1.2 Context of the Plan

This TDPNI covers a period of ten years which, as well as being a statutory requirement under our licence, is in line with the European Network of Transmission System Operators for Electricity's (ENTSO-E) Ten Year Network Development Plan (TYNDP). As part of the preparation of the TDPNI, we consult with EirGrid as TSO in Ireland and with NIE Networks in compliance with the licence condition. SONI is obliged to undertake a public consultation on the draft TDPNI. Following feedback received from the public consultation we update the TDPNI, as required, and provide a report to the Utility Regulator on feedback received. We prepare the final version of the TDPNI and submit it to the Utility Regulator for approval. A public consultation on the TDPNI is held by the Utility Regulator for Northern Ireland before approval and final adoption[23].

A Strategic Environmental Assessment (SEA) has been undertaken on this TDPNI under the provisions of the European Communities Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive) as transposed through the Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004 (S.R. 280/2004). A Habitat Regulations Assessment (HRA) has also been prepared (Council Directive 92/43/EEC, and Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995). The SEA aims to provide a high level of protection for the environment and to promote sustainable development. The SEA and HRA are anticipated to be valid for five years.

[21] NIE Networks Transmission Licence, Condition 19. Available here: https://www.uregni.gov.uk/files/uregni/media-files/NIE%20Transmission%20Licence%20effective%2018%2001%202020.pdf

[22] These are described in section 3.3

[23] Directive 2019/944/EC, Article 51, Paragraph 4: *"The regulatory authority shall consult all actual or potential system users on the ten-year network development plan in an open and transparent manner. Persons or undertakings claiming to be potential system users may be required to substantiate such claims. The regulatory authority shall publish the result of the consultation process, in particular possible needs for investments."*

The Transmission Owner (TO), NIE Networks, is responsible for the detailed design and construction of all projects detailed in the TDPNI. NIE Networks is also responsible for planning and delivering asset replacement projects.

The development of the transmission network involves forecasting future needs. Solutions chosen to address these needs must maintain security and quality of supply within standards, while balancing costs and environmental impacts. The process is flexible to enable the long-term development of the network, and derogations against standards can be obtained in exceptional circumstances.

Considerations that shape the medium and long-term development of the transmission network are outlined below.

### 1.2.1 GB, All-Island and European Context

Our TSO licence obliges us to carry out transmission planning on a coordinated all-island basis in conjunction with EirGrid. This requirement is met by the System Operator Agreement in place between SONI and EirGrid. Together we now publish All-Island Generation Capacity and Ten Year Transmission Forecast Statements. The aim of coordinated planning is to ensure, as far as possible, that projects developed, particularly in border areas, will benefit the entire island.

European legislation requires all European TSOs to cooperate through ENTSO-E. ENTSO-E has six regional groups that co-ordinate network planning and development at regional level. We are members of the Regional Group North Sea (RGNS), which also includes EirGrid and the TSOs of Belgium, Denmark, France, Germany, Luxembourg, Netherlands and Norway. One of the duties of RGNS is to produce a Regional Investment Plan (RegIP) every two years. This RegIP together with the other five RegIPs feed into ENTSO-E's Ten Year Network Development Plan (TYNDP).

SONI also liaises with the Electricity System Operator in Great Britain, including where relevant around matters related to interconnection between our synchronous systems.

Projects of pan-European and regional significance[24] are identified in the TDPNI using the following labels: "TYNDP/ TYNDP_Project_No" or "RegIP/ RegIP_Project_No". The most recent final versions of TYNDP[25] was issued in April 2022 and the RGNS RegIP[26] was issued in January 2023. Northern Ireland projects in European plans are listed in Appendix C.

## 1.3 Period Covered by the TDPNI 2023-2032

TDPNI 2023-2032 presents our view of future transmission needs and our plan to develop the network through specific projects to meet these needs over the next ten years. It also includes NIE Networks' view of asset replacement needs on the transmission system, including those provided for through its price control.

It is possible that changes will occur in the need for, scope of, and timing of the listed developments. Similarly, it is likely, given the continuously changing nature of electricity requirements, that new developments will emerge that could impact the plan as presented. These changes will be identified in future studies and accommodated in future TDPNIs. As such, the long-term development of the network is under review on an on-going basis.

This TDPNI presents the projects which are currently being advanced to solve the needs of the transmission network. In addition, future needs that drive future potential projects are also discussed.

## 1.4 Data Management

Transmission network development is continuously evolving. To help the comparison of network development projects year-on-year, and in the interest of routine reporting, data is represented at a fixed point in time – the data freeze date.

[24] Please see Appendix C for information on what qualifies a project to be of pan-European significance.

[25] TYNDP 2022 can be found here: https://2022.entsos-tyndp-scenarios.eu/wp-content/uploads/2022/04/TYNDP2022_Joint_Scenario_Full-Report-April-2022.pdf

[26] Regional investment plan 2022 – Northern Seas (windows.net)

The TDPNI summarises transmission projects applicable as at the data freeze date, 1 May 2023. Future TDPNIs will highlight the changes that have happened since the previous plan.

## 1.5 Planning Area Categorisation

Power flows on the transmission network are not contained within specific localities. Therefore, from a transmission planning viewpoint, it is more appropriate to represent planning areas that best reflect the conditions and power flows on the transmission network. For this purpose we refer to two planning areas in Northern Ireland:

- The North and West; and
- The South-East.

The regions and planning areas that best reflect the conditions and power flows on the transmission network are illustrated in Figure 1-1 below.

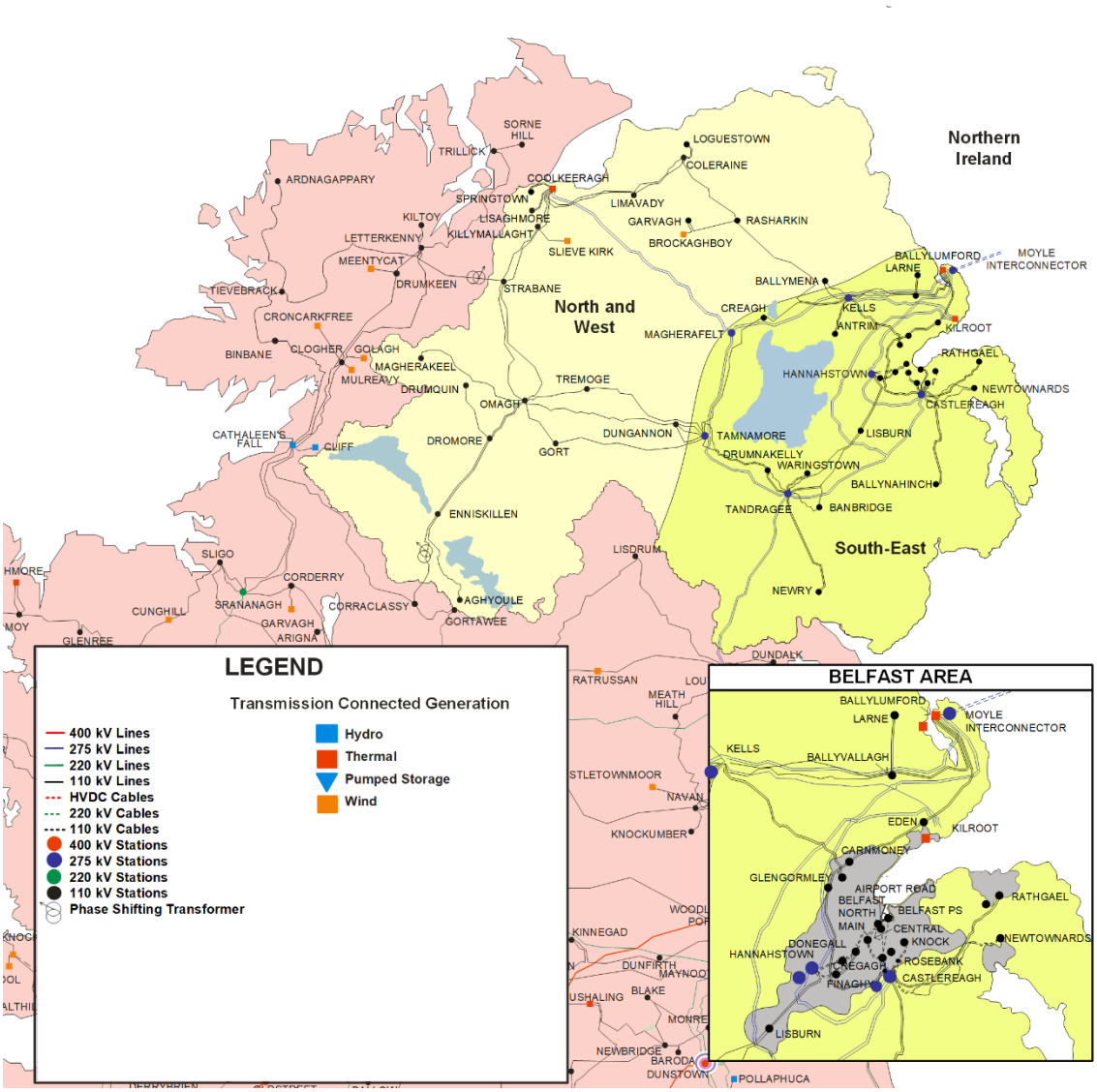


Figure 1-1 Illustration of the Northern Ireland planning areas

## 1.6 The TDPNI and Other SONI Publications

SONI and EirGrid are responsible for the publication of a number of statutory documents under their respective TSO licences. Two of these documents (the Generation Capacity Statement and the Ten Year Transmission Forecast Statement) are published on an all-island basis by both TSOs.

The other statutory documents published by both SONI and EirGrid are detailed below. All statutory documents can be found on the SONI website[27]. Figure 1-2 shows the relationships between the statutory documents published by SONI.

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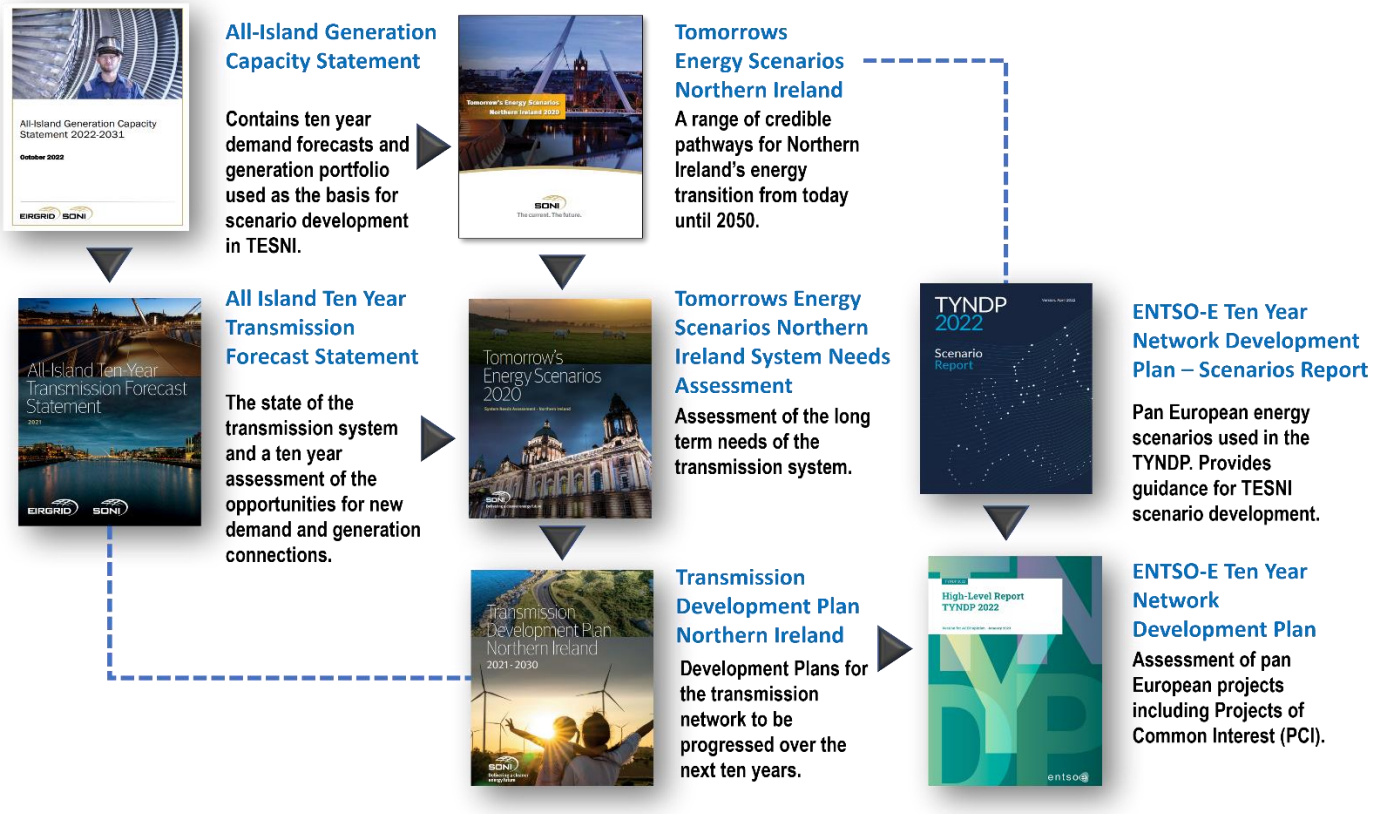



Figure 1-2 The TDPNI in context with other SONI publications

### 1.6.1 Generation Capacity Statement

The Generation Capacity Statement (GCS) is published annually by SONI and EirGrid. The GCS provides:

- A ten year forecast of electricity demand in Northern Ireland and Ireland;
- Contracted changes to conventional generation;
- Forecasted changes to renewable generation; and
- A ten-year forecast of the generation capacity required to meet demand.

[27] https://www.soni.ltd.uk/library/

The most recent version of the GCS is Generation Capacity Statement 2022-2031 and is available from the SONI website[28].

### 1.6.2 Ten Year Transmission Forecast Statement

The Ten Year Transmission Forecast Statement (TYTFS) is published annually by SONI and EirGrid. The TYTFS provides:

- Network models and data of the all-island transmission system;
- Forecast generation capacity and demand growth (taken from the GCS);
- Maximum and minimum fault levels at transmission system stations;
- Predicted transmission system power flows at different points in time; and
- Demand and generation opportunities on the transmission system.

The most recent version of the TYTFS is Ten Year Transmission Forecast Statement 2021 and is available from the SONI website[29].

### 1.6.3 Transmission Development Plan (Ireland)

The Transmission Development Plan (TDP) for Ireland is published annually by EirGrid. It is the equivalent document to the TDPNI for Ireland and is the plan for the development of the Irish transmission network and interconnection. It covers a ten-year period. The TDP presents projects that are needed for the secure operation of the Irish transmission network. EirGrid and SONI work to co-ordinate the two plans.

The most recent version of the TDP (Ireland) is TDP 2021-2030 and is available from the EirGrid website[30]. A draft version of the CRU Consultation on Transmission Development Plan (TDP) 2023 – 2031 is available on the CRU website[31].

28 https://www.soni.ltd.uk/media/documents/EirGrid_SONI_2022_Generation_Capacity_Statement_2022-2031.pdf

29 All-Island-Ten-Year-Transmission-Forecast-Statement-TYTFS-2021.pdf (soni.ltd.uk)

30 https://www.eirgridgroup.com/site-files/library/EirGrid/Transmission-Development-Plan-2021-2030.pdf

31 https://www.cru.ie/publications/27455/

### 1.6.4 Tomorrow's Energy Scenarios Northern Ireland

Tomorrow's Energy Scenarios Northern Ireland (TESNI) was published for the first time in 2020. TESNI considers a range of possible ways that energy usage in Northern Ireland may change into the future. For TESNI 2020 SONI consulted on three credible pathways for the transformation of the power system. Two of these scenarios see Northern Ireland delivering its contribution to the UK's 2050 net-zero emissions target. SONI are currently developing a new version of TESNI for publication later in 2023. These scenarios will be used to inform power system studies out to 2050 and will form a key input to future versions of the TDPNI.

Information on TESNI is available from the SONI website[32].

### 1.6.5 Associated Transmission Reinforcements

Associated Transmission Reinforcements (ATRs) refer to new or upgraded transmission infrastructure. They are associated with a generation project and must be complete to release a generation project's Firm Access Quantity (FAQ) allocation. To achieve firm access up to its Maximum Export Capacity (MEC) value in the Single Electricity Market, the generation project must be connected via its permanent connection as well as its ATRs being complete. Planned ATRs are captured within this TDPNI.

SONI publishes ATR status reports[33] on its website so that generators can track the status of the ATRs associated with their generation project(s). Where the scheduled FAQ date for a generation project changes as a result of a change to the scheduled completion date or the completion of an ATR for that generation project, the customer is notified in writing and the website is updated.

## 1.7 Changes Since TDPNI 2021-2030

Since the production of TDPNI 2021-2030 a number of SONI projects have had their status or scope changed:

[32] https://www.soni.ltd.uk/media/documents/TESNI-2020.pdf

[33] FAQs & ATRs (soni.ltd.uk)

Table 1-1 Project changes since TDPNI 2021-2030

| Project | Changes | Rationale |
|---|---|---|
| Rasharkin 2nd 110/33 kV Transformer | Cancelled[34] | This was previously included as a TDPNI project to alleviate 33 kV constraints in the Coleraine area. However NIE Networks have progressed an alternative solution. |
| North West Voltage Support | Cancelled | The need for this project is being addressed through the Low Carbon Inertia Services procurement and battery connections. |
| Omagh Main – Dromore Third Circuit | Cancelled | No longer necessary as preferred option for Mid Tyrone project removes need. |
| Enhancement to the low frequency load disconnection scheme | Cancelled | The current scheme has been found to be fit for purpose. |
| 22 kV Switchgear Uprates | Cancelled | Any issues being addressed through NIEN Asset Replacement programme. |
| New NW 110 kV Switching Station | Cancelled | Being assessed as an option in the Coolkeeragh – Strabane Uprate project. |
| North West & Mid Tyrone Large-Scale Reinforcement | Renamed Mid Tyrone Reinforcement and scope changed | Preferred option has narrower scope than originally foreseen. |
| Castlereagh – Hannahstown 110 kV Reinforcement | Renamed Energising Belfast | Preferred option is entirely within Belfast City and not on the Castleragh – Hannahstown corridor. |
| Moyle 275 kV Reinforcement | Renamed Moyle Interconnector Capacity Increase | Clarity |
| Cam Cluster Substation | New project | Driven by new connections. |
| Coolkeeragh – Limavady – Coleraine Uprate | New project | Driven by new connections. |
| North Sperrin Generation Substation | New project | Driven by anticipated new connections and network constraints. |
| Larne Transformer | New project | Driven by new 33 kV connections. |

[34] A 2nd 110/33 kV transformer is being installed at Rasharkin but this is as part of the connection of a wind farm and is funded by the wind farm developer.

| | | |
|---|---|---|
| Limavady Transformer Replacement | New project | Driven by new 33 kV connections. |
| Castlereagh – Knock 110 kV Cables Uprate | Complete | |
| Garvagh Cluster Substation | Complete | |

## 1.8 Changes Since the Freeze Date

This document was produced with a freeze date of 1 May 2023. Since then, there have been changes in the status of projects as of 1 October 2023. The information in Table 1-2 below has not been updated in the main body of this TDPNI but will be included, along with any other updates, in future TDPNI publications:

Table 1-2 Changes since the Freeze date

| Project | Changes |
|---|---|
| Coleraine Transformer Replacement | New project |
| Limavady Transformer Replacement | Now Limavady Mesh Extension and Transformer Replacement |
| Tamnamore Land Purchase | New project |
| | |
| | |
| | |
| | |
| | |

# 2 STRATEGY FOR DEVELOPING THE GRID

As the TSO for Northern Ireland, we have a statutory duty to ensure the transmission network is able to support all reasonable demands for electricity. In addition, we are required to make an offer for connection with parties seeking to connect to the transmission network. This in turn supports economic development in Northern Ireland.

Changes to demand, generation merit order, or to interconnection with neighbouring transmission networks may alter the flow of electrical power throughout the Northern Ireland transmission network. To accommodate these changes in power flows it is sometimes necessary to reinforce the transmission network to ensure adequate performance and reliability levels are maintained and that the cost of constraints is minimised.

The Northern Ireland electricity industry and its development take direction from a number of broad local[35][36], UK[37] and European[38] strategic objectives. These objectives guide investment in the Northern Ireland transmission network and are summarised in the legislation[39] which requires SONI to:

- ensure the development and maintenance of an efficient, co-ordinated and economical system of electricity transmission which has the long-term ability to meet reasonable demands for the transmission of electricity;
- contribute to security of supply through adequate transmission capacity and system reliability; and
- facilitate competition in the supply and generation of electricity.

To ensure these objectives are met we must provide on-going and timely reinforcement of the Northern Ireland transmission network.

In the development of the network reinforcement projects we are led by the following strategy statements:

- Inclusive consultation with local communities and landowners will inform how we plan the development the network;
- All practical technology options will be considered for network development; and
- The network will be optimised to minimise the requirement for new infrastructure to be built.

[35] The Energy Strategy for Northern Ireland can be found here: https://www.economy-ni.gov.uk/sites/default/files/publications/economy/Energy-Strategy-for-Northern-Ireland-path-to-net-zero.pdf

[36] Climate Change Act (Northern Ireland) 2022: https://www.legislation.gov.uk/nia/2022/31/contents/enacted

[37] The UK Climate Change Strategy 2021–2024 can be found here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1019141/UKEF_Climate_Change_Strategy_2021.pdf

[38] https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2030-climate-energy-framework_en#ecl-inpage-911

[39] Article 12, The Electricity (Northern Ireland) Order 1992

# 3 GENERAL APPROACH TO DEVELOPING THE GRID

## 3.1 Scenario Planning

As TSO, we are obliged to plan the development of a safe, secure, reliable, economical, efficient, and coordinated transmission network that is able to meet all reasonable demands for electricity, in accordance with the activities permitted by our licence.

With a continued increase in the pace and ambition of decarbonisation targets, most recently with the introduction of a legal target of generating 80% of electricity from renewable sources by 2030, we anticipate a significant change in how energy is used over the coming decades. The form this change will take and the exact role that the electricity transmission system will play is uncertain. SONI carried out analysis on a range of scenarios of energy usage out to 2040 as part of Tomorrow's Energy Scenarios Northern Ireland (TESNI) which we published for the first time in 2020[40].

We are presently updating Tomorrow's Energy Scenarios and will hold a consultation into a draft set of scenarios later in 2023, which will take into account the latest targets, trends and developments across the energy sector. Until that work is complete, we continue to make use of the existing scenarios to identify future needs of the transmission grid. One of these scenarios, Accelerated Ambition, delivers 80% of electricity from renewable generation sources by 2030, and a net-zero power system by 2040, and so remains a useful scenario for identifying future needs.

The TESNI 2020 System Needs Assessment, published in 2020, uses the scenarios to identify future needs;. This in turn, informs this version of the TDPNI. This has allowed us to better inform the prioritisation of projects and has allowed us to remove projects from the plan that were shown to have little or no need under the scenarios.

When assessing development options to address future potential network needs, we consider the impacts of each possible option on other potential development needs. Sometimes by making more effective use of the existing network, we can delay large investment or avoid the need for additional circuits. In some cases, a proposed project may meet more than one development requirement and prove more economic and have

[40] TESNI-2020.pdf (soni.ltd.uk)

less impact on the environment than multiple projects. Where possible, we seek to find single development projects to meet multiple network requirements.

## 3.2 Planning Standards

We plan the development of the transmission network taking account of the long-term needs and the economics of various development options. The need for development is determined by assessing long-term future network performance against technical standards. To ensure transmission system reliability and security, predicted power flows of the network are compared with the requirements of the Transmission System Security and Planning Standards (TSSPS[41]).

The TSSPS establishes a set of design criteria for the transmission system. This includes setting the minimum level of redundancy that should be incorporated into the design to deal with credible faults and outages. The standard includes checking for any circuits that would be overloaded or where voltages would fall below statutory levels.

SONI assesses the present and future transmission system against these standards and, when breaches are forecast, establishes plans to address these breaches. However, in some limited circumstances it may be more appropriate to seek derogation in the case, such as economic reasons. This derogation would be directed by The Utility Regulator following consultation with SONI and materially affected electricity undertakings, including the TO and the TSO of Ireland.

Under Condition 20 of the Licence, SONI is required to periodically review the TSSPS. SONI is presently conducting such a review and will be consulting on proposed changes later in 2023.

## 3.3 Roles and Responsibilities

There are three parties licensed to participate in the transmission of electricity in Northern Ireland. Northern Ireland Electricity Networks (NIE Networks) is responsible for the delivery of SONI-planned transmission projects, as well as maintenance of the

[41] Transmission System Security and Planning Standards can be found here: https://www.soni.ltd.uk/media/Northern-Ireland-TSSPS-September-2015.pdf

transmission system in accordance with the NIE Networks Licence and the Transmission Interface Arrangements (TIA). SONI holds the Transmission System Operator licence and is responsible for the operation and planning of the transmission system. Moyle Interconnector Limited also holds a transmission licence as the owner of the interconnector to Scotland.

The arrangements between NIE Networks and SONI are governed by the Transmission Interface Arrangements (TIA). The TIA arrangements include responsibilities regarding the preparation of draft asset replacement plans by NIE Networks and the system development plans prepared by SONI. The TIA allows for the ongoing development of an asset replacement and system development investment plan. SONI is responsible for ensuring that asset replacement and system development are integrated into an investment plan.

Some projects included in the investment plan will be well developed whereas others will be conceptual or indicative and therefore more likely to be changed from year to year. The plan is modified regularly as planning assumptions and scenarios are changed.

The investment plan is then circulated between SONI and NIE Networks before becoming a draft Transmission Development Plan Northern Ireland (TDPNI). The draft TDPNI is subject to public consultation by SONI and consultation and approval by the Utility Regulator.

## 3.4 SONI's Grid Development Process

The planning of grid development projects by SONI follows a three part process, shown in figure 3-1. Asset replacement projects are progressed separately by NIE Networks. The process includes stakeholder and public participation in the development of projects.

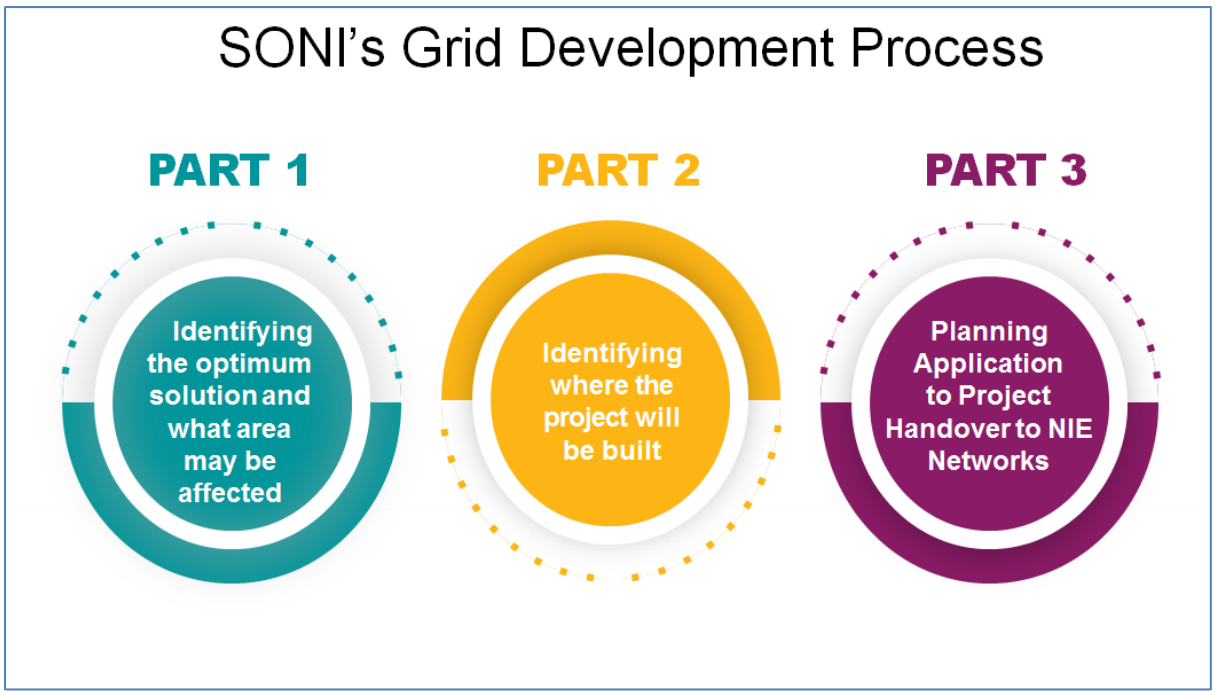



Figure 3-1: SONI's Grid Development Process

### Part 1: Planning: Identifying the optimum solution and what area may be affected

When a potential breach of the standards is identified (operationally or through SONI's planning studies, including the Ten Year Transmission Forecast Statement and Tomorrow's Energy Scenarios), SONI will study the potential breach in detail including any other related issues. Consistent with good practice, as set out in the TSSPS, SONI will initially seek ways that would allow the potential breach to be managed operationally and put into place any changes to operational practice as may be required. For example, SONI can manage potential overloads of the transmission system by constraining the output of generators. In particular, high output of renewables can lead to bottlenecks on the network and a need to constrain the output until reinforcement options are assessed and developed. Any potential project will be compared with the costs, risks, and impact on carbon emissions of this constraint. If constraining wind is deemed unacceptable in the long term, SONI will initiate a project to develop the transmission system.

When we identify the need to commence a transmission project, we will consider how best to deliver it. This means looking at a number of solutions and narrowing these down based on their technical viability, deliverability, cost, potential impact on the

environment and on those living and working in the general area where the project may be located. This process is conducted in close cooperation with NIE Networks.

Once it has been established that an operational solution is not feasible, the first step in the planning process is to identify a long list of options across a range of different technologies that could resolve the issue. Such options will include the need for any new substations or overhead line and underground cables. In some cases where appropriate the use of flexible AC transmission systems (FACTS) and HVDC will also be considered depending on the need identified. The long list of options will be assessed against multi-criteria analysis including technical implications, asset management issues, and environmental and cost benefit assessments to identify a shorter list of potential options. The long list of options includes Do Nothing and / or Derogation against standards.

SONI will then consider the short list in greater detail. Depending on the nature of the project, SONI will seek to engage with key stakeholders before progressing the recommendation further. We engage throughout with NIE Networks and in some cases engage expert consultants to assist. These studies may include sensitivity studies to assess the performance of the options against different generation and demand assumptions. The process culminates with a recommendation for a preferred solution or solutions to bring forward for further development, and tiering to establish the level of further stakeholder engagement and consultation required. During subsequent phases SONI will consider the input provided by stakeholder engagement and amend any plans accordingly before progressing further. We will also publicise the results of the stakeholder engagement process and further decisions.

In parallel with the early (Part 1) stakeholder engagement phase, and recognising that the Utility Regulator is also a key stakeholder, SONI will seek approval for cost recovery through the Utility Regulator through the Transmission Network Preconstruction Project (TNPP) and progress the project to the outline design stage. This stage will identify any study areas for identification of new substations or corridors for overhead line and/or cable routes.

### Part 2: Outline Design: Identifying where the project will be built

SONI manages the pre-construction outline design of transmission projects once the preferred option or options has been identified (Part 1 in Figure 3-1). This also includes consultation with the TO (NIE Networks). The projects can involve the development of new substations, overhead lines or cable circuits operating at 110 kV and above.

SONI is responsible for identifying all feasible route / site options in the general study area based on a technical, economic, environmental and deliverability analysis and comparison.

SONI is responsible for preparing documentation required to apply for planning consent for the development of the projects. This entails working with NIE Networks to develop the design to the level required for obtaining planning consent including any necessary environmental reports or assessments, and further consultations with stakeholders and landowners to obtain the right to gain access and install transmission equipment on their lands.

### Part 3: Consents: Planning application to NIE Networks project handover

SONI submits planning applications with the relevant planning authority. SONI is also responsible for submitting any other consent applications that may be required, e.g. a Marine Licence, with the relevant consenting authority. The planning authority will make a legally binding decision on the project. It may grant full planning permission, request that we make changes or refuse permission. SONI is responsible for the acquisition of any wayleaves, easements, access rights, land options, leases and any other legal rights required for the installation of the new infrastructure.

Following receipt of planning and landowner consents the project is handed over to NIE Networks for detailed design. This includes a review of the SONI functional specification (outline design and consents) and preparation of a design specification. Separate pre-construction work for NIE Networks will also include procurement. Following receipt and review of the design specification from NIE Networks, SONI issues a Transmission Project Instruction and enters into a Project Agreement with NIE Networks. NIE Networks then deliver the project.

Throughout all stages of the process, and when any new information comes to light, we check that the need for network development remains robust, and make any changes necessary to ensure that the proposed development continues to meet this need.

## 3.5 Public Planning and Environmental Considerations

Planning and environmental considerations are integrated into the three part process for grid development. This section details SONI's public planning and environmental responsibilities and how these issues are considered in grid development (See also Section 4).

### 3.5.1 Public Planning Considerations

SONI is supported by experienced professional planning and ecological consultants. These consultants assist in the development of transmission infrastructure projects and in other aspects of network development from a planning and environmental perspective.

### 3.5.2 Environmental Considerations

Environmental considerations are integrated into the functioning of grid development at both the strategic (i.e. plan level) and at the project level.

The requirements for Environmental Impact Assessment (EIA - for projects) and Appropriate Assessment (AA) (see below) are transposed into Northern Ireland law in Statutory Rules of Northern Ireland **2017 No. 83** The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 and Conservation (Natural Habitats) Regulations 1995 (as amended).

Where necessary applications for statutory consent are accompanied by an Environmental Statement (ES) or an Environmental Report (ER) the need for a statutory ES is informed by way of an EIA Screening report.

Similarly, screening for the need for AA for impacts on sites specifically designated for nature conservation is routinely undertaken for all our grid projects.

### 3.5.3 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) is a systematic process of predicting and evaluating the environmental effects of a proposed plan or programme, in order to ensure that these effects are adequately addressed as early as possible. A SEA is prepared in respect of this transmission development plan. The purpose of the SEA is to ensure that environmental considerations are integrated into the development plan and that to anticipate and avoid, where possible, potential adverse environmental impacts arising from the TDPNI.

The SEA has a five year lifespan, with review and drafting processes for the next SEA beginning in the final year. A SEA was last carried out on TDPNI 2018-2027. As it has been five years since this, an SEA has also been carried out on this TDPNI. However, as the preparation of a TDPNI is a rolling process, each TDPNI prepared is accompanied by an Environmental Appraisal Report (EAR) which assesses the plan against the provisions of the adopted SEA statement. This process ensures consistency of approach in environmental issues of each TDPNI across the lifespan of the SEA. The first TDPNI published after 5 years has passed will be accompanied by an SEA, meaning that form now, every third TDPNI will be subject to SEA.

A summary of the environmental assessment and mitigation measures of this SEA is presented in Sections 8-10 of this report.

#### Environmental Impact Assessment (EIA)

EIA is the process of examining the environmental effects of projects, from consideration of environmental aspects at design stage to preparation of a non-statutory Environmental Report, or Environmental Statement (ES) required by the EIA Directive. Annex 1 of the Directive, as transposed by Northern Irish regulations sets out the projects which require mandatory EIA. In the context of electricity transmission projects, this notably includes the construction of overhead electrical powerlines where:

- The voltage is 220 kV or more; and
- The circuit length is more than 15 km.

An ES may be required for sub-threshold development where likely significant impacts on the environment are identified by the relevant planning authority, and where. For modification of existing overhead lines, an EIS is not required inside the parameters provided in Northern Irish regulations[42](including a maximum length of 850 m).

The content and scope of the EIA is defined by the EIA Directive and Northern Irish regulations[43]; however, detail varies between projects depending on local environmental sensitivities.

### Appropriate Assessment (AA)

In accordance with the provisions of the EU Habitats Directive (92/ 43/ EEC), any plan or project not directly connected to a Natura 2000 site (Special Area of Conservation (SAC) or Special Protection Area (SPA), or Ramsar sites that is likely to have a significant effect on the site, is subject to Appropriate Assessment (AA) of its implications on the site.

The Habitats Directive is implemented via the Conservation (Natural Habitats) Regulations 1995 (as amended)[44] in Northern Ireland.

The Appropriate Assessment process in Northern Ireland is generally referred to as a Habitats Regulations Assessment (HRA). A Screening for Appropriate Assessment is referred to as a Test of Likely Significance (ToLS), with the resultant report being referred to as a ToLS Report.

In Northern Ireland, the HRA process is undertaken by Shared Environmental Services (SES), a centralised body comprising specialist staff that provides expert environmental advice and support to Councils. SONI as project proponent will usually submit a ToLS Report or a HRA Report as part of a bundle of environmental information when seeking planning permission.

[42] Overhead Lines (Exemption) Regulations (Northern Ireland) 1992 S.I.

[43] The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017.

[44] And aligned with the The Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 No. 582

# 4 IMPLEMENTATION: HOW THE STRATEGY FOR DEVELOPING THE GRID WILL BE IMPLEMENTED

In this chapter we set out how our strategy for developing the grid is implemented. SONI is responsible for the inclusion of asset replacement projects in the investment plan and TDPNI, but the delivery of these asset replacement projects (including planning, consents and all detailed assessments) are the responsibility of the TO, NIE Networks.

SONI's strategy for planning the development of the grid is discussed under the following headings:

- Our approach to the environment;
- Our approach to technology;
- Our approach to project development;
- Our approach to planning and consenting of projects; and
- Our approach to consultation and engagement.

These topics build upon the previous chapter which detailed our general approach to developing the grid. Policies and objectives are set out to assist in delivery of the grid strategy objectives in a sustainable manner.

## 4.1 Our Approach to the Environment

### 4.1.1 Introduction

SONI has a legal responsibility to comply with planning law, including all relevant environmental legislation. In practice this means that environmental issues inform the decision-making process when it comes to developing the grid in Northern Ireland.

This TDPNI is subject to Strategic Environmental Assessment as outlined in previous sections (See Chapter 8 for a detailed description of the process).

Planning and environmental considerations are embedded into every grid development project that SONI undertakes in order to ensure that environmental issues are at the forefront of decision-making. Early involvement in projects allows potential

environmental issues to be identified and avoided or managed in the course of project development.

### 4.1.2 Policies and Objectives

The following environmental policies (ENVP) have been compiled to ensure that SONI has due regard for existing environmental protection legislation and environmental best practice when developing projects.

Environmental objectives (ENVO) have also been developed for a number of environmental topics.

### 4.1.3 General

It is the policy of SONI:

**ENVP1:** To promote best environmental practice in the design and appraisal of transmission development projects.

### 4.1.4 Biodiversity

It is the policy of SONI:

**ENVP2:** To exercise its functions as a TSO in line with the Wildlife and Natural Environment Act (Northern Ireland) 2011 and the Northern Ireland Biodiversity Strategy (2015) to further the conservation of biodiversity so far as is consistent with the proper exercise of those functions.

**ENVP3**: To avoid adverse effects on sites designated for nature conservation including, Special Conservation Areas, Special Protection Areas, RAMSAR Sites, Areas of Special Scientific Interest and National Nature Reserves.

**ENVP4:** To protect NI priority species and habitats and other species protected under legislation in the development of any transmission infrastructure and to preserve key ecological linkage features.

**ENVP5:** To go beyond nature protection and seek funding, or other mechanisms to deliver site-specific, measurable and lasting biodiversity restoration and

enhancement on suitable projects to fulfil the 'Biodiversity Duty' attaching by law to public authorities in Northern Ireland.

It is the objective of SONI:

**ENVO1:** To prepare and utilise industry specific Ecology Guidelines for the development of Transmission projects. This will ensure a standard approach to ecological impact assessment for transmission projects.

**ENVO2:** To regularly monitor, document, and report specific actions taken for biodiversity restoration and enhancement under ENVP5.

### 4.1.5 Climate Change

It is the policy of SONI:

**ENVP5:** To integrate measures related to climate change into grid development, by way of both effective mitigation and adaptation responses, in accordance with available guidance and best practice.

### 4.1.6 Noise

It is the policy of SONI:

**ENVP6:** To employ methods on transmission infrastructure which minimise noise emissions in line with best industry practice.

It is the objective of SONI:

**ENVO2:** To give careful consideration to the siting of transmission infrastructure so as to ensure that noise-sensitive receptors are protected from potential noise emissions.

**ENVO3:** To seek to preserve and maintain noise quality in accordance with good practice and relevant legislation.

### 4.1.7 Landscape

It is the policy of SONI:

**ENVP7:** To have regard to the Northern Ireland Landscape Character Assessment 2000, and the Northern Ireland Seascape Character Assessment in the design and appraisal of its transmission development projects.

It is the objective of SONI:

**ENVO4:** To protect landscapes through the sustainable planning and design of transmission infrastructure and to have regard to important landscape designations including AONBs and the World Heritage Site.

### 4.1.8 Cultural Heritage

It is the policy of SONI:

**ENVP8:** To take reasonable measures to ensure that the special interest of protected structures, including their curtilages and settings, are protected when considering site or route options for the planning of transmission infrastructure.

**ENVP9:** To protect archaeological material when planning transmission infrastructure, by avoidance or by best practice mitigation measures.

### 4.1.9 Water

It is the policy of SONI:

**ENVP10:** That there is no increase in flood risk as a result of transmission development, and to ensure any flood risk to the development is appropriately managed.

**ENVP11**: To promote the use of sustainable urban drainage systems in any new developments where it is appropriate.

**ENVP12:** To have regard to Planning Policy Statements and Supplementary Planning Guidance: PPS 15 Planning and Flood Risk Development Control Considerations in the preparation of grid development strategies and plans.

It is the objective of SONI:

**ENVO5:** That all grid development proposals, and in particular, transmission substation developments, shall carry out, to an appropriate level of detail, a site-specific Flood Risk Assessment that shall demonstrate compliance with all current Guidelines, standards and best practice. The Flood Risk Assessment shall pay particular emphasis to residual flood risks, site-specific mitigation measures, flood-resilient design and construction, and any necessary management measures.

### 4.1.10 Air Quality

It is the policy of SONI:

**ENVP13:** To preserve and maintain air quality in accordance with good practice and relevant legislation in the proposed construction of its transmission projects.

**ENVP14:** To ensure appropriate dust suppression during construction works.

### 4.1.11 Tourism

It is the policy of SONI:

**ENVP15:** To consider the potential impact upon tourism in the planning of transmission projects.

It is the objective of SONI:

**ENVO6:** To identify the nature of tourism in a project area; to consider the cumulative / in combination impact on tourism of a project and to consider short term and long-term impacts of grid development projects on tourism as appropriate.

### 4.1.12 Conclusion

All of the environmental policies and objectives detailed above are assessed against Strategic Environmental Objectives. This is provided in the SEA Environmental Report.

## 4.2 Our Approach to Technology

### 4.2.1 Introduction

As outlined in Chapter 2 of this document, the SONI Strategy sets out three strategy statements, two of which directly relate to technology in transmission infrastructure development:

- We will consider all practical technology options; and
- We will optimise the existing grid to minimise the need for new infrastructure.

The use of new technologies can bring a number of advantages, including enhanced operational performance, improved system reliability, shortened construction times and reduced impact on the environment. All of these have the potential to reduce system costs.

We developed a world-leading initiative *"Delivering a Secure, Sustainable Electricity System"* (DS3 programme). The aim of the programme was to meet the challenges of operating the electricity system in a secure manner while achieving the 2020 renewable electricity targets for Northern Ireland.

We established a program of work called Shaping Our Electricity Future, which delivered a roadmap setting out network, market and operational requirements needed to be in place by 2030 to deliver a target of 70% RES-E. This roadmap was published in November 2021. We have completed an update to this roadmap, published in June 2023, which sets out the additional requirements needed to deliver a new target of 80% RES-E by 2030, as set out in the Climate Change Act (Northern Ireland).

We continue to examine the performance of underground cables and their technical impact on the network, noting their advantage in terms of the potential for reduced visual impact compared with overhead lines. However, this must be balanced against costs as well as the potential impacts on sensitive environmental and ecological areas from what can be significant civil engineering works. Underground cables also present limitations to dynamic rating schemes as well as future uprating. We will continue to assess technological developments in this area to ensure the full capability of this technology is available for use on the Northern Ireland grid.

The transmission grid in Northern Ireland, similar to other European and international grids, uses high voltage alternating current (HVAC). Where power is to be transferred over long distances it may be cost effective and technically possible to do so using high voltage direct current (HVDC). Over the last number of years we have continued to examine the performance of HVDC and its technical impact on the network.

Demand Side Management and Response has been used in Northern Ireland for many years, primarily at industrial level. It works by customers reducing their electricity consumption on request. This helps us to operate the grid more securely and is now actively participating in the energy, capacity and system services markets.

We are also investigating the use of modular power flow control technologies that may enable us to make better use of the existing transmission network.

In most cases overhead line technology remains the most reliable and least expensive option for developing new circuits.

Over the last number of years, we have learned that the level of uncertainty over the future usage of the grid is increasing. To cater for this, we have changed how we plan the grid. Our new approach involves developing a range of energy scenarios (possible situations or events that impact on energy) called 'Tomorrow's Energy Scenarios Northern Ireland'.

In the process of developing the range of energy scenarios, key policy makers, industry experts, and stakeholders are asked how they see the energy landscape changing over time. The final scenarios are published and reviewed every two years. We are now using these scenarios throughout our planning analysis to assess the future needs of the electricity system, and to test the practicality and merits of different options for grid development. These scenarios were first published in 2020[45]. An updated version is currently in progress and due for publication later this year.

[45] https://www.soni.ltd.uk/customer-and-industry/energy-future/

### 4.2.2 Policies and Objectives

It is the policy of SONI:

**TP1:** To promote and facilitate the sustainable development of a high-quality transmission grid to serve the existing and future needs of NI.

**TP2:** To consider all practical technology options in the development of projects, including maximising use of existing transmission grid.

## 4.3 Our Approach to Project Development

### 4.3.1 Introduction

SONI undertakes a number of grid development projects as part of its statutory role in planning the development of and operating the transmission grid.

A focus in the development of our projects is on matters of proper planning and sustainable development. This requires a careful balancing of the technical need and solutions for a project with appropriate and adequate opportunities for public participation in the project development process.

SONI has established an approach to developing grid projects in Northern Ireland. This is a three part process, from the identification of need to develop the grid to the eventual hand over to NIE Networks for construction and operation of a project by SONI. The details of this process can be seen in Section 3.4.

### 4.3.2 Policies and Objectives

The following policies and objectives have been adopted by SONI in order to ensure an appropriate and sustainable approach to the development of our transmission projects.

It is the policy of SONI:

**PDP1:** To engage with stakeholders in accordance with SONI's *Process for Developing the Grid in Northern Ireland*.

**PDP2:** To promote sustainable grid development by balancing complex and/or competing technical, economic, environmental, social and deliverability goals and priorities in decision-making.

**PDP3:** To ensure that grid development is carried out in an economically efficient manner, and seek derogation from the Utility Regulator when this is not possible.

## 4.4 Our Approach to Planning and Consenting of Projects

### 4.4.1 Introduction

The SONI licence requires it to plan and operate the transmission system. SONI is also required to carry out these duties in accordance with the TIA (Transmission Interface Arrangements). SONI is responsible for the design of projects up to the point where consents are obtained, with NIE Networks carrying out some aspects of this work under SONI direction. Our grid developments occur within a planning and environmental context. In this context the focus is on matters of proper planning and sustainable development. Public participation is of key importance alongside the environmental and ecological impact of our projects in order to provide an economic solution for end-users of the network.

### 4.4.2 Policies and Objectives

The following policies and objectives have been adopted by SONI in order to ensure an appropriate and sustainable approach to the planning and consenting of our transmission projects. Projects will also be subject to the policies of NIE Networks.

It is the policy of SONI:

**PCP1:** To have regard to relevant legislation and guidelines in respect of planning and consenting of transmission infrastructure development projects and make provision for any policies for the provision of transmission infrastructure set out in these documents.

**PCP2:** To have regard to precedent arising from decisions of the Competent Authorities, and of the High Court in Judicial Review of decisions, relating to the planning and consenting of transmission infrastructure development projects.

**PCP3:** To promote sustainable grid development by balancing complex and/or competing technical, economic and environmental goals and priorities in decision-making.

## 4.5 Our Approach to Consultation and Engagement

### 4.5.1 Policies and Objectives

The following policies and objectives have been adopted by SONI in order to ensure an appropriate and sustainable approach to consultation and engagement in the development of our transmission projects. Under the TIA, NIE Networks are obliged to support SONI in this engagement.

It is the policy of SONI:

**CEP1:** To consult and engage with statutory and non-statutory stakeholders including communities, landowners and the general public, at the earliest appropriate stage of a project's development.

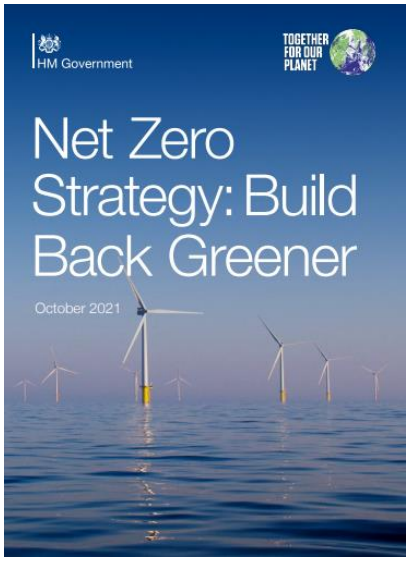
**CEP2:** To recognise and develop the essential role that communities, landowners and other stakeholders play in transmission infrastructure development and to engage with different stakeholders as appropriate during the life of a grid development project.

**CEP3:** To ensure consultation and engagement feedback is appropriately considered in decision making.

# 5 INVESTMENT NEEDS

SONI is responsible for planning and operating an economic, efficient and coordinated electricity transmission network in Northern Ireland. Key to achieving this is a reliable and high-quality electricity infrastructure which powers the Northern Ireland economy and supports investment in the region.[46]

For Northern Ireland, the United Kingdom's Committee on Climate Change advised that it is necessary, feasible and cost-effective for the UK to set a target of net -zero Green House Gas (GHG) emissions by 2050. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 came into effect on the 27 June 2019. The revised legally binding target towards net zero emissions covers all sectors of the economy. This update to the Order demonstrates the UK's commitment to targeting a challenging ambition in line with the requirements of the Paris Agreement on climate change.




Energy Policy is a devolved matter for Northern Ireland and the Department for the Economy (DfE) has been working with stakeholders, including SONI, to develop a Future Energy Strategy. This was published at the end of 2021[47] and was followed in June 2022 by Northern Ireland's Climate Change Act which has a target of 80% of renewable energy by 2030.

SONI has provided analysis and data to the DfE to support this important work, which will inform future renewable targets, and the approach to facilitating growth in renewable electricity generation.

In order to meet Northern Ireland's future commitments, investment will be needed in new renewable generation capacity and electricity networks. The transition to low-

[46] Grant Thornton: "Powering Northern Ireland A report exploring SONI's role in the economy", October 2016. Available here: http://www.grantthorntonni.com/globalassets/1.-member-firms/ireland/insights/publications/powering-northern-ireland_grant-thornton.pdf

[47] https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy

carbon and renewable energy will have widespread consequences; it will require a significant transformation of the electricity system.

In 2019 SONI launched a new corporate Strategy 2020-2025 which was shaped by two factors: climate change and the impending transformation of the electricity sector. SONI is committed to leading the change towards a carbon-free electricity system and achieving the renewable energy ambitions of both jurisdictions.

To realise these ambitions and to enable transformation of the electricity system, we launched the Shaping Our Electricity Future Roadmap in November 2021. The Roadmap is informed by a comprehensive consultation process with stakeholders across society, policy makers, industry, market participants and electricity consumers. The valued feedback has contributed to our growing body of knowledge on how to decarbonise the electricity system and to support decarbonisation of the broader economy while maintaining a safe and secure supply of electricity for consumers.

The Roadmap provides an outline of the key developments from a networks, engagement, operations and market perspective needed to support a secure transition to at least 80% renewables on the electricity grid by 2030 – an important step on the journey to net zero by 2050. Inherent in this is a secure transition to 2030 whereby we continue to operate, develop and maintain a safe, secure, reliable, economical and efficient electricity transmission system with a view to ensuring that all reasonable demands for electricity are met.

The publication of the Roadmap informs a pathway to achieving energy objectives and climate ambitions across both jurisdictions. Energy and climate policy in both jurisdictions contemplates an overall transition to net zero by 2050 and the Shaping Our Electricity Future Roadmap provides an outline of the key developments to support this transition.

It identifies the transmission network reinforcements needed to manage renewable generation and demand growth. As part of this Roadmap, SONI have developed corresponding engagement plans to underpin delivery of this network, recognising that engagement and public acceptance is key to a successful transition. The operation of a

power system with large levels of renewable generation needs an enhanced operating capability, market changes and tools are also considered as part of the Roadmap.

SONI is committed to updating the Shaping Our Electricity Roadmap at regular intervals to cater for evolving energy policy. SONI will continue to work with key stakeholders in exploring the necessary market reforms to attract investment in renewable energy and system services and to optimise participation of community owned and demand-based energy resources.

In this regard, the TDPNI is developed to support NI government and local council objectives and enable this energy transition.

By facilitating new connections onto the network, reviewing maintenance plans and identifying the future electrical needs of Northern Ireland, SONI can direct and plan investment in the transmission system. This investment will, in turn, secure the electricity supply into the future.

## 5.1 Policy Drivers of Transmission Network Investment

In order to achieve the identified strategic objectives laid out by the NI Energy Strategy and UK policies, we must continue to produce investment plans and progress individual projects to develop the electricity transmission network. Specific drivers of investment in transmission network infrastructure are identified and described in the following sections.

### 5.1.1 Security of Transmission Network

Security of supply generally addresses two separate issues:

- The need to ensure that all reasonable demands in Northern Ireland for electricity are met (which is the responsibility of the UR and the Department for the Economy)[48]; and

[48] 2003 Energy Order, Article 12 "The principal objective and general duties of the Department and the Authority in relation to electricity", Paragraph 2(a)

- The ability of the transmission network to reliably transport electrical energy from the generators, where it is generated, to the demand centres, where it is consumed, as set out in the TSSPS[49].

The TDPNI is aimed at addressing the security of supply issues that relate to the transmission network.

For this document, security of supply means the ability of the transmission network to transport electrical energy reliably and securely from where it is generated to the demand centres where it is consumed.

### 5.1.2 Market Integration

With increased market integration, electrical power can flow from areas where it is cheap to produce to areas where it is more highly valued. Therefore, the aim is to make the UK and NI electricity markets more integrated.

The integration of Renewable Energy Sources (RES) and other forms of low carbon generation significantly increases the power exchange opportunities across the region. Differences in national targets combined with varying availabilities of renewable sources across Great Britain and Europe will lead to greater penetration of RES in certain areas compared to others. Therefore, there is a need to reinforce the transmission networks between and within NI, GB and European countries to obtain these economic benefits.

### 5.1.3 Renewable Energy Sources Integration

Developing renewable energy is an integral part of Northern Ireland's sustainable energy objectives and climate change strategy. In comparison to fossil fuels, RES have lower or no net emissions. RES contribute to the decarbonisation of the energy supply and to the reduction in greenhouse gas emissions. They also contribute to energy security being, for the most part, an indigenous energy source. In a period of volatile energy costs RES can also contribute to cost competitiveness by reducing dependence on imported fossil fuels. Currently wind farms are the main sources of renewable

[49] 1992 Electricity Order, Part II Electricity Supply, Article 12 "General duties of electricity distributors and transmission licence holders"

electricity generation in Northern Ireland. However, additional forms of renewable energy continue to develop in Northern Ireland with significant increases in solar and biomass generation in recent years. It is expected that on-shore wind and solar energy will be further developed in the coming years to reach 80% of transmission system electricity consumption from renewable sources by 2030. We are also expecting off-shore wind to begin connecting to the system.

In order to fulfil government renewable targets[50], many RES-related projects are expected to be initiated throughout the period of this TDPNI. A considerable number of these projects are located in rural areas where the transmission network is less developed. This places pressure on the electricity transmission network in these areas. Significant challenges will arise in extending and reinforcing the network to connect new RES.[51]

### 5.1.4 Project Prioritisation and Deliverability Assessment

SONI and NIE Networks carried out a number of workshops on the TDPNI in 2022 and 2023 to assess the deliverability of the plan in light of constraints of resources, the Planning process, supply chain and availability for network outages. This work identified newbuild projects as key to the achievement of 2030 targets as it will not be possible to deliver an extensive programme of circuit uprates in time due to outage availability[52]. Through this work, and the ongoing update to Shaping Our Electricity Future, six projects have been identified as key to enabling 80% RES-E. These six projects will reduce grid constraints and enable increased import and export of renewable energy from and to neighbouring jurisdictions.

These six projects are:

- North - South Interconnector
- Mid Antrim Upgrade
- Mid Tyrone Project
- North West of NI 110 kV Reinforcement

[50] Northern Ireland currently has a binding target of 80% electricity consumption to be met by renewable sources by 2030

[51] Northern Ireland Climate Act 2022; https://www.legislation.gov.uk/nia/2022/31/contents/enacted

[52] Due to higher demand in Winter, significant outages are only possible between March and October. System security must be maintained at all times, which restricts the number of concurrent outages which can occur.

- Moyle Interconnector Capacity Increase
- North Sperrin Generation Substation

Delivery of these projects by 2030 will be extremely challenging and doing so in a timely manner is dependent on close co-operation between SONI, NIE Networks, the Utility Regulator, local Councils, and the Departments for the Economy and Infrastructure. The scale of the investment required by 2030 in order to meet the target is the biggest change to the power system since it was originally built, and It will be key for all stakeholders to identify risks and bottlenecks at an early stage and put mitigations in place in a timely manner.

SONI will continue to work closely with all key stakeholders to deliver the Plan . SONI will continue to assess the progress of projects and highlight any risk to the programme and consequently delivery of the 80% target.

## 5.2 Technical Drivers for Transmission Network Investment

Technical drivers of transmission network investment include changes in demand, generation and interconnection, inter-regional power flows and changes in asset conditions.

### 5.2.1 Demand, Generation and Interconnection

#### Changes in Demand and Generation

Demand growth and the connection of new demand can give rise to higher power flows which may trigger the need to reinforce the network as a result. Closure or reduction in the size of demand facilities can reduce the power flows on lines feeding the load. However, in certain cases where the demand is absorbing local generation and reducing the amount of generation exported from the area, the closure can lead to increased power flows on specific transmission lines. Our All-Island Generation Capacity Statement 2021 (GCS) , details the forecast of electricity demand for Northern Ireland for the years 2021 to 2030. The peak demand in Table 5-1 corresponds to the forecast median transmission system peak demand published in GCS 2022. Also shown is a breakdown of non-dispatchable (wind and solar) and dispatchable (conventional, biogas and hydro) generation.

| Year | Peak Demand (GW) | Non-dispatchable Generation Capacity (GW) | Dispatchable Generation Capacity (GW) |
|---|---|---|---|
| 2022 | 1.64 | 1.815 | 1.763 |
| 2023 | 1.66 | 1.945 | 1.763 |
| 2024 | 1.68 | 2.065 | 1.503 |
| 2025 | 1.70 | 2.245 | 1.361 |
| 2026 | 1.75 | 2.435 | 1.503 |
| 2027 | 1.77 | 2.625 | 1.503 |
| 2028 | 1.79 | 2.805 | 1.503 |
| 2029 | 1.81 | 2.995 | 1.503 |
| 2030 | 1.83 | 3.365 | 1.503 |
| 2031 | 1.86 | 3.455 | 1.503 |

**Table 5-1 Northern Ireland Forecast Peak Demand and Generation Capacity over the period 2022 to 2031[53]**

Our All-Island Ten Year Transmission Forecast Statement 2021 (TYTFS)[54], available here[55], includes information on how the GCS demand forecast relates to each individual demand centre node over the period covered by this TDPNI.

Because of the relative size of individual generators, changes in generation installations, whether new additions or closures can have a more significant impact on power flows than demand. This is equally so in the case of interconnectors which are treated as generators during periods when power is imported.

[53] This forecast is based on information presented in GCS 2022. The Moyle interconnector is not included in these figures.

[54] It is important to note that the information in the TYTFS 2021 is based on the best information available at the freeze date, January 2021.

[55] All-Island-Ten-Year-Transmission-Forecast-Statement-TYTFS-2021.pdf (soni.ltd.uk)

The addition of new generation capacity requires network development to connect the new generator to the network. This provides a path for electric power flow between the new generator and the transmission network. This is known as the shallow connection. The new generation capacity will inevitably alter the power flows across the network, which has the potential to create overload problems deep into the network. To resolve these overloads we need further reinforcements (known as deep reinforcements) to allow full network access.

The connection of large generators, or groups of generators, combined with the increasingly meshed nature of the transmission network results in lower network impedance and consequently increased short circuit levels. This is a safety issue as under fault conditions such high short circuit levels may cause catastrophic failure of high voltage equipment. We monitor fault levels on the network and take measures to prevent such conditions occurring. The areas where the network is close to the fault rating of installed equipment, without mitigation, are highlighted on the map in Figure 5-1. Note that mitigation measures will be used to manage fault levels that would otherwise exceed switchgear rating. This may include reconfiguration of the transmission system as necessary until switchgear is replaced or alternative permanent solutions put in place.

Table 5-1 Northern Ireland Forecast Peak Demand and Generation Capacity over the period 2022 to 2031 as detailed in the upcoming TYTFS 2022. It is important to note that this figure does not include additional generation that is in the applications queue but is not contracted as of the freeze date of May 2023, as these generators do not yet have an agreed connection method.

The projected changes in generation are accommodated by the reinforcements included in this TDPNI. This includes the identified future potential projects discussed in Chapter 6.

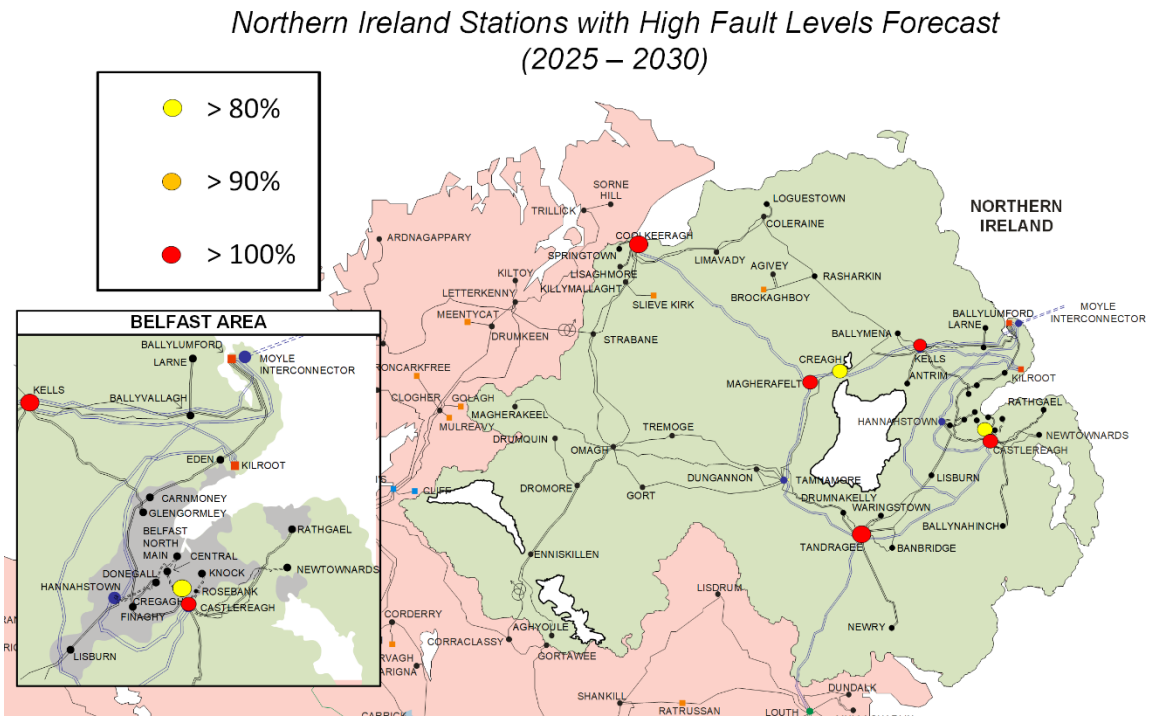



Figure 5-1 Stations with forecast high fault levels, 2025 – 2030 (from TYTFS 2022)

## Changes in Northern Ireland's Interconnection

UK policy recognises the economic and technical benefits associated with increased interconnection and therefore seeks to promote interconnection between Great Britain, Northern Ireland and Ireland's transmission systems. Increased interconnection between transmission networks results in a larger energy market. With increased market integration there is greater competition and the potential for prices to be reduced. There is also access to a broader generation base which enhances the networks' security of supply. This can potentially defer the need for additional generation to be constructed to meet security of supply standards or requirements.

The planned second North-South Interconnector between Northern Ireland and Ireland is included in this TDPNI.

In Northern Ireland there is potential for new interconnection (LirIC) to Scotland. Based on the early development status of this project at the data freeze of May 2023 it is not included within any studies or tables in this report.

### 5.2.2 Changes in Inter-Regional Power Flows

The following factors have the potential to significantly change the flow of electrical power throughout the transmission network. They can drive the need for network reinforcements over the next ten years and beyond:

- Changes in demand;
- Development of storage and Low Carbon Inertia Services;
- Further integration with neighbouring countries; and
- Integration of significant levels of new generation (both conventional and renewable).

There is now a growing need to accommodate a much broader range of plausible and credible flow patterns across the network. This is due to the extent of the likely changes that are envisaged for Northern Ireland, particularly in respect of RES integration. To cater for a broader range of flow patterns greater transmission network flexibility is required.

### 5.2.3 Changes in Asset Condition

Transmission network assets have a finite lifespan their useful life is impacted by a number of factors. These include:

- The age of the asset;
- Technology type and its propensity for obsolescence;
- Maintenance adequacy and effectiveness;
- Environmental conditions; and
- Utilisation.

In order to ensure that security of supply is not compromised, routine condition assessments are carried out by the TO. These assess the condition of the assets and estimate remaining useful life.

Typically, where assets are considered to have reached the end of their useful life and they continue to be required, assets are:

- Refurbished;
- Replaced on a “like-for-like” basis; or
- Replaced with higher rated equipment to cater for future needs.

# 6 PLANNED NETWORK DEVELOPMENTS

## 6.1 Overview of the Plan

This chapter summarises the network development projects that are a result of the transmission network development planning process (outlined in Section 2.4). Projects are described in greater detail in Chapter 7 and Appendix B.

The TDPNI includes a total of 78 projects that are currently in progress. These projects are categorised as either:

- New Build;
- Uprate/Modify;
- Refurbish/Replace related projects; or
- Combination.

**New Build projects:** are projects that involve the construction of new substations or new circuits. This category also includes projects that involve the installation of new equipment in existing substations.

An example of a new build project is the installation of new transformers or new reactive support devices within existing stations.

**Uprate/ Modify projects:** are projects that involve the uprating of existing assets. An example of an uprate project is the changing of equipment to increase the capacity of circuits between stations; or busbars within existing stations.

This category also includes projects that involve the modification or reconfiguration of existing assets.

An example of a modification project is the installation of new couplers in existing substations.

**Refurbish/ Replace projects:** are projects that involve the refurbishment of existing substations or circuits. This category also includes projects that involve the replacement

of existing assets. For example, the replacement of stations at, or close, to the end of their useful life or replacement and upgrading of protection in existing stations.

**Combination:** are projects that involve a combination of any of the three categories above.

Table 6-1 below summarises the 78 active projects into their respective categories.

Table 6-1 Summary of Projects by Category

| Project Category | Network Development Projects | Asset Replacement projects |
|---|---|---|
| **New Build** | 14 | 0 |
| **Uprate/ Modify** | 20 | 4 |
| **Refurbish/ Replace** | 0 | 36 |
| **Combination** | 2 | 1 |
| **TOTAL** | 36 | 41 |

## 6.2 Summary of Stage of Projects

Table 6-2 below summarises the number of development projects (not including the 41 asset replacement projects) in each phase of network development[56].

[56] The process of network development is described in section 2. Further information on the stage of the project is available in Appendix A.

Table 6-2 Number of Development Projects in each stage of development

| No. of Development Projects in Each Stage | | | | |
|---|---|---|---|---|
| **Part 1 Planning** | **Part 2 Outline Design** | **Part 3 Consents** | **Under Construction** | **TOTAL** |
| 23 | 4 | 4 | 6 | 37 |

Figure 6-1 below illustrates the location of the larger network development projects in Parts 1 to 3.

For those projects in the early stages of the planning process, indicative corridors are shown on the map as a specific solution or line route has not yet been decided on. A full list of projects and their corresponding stage of development is given in Appendix B.

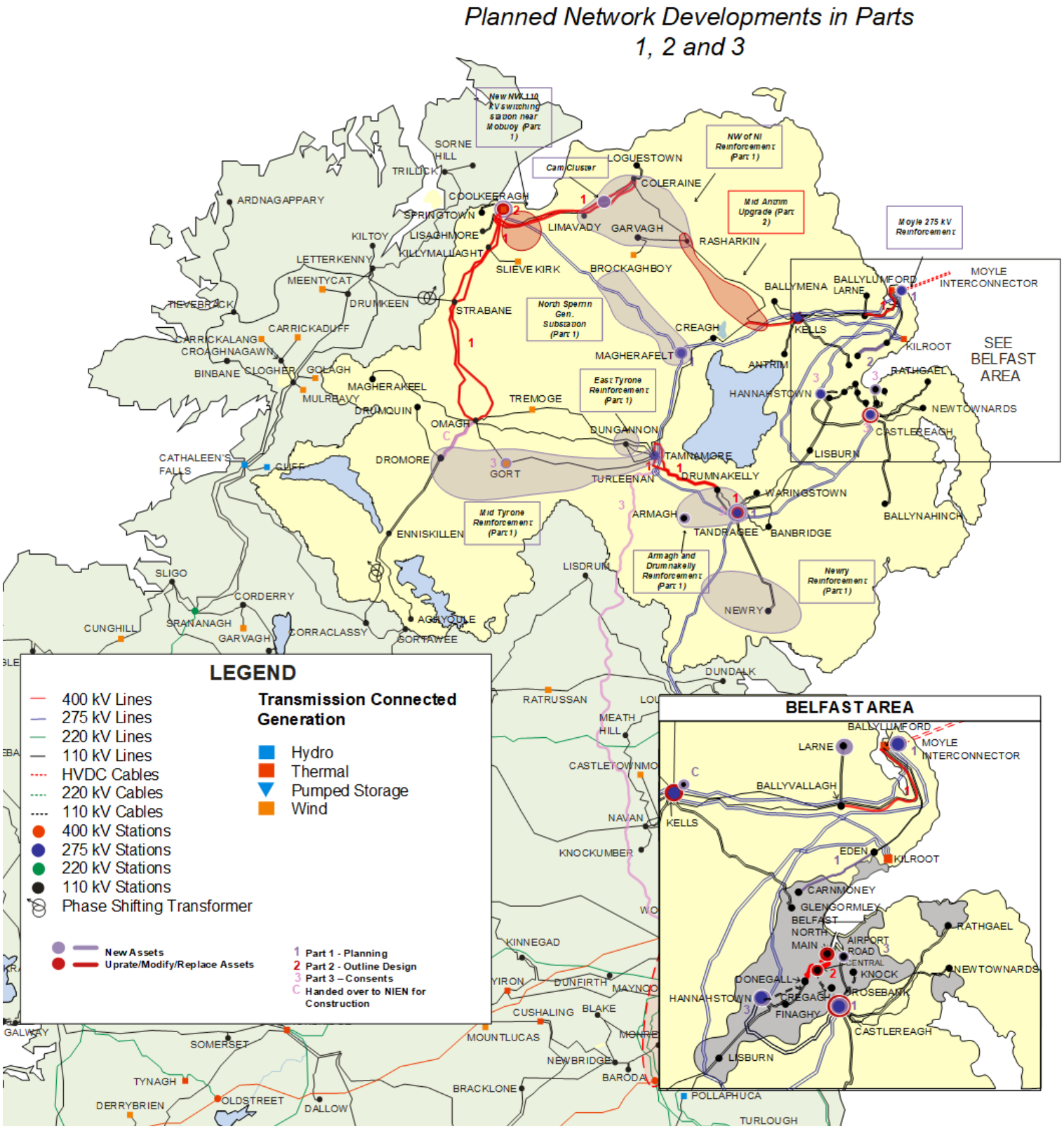



Figure 6-1 Planned Network Developments in Parts 1, 2 and 3

# 7 PROJECT DESCRIPTION

## 7.1 Overview

As described in Chapter 1, planned development projects are categorised on a planning area basis as per Figure 1-1. Asset replacement projects are listed together as these are the responsibility of NIE Networks and are not subject to SONI's grid development process. There are 2 individual projects that are in or have the potential to be in both planning areas. These projects are listed in Table B-1 in Appendix B.

Projects of pan-European and regional significance in, or partly in, Northern Ireland are identified in ENTSO-E's 2022 TYNDP and RegIP documents. Such projects are identified in this TDPNI using the following labels: " TYNDP/ TYNDP_Project_No" or " RegIP/ RegIP_Project_No" and are listed in Appendix C.

## 7.2 Asset Replacement Projects

NIE Networks' asset replacement projects (in both areas) are detailed below. Projects with a completion date beyond 2025 are indicative as they are subject to the outcome of NIE Networks' RP7 price control.

For all projects in RP6, a reference is included in brackets to the sub-project code used by NIE Networks in their RP6 price control submission where applicable. Full details of this, including the original cost estimates, can be seen here on the UR website[57] in Annex O[58] and Annex P[59].

### Ballylumford - Eden 110 kV Circuit Uprate

The conductor on the existing tower line as well as a number of towers and foundations will be replaced due to the condition and age of the existing assets. The conductor will also be uprated to cater for increased demand. **Estimated completion: 2023**

### Ballylumford Switchgear Replacement (T501)

The existing 110 kV switchgear at Ballylumford is to be replaced with a new 110 kV GIS double busbar and the 110 kV circuits diverted accordingly. The need for this project arises from the age, condition and obsolescence of the existing equipment as well as the need for a higher short circuit rating. **Completion date: 2027**

### Castlereagh – Rosebank Tower Line Removal

Following an assessment by SONI that the Castlereagh – Rosebank 110 kV tower line is no longer needed, the line is to removed and the existing communications link on the line replaced. **Completion date: after 2025**

### Coolkeeragh - Magherafelt 275 kV Circuits Refurbishment (T502)

The need for this project arises from the condition and rating of the existing conductor on the double circuit tower line, originally installed in the 1960s. Under certain scenarios there is a risk of overloading the existing conductor. The rating of the

Annex O - Assessment of Network Investment Direct Allowances.pdf (uregni.gov.uk)

replacement conductor will be increased to cater for increased generation and will be defined as part of the redesign of the circuit. **Completion date: Autumn 2023**

### Enniskillen Main Transformer 1 and 2 Replacement (T14)

The 110/33 kV transformers TX 1 and 2 are to be replaced due to the condition of the assets. **Completion date: 2024**

### Glengormley Main Transformer Tx B Replacement (T14)

The 110/33 kV transformer Tx B is to be replaced due to the condition of the asset. The substation is also being refurbished and rebuilt. **Completion date: 2025**

### Hannahstown Shunt Reactor Replacement

One shunt reactor at Hannahstown is due to be replaced due to the failure of a previous device. **Completion date: 2025**

### Hannahstown Inter-Bus Transformer 1 Replacement (T13)

The 275/110 kV 240 MVA interbus transformer IBTx 1 at Hannahstown is to be replaced due to asset age. A shunt reactor will also be installed on the new transformer. **Completion date: 2025**

### Hannahstown 275 kV Structures, Busbars and Disconnectors Replacement

The 275 kV structures, busbars and disconnectors at Hannahstown are to be replaced due to the age and condition of the existing assets. **Completion date: 2024**

### Tandragee Shunt Reactor Replacement (T15)

Tandragee TR2 shunt reactor is to be replaced due to the age and condition of the existing assets. **Completion date: by 2025**

### Kilroot 275 kV CT Replacement Phase 1 (T11p)

The Current Transformers (CTs) on the 275 kV circuits at Kilroot are to be replaced due to the condition of the existing assets. **Completion date: by 2025**

### Strabane Main 110 kV Refurbishment (T10)

The 110 kV mesh at Strabane Main is to be refurbished due to the condition of the existing assets. **Completion date: 2023**

### RP6 275 kV Tower Maintenance (T17)

This project includes maintenance of 275 kV towers and condition assessment of towers and foundations. **Completion date: Before 2025**

### RP6 110 kV Tower and Overhead Line Maintenance (T19)

This project includes wood pole replacement, tower maintenance and tower and foundation condition assessments elsewhere. **Completion date: Before 2025**

### RP6 110 kV Cable Maintenance (T20)

This project includes 110 kV cable refurbishment, cable flushing and maintenance of ancillaries. **Completion date: Before 2025**

### RP6 110 kV Transmission Protection (T602)

This project includes replacement, maintenance and upgrading of protection at 110 kV substations. **Completion date: Before 2025**

### RP6 275 kV Transmission Protection (T602)

This project includes replacement, maintenance and upgrading of protection at 275 kV substations. **Completion date: Before 2025**

### RP6 22 kV Transmission Protection (T602)

This project includes replacement, maintenance and upgrading of protection relating to 22 kV connected reactors at 275/110 kV stations. **Completion date: Before 2025**

### Miscellaneous RP6 Works (T11a-T11n, T11r, T12d-T12q, T12s, T16, T40)

This includes a number of small, within-station works including asbestos removal, concrete refurbishment, transformer bunding, auxiliary transformer replacement, transformer cooler replacement, 33 kV earthing transformer replacement, bushing replacement, station electrical systems, civil works, painting, earthing transformer replacement, transformer cooler replacement, security upgrades, health and safety upgrades, and provision of spares. This work is to be completed within the RP6 period and thus should be **completed by 2025**

**Proposed RP7 Projects (post 2025)**

### Banbridge Main Transformer 1, 2, 3 and 4 Replacement

The 110/33kV transformers Tx 1-4 at Banbridge Main are to be replaced due to the age and condition of the existing transformers.

### Ballylumford 275 kV CVT Replacement

6 CVTs at Ballylumford 275 kV substation are to be replaced during RP7.

### Castlereagh Interbus Transformer 1 Replacement

The 275/110 kV 240 MVA interbus transformer IBTx 1 at Castlereagh is to be replaced due to the condition of the asset.

### Castlereagh Inter-Bus Transformer 3 Replacement

The 275/110 kV 240 MVA interbus transformer IBTx 3 at Castlereagh is to be replaced due to the age and condition of the existing transformer.

### Cregagh Refurbishment

This project involves replacement of the existing 110/33/6.6 kV transformers at Cregagh with 110/33 kV and 33/6.6 kV units. It will also involve realignment of the transformers to ensure sufficient clearances.

### Donegall Main (North) Transformer Replacement

The 60 MVA transformer Tx B at Donegall North is to be replaced by a new 90 MVA unit. The need for this arises because of the condition of the asset. The rating of 90 MVA is the standard rating now procured for 110/33 kV transformer applications.

### Dungannon Main Tx1 Replacement

The 90 MVA transformer Tx 1 at Dungannon is to be replaced by a new 90 MVA unit. The need for this arises because of the condition of the asset.

### Hannahstown 110 kV Pantograph and CT Replacement

A number of 110 kV pantographs and CTs are to be replaced at Hannahstown due to asset condition.

### Kells Shunt Reactor Replacement

Two shunt reactors at Kells are due to be replaced due to the condition and age of the existing assets.

### Kilroot 275 kV CT Replacement Phase 2 (T11p)

The Current Transformers (CTs) on the 275 kV circuits at Kilroot are to be replaced due to the condition of the existing assets.

### Kilroot CVT Replacement

18 CVTs (275 kV) at Kilroot substation are to be replaced during RP7.

### Loguestown Transformer 1 and 2 Replacement

Both 110/33 kV transformers at Loguestown Main are to be replaced. This work will include installation of new 110 kV structures, disconnectors and earth switches.

### Noise Enclosures

Noise enclosures are to be installed on transformers at Eden, Lisburn and Newry. This will reduce the ambient noise from transformer operation.

### Rathgael 110 kV Structures Replacement

The 110 kV structures at Rathgael are to be replaced due to the condition of the existing assets.

### Standby Generators

60 kVA standby generators are to be installed at 18 transmission substations to provide resilience.

### Tandragee Inter-bus Transformer Replacement

Both of the 275/110 kV transformers at Tandragee are to be replaced during RP7 due to the age and condition of the transformers.

### RP7 275 kV Tower and Overhead Line Maintenance

This project includes maintenance of 275 kV towers and lines and condition assessment of towers and foundations.

### RP7 110 kV Tower and Overhead Line Maintenance

This project includes conductor replacement on some 110 kV spans, wood pole replacement, tower maintenance and tower and foundation condition assessments.

### RP7 110 kV Cable Refurbishment

This project includes 110 kV cable refurbishment, cable flushing and refurbishment of ancillaries.

### RP7 110 kV Transmission Protection

This project includes replacement and upgrading of protection at 110 kV substations.

### RP7 275 kV Transmission Protection

This project includes replacement and upgrading of protection at 275 kV substations.

### Miscellaneous RP7 Works

This includes a number of small, within-station works including station electrical station upgrades, transformer cooler replacement, transformer bushing replacement, refurbishment of earthing systems, health and safety upgrades, security works, flooding works, transformer bunding, civil works, and provision of spares. This work is to be completed within the RP7 period.

## 7.3 The North and West Planning Area

| The North and West Planning Area Overview |
|---|
| The North and West planning area comprises all areas connected to the transmission system north and west of the 275 kV double circuit ring around Lough Neagh and the 275 kV connection with Louth station in Ireland. |

| Summary of TDPNI Projects | |
|---|---|
| TDPNI project category | No. of Projects |
| New Build | 7 |
| Uprate/ Modify | 9 |
| Refurbish/ Replace | 0 |
| Combination | 0 |
| Total | 16 |

| Regional Description |
|---|
| This area is characterised by a significant amount of wind generation connected to the 110 kV network and has more generation than demand. Conventional generation in this area is provided by Coolkeeragh Power Station, connected to the main 275 kV ring by a double circuit spur line which crosses the Sperrin mountains from Magherafelt.<br>There are two cross-border connections on the 110 kV system, connecting Strabane with Letterkenny in County Donegal and Enniskillen with Corraclassy in County Cavan. Cross-border power flows are managed by power flow controllers (PFCs).<br>There is limited high capacity 275 kV infrastructure in this area and currently little or no spare capacity for generation on the 110 kV system.<br>The planning area has considerably more generation than demand.<br>Significant further generation is expected in this area over the coming years, most, if not all, of which is expected to be renewable in order to meet the 80% target. This will be a combination of existing generators replacing old plant with new, higher capacity equipment, and new connections. An increasing number of battery storage schemes are also connecting, as well as Low Carbon Inertia Services. |

To cater for the high levels of generation described above network reinforcement is necessary. This will enable the efficient export of generation from this area towards areas with high load, such as the South-East.
There are also reinforcement needs due to local constraints related to a shortage of transmission capacity and voltage support.
The projects described in this section will enable the transmission network to safely accommodate the more diverse power flows which are a result of excess regional generation. This project list is not definitive and will be updated in future TDPNIs to reflect the changing nature and understanding of the needs of the power system. They will also provide benefits to existing and future users of the transmission network in the planning area and facilitate broad future regional load growth.

The 16 development projects in the North and West planning area are discussed in more detail below as are any changes to the expected completion date from TDPNI 2021-2030. The status of the network development projects is noted in Appendix B.

Please refer to Figures 6-1 and 6-2 for locational information of planned Network Developments in the North and West Planning Area.

Unless otherwise mentioned, any changes in project costing since the previous TDPNI are due to inflation.

### 7.3.1 Renewable Generation Cluster Substations

#### Cam Cluster Substation (NEW)

Under NIE Networks' cluster methodology[60], a generation cluster has been designated between Limavady and Coleraine in the Cam area. This will be connected to the 110 kV circuit between Coolkeeragh and Limavady. As a cluster substation this work is chargeable to the connecting generators, however to enable future transmission network development in this area SONI are progressing a the Cam Substation Extension project which will additionally turn in the Coleraine – Limavady 110 kV circuit. This extension is estimated to cost £5.2m.

**Estimated completion: 2029**

[60] https://www.nienetworks.co.uk/connections/generation-connections/small-large-scale/clusters

### 7.3.2 Renewable Integration Developments

#### Coolkeeragh 110 kV Extension

This project will involve provision of additional 110 kV bays at Coolkeeragh through a busbar extension in order to enable further connections and improve security of supply. The estimated project cost has reduced to £12.2 million due to a better understanding of necessary land remediation works.

**Estimated completion: 2029**

#### Coolkeeragh – Killymallaght – Strabane 110 kV Uprate

As a result of increasing growth in renewable generation in the northwest of NI there will be a need to uprate the 110 kV circuits between Coolkeeragh, Killymallaght and Strabane with a higher capacity conductor. Project prioritisation and outage assessment has pushed the estimated completion date of this project to 2031. The estimated cost of this project is £19.98m.

**Previous estimated completion: 2027**

**New estimated completion: 2031**

#### Coolkeeragh – Limavady – Coleraine 110 kV Uprate (NEW)

As a result of increasing growth in renewable generation in the northwest of NI there will be a need to uprate the 110 kV circuits between Coolkeeragh, Limavady and Coleraine with a higher capacity conductor. The estimated cost of this project is £15.1m.

**Estimated completion: 2027**

#### Limavady Transformer Replacement (NEW)

The capacity of the existing 110/33 kV transformers at Limavady is insufficient for further connection of renewable generation to the Limavady distribution system. There is new generation planned in this area and therefore there is a need to replace the existing transformers at Limavady with higher capacity units. This project is expected to cost £3m.

**Estimated completion: 2026**

#### Gort 110/33 kV 2nd Transformer

A reduction in local demand and increase in small scale generation on the distribution

system connected to Omagh Main means that there is a risk of overload from a wind farm connected to this system. This project will involve the installation of a second 110/33 kV transformer at Gort to allow the transfer of a nearby wind farm to Gort from Omagh. This would address the transformer capacity issue currently at Omagh. The estimated cost of this project is £1.41 million.

**Estimated completion: Summer 2024**

### Mid-Antrim Upgrade

The drivers of this project are security of supply and RES integration. As a result of increasing growth in renewable generation there is a need to increase grid capacity south of Rasharkin 110/33 kV cluster substation. The estimated cost of this project has increased to £30.57 million due to inflation and an improved understanding of costs arising from project progress. An outage and deliverability assessment with NIE Networks has found that this project is likely to now conclude in 2029.

**Previous estimated completion: 2028**

**New estimated completion: 2029**

### North Sperrin Generation Substation (NEW)

There are increasing numbers of renewable generators connecting in the North Sperrin area, as well as older wind farms replacing older turbines with new, higher power units. However there is a lack of strong connection points in this area, and existing transmission infrastructure in the North West is heavily loaded. Provision of a new transmission substation has the potential to provide an efficient means of connecting future generation and reconfiguring existing generation to reduce constraints. This is a joint transmission/distribution project to optimise the connection of generation and this area.

**Estimated completion:** To be confirmed, at early scoping stage of project.

### North West of NI 110 kV reinforcement

The drivers for this project are security of supply and RES integration. As a result of increasing growth in renewable generation in the northwest and potential for voltage instability there will be a need to reinforce the 110 kV transmission system near

Rasharkin, Coleraine, Limavady and Garvagh cluster. As well as likely uprating of the circuits from Coolkeeragh to Limavady, the new circuit options to be investigated as part of this project will include:

- 110 kV circuit from Cam cluster – Rasharkin; and
- 2nd 110 kV circuit from Coleraine – Rasharkin.

The estimated cost of this project is £33.6m.

**Previous estimated completion: 2029**

**New estimated completion: 2030**

### Mid Tyrone Project

Due to the increase in the renewable generation in the north and west there is a need to reduce congestion on the grid between Dromore, Omagh and Tamnamore. The preliminary preferred option for this project is to extend Tamnamore substation and construct a new 110 kV circuit from Dromore to Tamnamore. The estimated cost of this project has decreased from £67.24 million to £44m due to selection of the preferred option.

**Estimated completion date: 2030**

### Omagh Main – Dromore Uprate

With the connection of Drumquin cluster substation to Dromore it is necessary to restring the Omagh Main – Dromore tower line with higher capacity conductor. The cost of this project has increased to £5.4 million.

**Estimated completion: Autumn 2023**

### Strabane – Omagh 110 kV Uprate

With increasing generation in the North West there is a risk of overload of the 110 kV circuits between Strabane and Omagh. This project will involve replacement of the conductor on the existing overhead lines with new conductor of a higher rating. The completion date has been changed after an appraisal of future outage availability. The estimated cost of this project is £12m.

**Previous estimated completion: 2028**

**New estimated completion: 2031**

**Load Related and Security of Supply**

### Coolkeeragh T1 Transformer Cabling Uprate

The increase in wind generation in the north-west of NI has resulted in an increase in power flows at Coolkeeragh. The project is to uprate the 110 kV cabling associated with Transformer 1 in order to accommodate these flows. The estimated cost of this project is £0.6 million. This project has been delayed due to prioritisation of other projects.

**Previous completion: Winter 2024**

**New estimated completion: 2026**

### East Tyrone Reinforcement Project

NIE Networks and SONI are jointly assessing the level of security of supply on the distribution system supplying Cookstown and the 110/33 kV substation at Dungannon. It is forecast that demand will exceed capacity at the existing Dungannon 110/33 kV substation. In addition there is a particular risk to supplies following a second circuit outage. The preliminary preferred option for this project is to extend Dungannon substation and install an additional two 110/33 kV transformers.

The estimated cost of this project is £7.9m. The estimated completion date of this project has changed following selection of the preferred option and assessment of the works required.

**Previous estimated completion: 2024**

**New estimated completion: 2027**

### North West Special Protection Scheme Upgrade

This scheme was installed to protect the network in the north-west in the event of faults on the 275 kV network before the large-scale installation of wind generation in the north and west of NI. As wind generation capacity has increased, a need has been identified to replace and upgrade the existing special protection scheme.

The estimated cost of this project is £0.3 million.

**Estimated completion: Autumn 2023**

### Coolkeeragh 275 kV Redevelopment

A number of concrete structures at Coolkeeragh are not compliant with modern standards and are need of replacement. Additionally there is a need to install a 2nd bus

coupling circuit breaker. This project will address this issue through redevelopment of the existing substation or replacement. The estimated cost of this project is £18.2 million. The estimated completion of this project has been delayed following assessment of outage availability and project prioritisation.

**Previous estimated completion: 2029**

**New Estimated completion: 2031**

## 7.4 The South-East Planning Area

| The South-East Planning Area Overview | |
|---|---|
| The South-East planning area comprises all areas within the 275 kV double circuit ring around Lough Neagh, as well as Greater Belfast, South Antrim and County Down. | |
| **Summary of TDPNI Projects** | |
| TDPNI project category | No. of Projects |
| New Build | 7 |
| Uprate/ Modify | 9 |
| Refurbish/ Replace | 0 |
| Combination | 2 |
| Total | 18 |
| **Regional Description** | |
| This area is characterised by its relatively high demand, particularly in the Greater Belfast area. There are two large conventional power stations; Ballylumford near Larne and Kilroot near Carrickfergus. Wind generation makes up a small proportion of installed capacity.<br><br>There is one cross-border connection on the 275 kV system, connecting Tandragee with Louth. The Moyle HVDC interconnector provides a connection between the 275 kV system near Ballylumford with the power system of Great Britain, via Scotland.<br><br>There is strong 275 kV infrastructure in this area, with significant spare capacity for generation and demand. However, there is a need to refurbish or replace several 275 kV substations to fully enable access this capacity. | |

The development of the transmission network in the area is characterised by the need to meet increasing demand and improve system resilience and flexibility. Investment is required to increase transmission of wind power from the North and West as well as cross-border interconnection.

There are also reinforcement needs due to:

- Local constraints related to a shortage of transmission capacity and voltage support;
- Accommodate further market integration with Ireland.

The projects described in this section will enable the transmission network to safely accommodate the more diverse power flows which are a result of excess regional generation. This project list is not definitive and will be updated in future TDPNIs to reflect the changing nature and understanding of the needs of the power system. They will also provide benefits to existing and future users of the transmission network in the planning area and facilitate broad future regional load growth.

The 17 development projects in the South-East planning area are discussed in more detail below. The status of the network development projects is noted in Appendix B.

Please refer to Figures 6-1 and 6-2 for locational information of planned Network Developments in the South-East Area in Parts 2 & 3.

Unless otherwise mentioned, any changes in project costing since the previous TDPNI are due to inflation.

### 7.4.1 Dual Asset Replacement/ Load Related and Security of Supply Projects

#### Energising Belfast

The existing conductor on the Castlereagh – Carnmoney 110 kV double circuit is due for replacement due to the condition of the assets. This project will install a 4th interbus transformer at Castlereagh and establish a 110 kV cable connection between Hannahstown and Castlereagh substations through Belfast city centre. This will enable removal of the existing 110 kV double circuit between Carnmoney and Castlereagh. This

will be a phased project and that elements will be completed before the final completion of the project. The estimated cost of this project is £45.5m.

**Estimated completion: 2028**

#### Carnmoney – Eden Reinforcement

The existing tower line between Carnmoney and Eden is due for refurbishment or replacement. This project will refurbish the rural portion of this tower line and replace the urban portions with underground cable. A 2nd 110/33 kV transformer will also be installed at Glengormley Main substation. The estimated cost of this project has increased to £31 million after the project scope was revised to include increased use of underground cable. The estimated completion date of this project has changed due to the change in scope and reprioritisation of projects.

**Estimated completion: 2028**

### 7.4.2 Renewable Generation Cluster Substations

#### Kells 110/33 kV Cluster

It is planned to establish a 110/33 kV cluster substation at the existing Kells 275/110 kV substation to connect new renewable generation to the transmission system. This will be connected to the existing Kells 110 kV station via an underground cable. As a cluster substation, this is funded by the connecting generators and there is no cost to the NI consumer.

**Estimated completion: 2025**

### 7.4.3 Renewable Integration Developments

#### Ballylumford – Ballyvallagh 110 kV Uprate (NEW)

The existing 110 kV circuits between Ballylumford and Ballyvallagh are to be uprated due to increased flows relating to new renewable connections. This project is expected to cost £8.3m.

**Estimated completion: 2030**

#### Larne Transformer Replacement (NEW)

The capacity of the existing 110/33 kV transformers at Larne is insufficient for further

connection of renewable generation to the Larne distribution system. There is new generation planned in this area and therefore there is a need to replace the existing transformers at Larne with higher capacity units. This project is expected to cost £3m.
**Estimated completion: 2026**

#### Tamnamore – Drumnakelly 110 kV Uprate

These circuits may be subject to overload under high wind generation conditions and are consequently switched out during high wind periods. This project is to upgrade the capacity on these circuits, allowing these circuits to fully return to service. The estimated cost of this project increased from £9 million to £22.5 million due to a better understanding of the scope of the project and increased used of cable.
**Estimated completion: 2027**

### 7.4.4 Load Related and Security of Supply

#### Airport Road 110/33 kV substation

A new 110/33 kV substation will be constructed in the Belfast Harbour Estate, close to the existing Airport Road 33/6.6 kV substation. The substation will be connected to the existing Rosebank substation via the existing 110 kV tower line (currently operated at 33 kV) from Rosebank to Sydenham Road. The need for this project arises from the increasing load in the Belfast Harbour and city centre area. Planning permission has been received for this substation. The estimated cost of this project is £6.7 million. This project has been delayed due to negotiations to secure the required land.
**Estimated completion: 2026**

#### Armagh and Drumnakelly Reinforcement

There is a need to reinforce the distribution system supplying Armagh city and the surrounding area due to increasing demand. It is also forecast that demand will exceed capacity at the existing Drumnakelly 110/33 kV substation. The preferred option for this project is to establish a new 110/33 kV substation at Armagh with new 110 kV circuits from Tandragee.

The estimated cost of this project is £27.1 million.

**Estimated completion: 2029**

### Newry Reinforcement

The demand at Newry is forecast to approach the capacity of the substation in the next ten years. This project will investigate transmission and distribution options to provide more capacity on this part of the network. A shortlist of options has not yet been developed, but the indicative cost of this project is £29.3 million.

**Estimated completion: 2030**

### Shunt Reactors - Castlereagh, Tandragee and Tamnamore

In order to manage voltages on the transmission system at eperiods of low demand, further shunt reactors are planned to be installed at Castlereagh, Tandragee and Tamnamore substations in order to improve voltage regulation when the network is lightly loaded. The reactors for this project will be installed in phases with the first one connected in 2023. The estimated cost of this project is £6.3m. The reactors will be installed in phases starting in 2023.

Final completion has been delayed as several of the initially procured reactors are required to replace existing units which have failed in service, meaning that further units will be needed to complete the programme.

**New estimated completion: 2028**

## 7.4.5 Fault Level Replacements

### Castlereagh 110 kV Switchgear Replacement

Due to increasing fault levels it is planned to replace 110 kV circuit breakers and current transformers at Castlereagh. The estimated cost of this project is £3.1 million. The estimated completion of this project has been revised after assessment of the phasing and availability of outages.

**Estimated completion: 2027**

### Tandragee 110 kV Switchgear Replacement

Due to increasing fault levels it is planned to replace 110 kV circuit breakers and current transformers at Tandragee. The estimated cost is £2.7 million.

**Estimated completion: 2027**

### Castlereagh 275 kV Redevelopment

A re-appraisal of the original design has found that the concrete structures at Magherafelt are not sufficient to meet modern design standards. This project will address this issue through redevelopment of the existing substation or replacement. The estimated cost is £24.6m, of which £15m is projected to be spent within the timeframe of this TDPNI.

**Estimated completion: 2033**

### Kells 275 kV Redevelopment

A re-appraisal of the original design has found that the concrete structures at Magherafelt are not sufficient to meet modern design standards. This project will address this issue through redevelopment of the existing substation or replacement. The estimated cost of this project is £24.6m.

**Estimated completion: 2031**

### Magherafelt 275 kV Redevelopment

A re-appraisal of the original design has found that the concrete structures at Magherafelt are not sufficient to meet modern design standards. This project will address this issue through redevelopment of the existing substation or replacement. The estimated cost of this project has increased to £24.6 million due to a better understanding of the necessary scope.

**Estimated completion: 2031**

### Tandragee 275 kV Redevelopment

A re-appraisal of the original design has found that the concrete structures at Magherafelt are not sufficient to meet modern design standards. This project will address this issue through redevelopment of the existing substation or replacement. The estimated cost of this project is £25.3 million, of which £8.1m is projected to be spent during the timeframe of this TDPNI.

**Estimated completion: 2038**

### 7.4.6 Interconnection

#### North-South Interconnector

This project involves construction of a new 400 kV circuit from existing Woodland 400 kV station in County Meath (Ireland) to a proposed 400/275 kV station at Turleenan in County Tyrone (Northern Ireland). This project is needed to remove constraints within the single electricity market, improve security of supply and facilitate safe and secure operation of the power system with high renewable penetration levels. The estimated cost for the Northern Ireland portion is £119.2 million.

**Estimated completion: 2027**

#### Moyle Interconnector Capacity Increase

At present, full utilisation of the 500 MW export capability of the Moyle Interconnector is prevented by the potential for network overloads and voltage steps in the event of the loss of the 275 kV double circuit between the Moyle converter station at Ballycronan More and the nearby Ballylumford substation. This project involves works to allow reconfiguration of the connection to Moyle to address this contingency. The estimated completion has changed due to a better understanding of the procurement and planning needs of the project. The project cost is estimated at £9.5m.

**Estimated completion: 2028**

## 7.5 Projects in Both Planning Areas

### CVT Upgrade for Harmonic Measurement

It is planned to replace Capacitor Voltage Transformers (CVTs) at a number of sites with models capable of power quality monitoring, in order to improve monitoring of power system harmonics. The estimated cost of this project is £0.7 million.

**Estimated completion: 2024**

### Filter Tuning/Replacement (On hold)

With increasing use of cable on the transmission system as well as an increase in non-linear load and generation, harmonic levels on the transmission system are increasing. This project will analyse the requirement for harmonic filters and re-tune/augment these accordingly. This project is on hold pending results obtained from the planned new CVTs being installed (see project above)

**Estimated completion: TBD**

# 8 STRATEGIC ENVIRONMENTAL ASSESSMENT OF TDPNI 2023-2032

An examination of the possible environmental impacts of grid development project options within TDPNI 2023-2032 is part of the Strategic Environmental Assessment (SEA) as detailed in Chapter 7 of the Environmental Report.

All projects are developed with a range of inherent mitigation derived from statutory and in-house processes (SONI) and procedures that work to try to avoid the potential for significant environmental impacts in the first instance. These measures are set out Chapter 4 Implementation of this TDPNI. The applicability of these policies and objectives will be dependent on the nature and scale of each project.

The assessment of likely significant environmental effects (Chapter 7 of the SEA Environmental Report) has been undertaken with the assumption that these policies and objectives will be implemented for projects detailed in this TDPNI and also for projects included in future TDPNIs.

The SEA Environmental Report has been produced to assess the environmental impacts of the various project development options (alternatives) within the TDPNI and to provide the environmental guidance to help create a more sustainable TDPNI. In parallel to this, a Habitats Regulation Assessment (HRA) has been prepared to inform the decision making process, in terms of the potential for the development options to impact the integrity of any European sites in view of that sites conservation objectives. Both environmental assessments have been central to the development of the draft TDPNI.

It is important to note that while SONI is the competent authority for the purpose of preparing the TDPNI and associated SEA, all projects will likely require statutory consent under the provisions of the Planning Act (Northern Ireland) 2011, implemented by the relevant planning authority.

The TDPNI has been assessed via a Baseline Led Assessment. This method involves the assessment of each option available in the potential project developments listed in the TDPNI against each of the following topics:

- Biodiversity, Flora & Fauna (BFF);
- Population & Human Health (PHH);
- Soils, Geology and Land use (S);
- Water (W);
- Air (A);
- Climatic Factors (C);
- Material Assets & Infrastructure (MA);
- Cultural, Architectural & Archaeological Heritage (H); and
- Landscape & Visual Amenity (L).

Each potential development option/ project in the TDPNI has been assessed in the short, medium and long term for likely effects, the significance of the effects, and whether they are positive or negative effects. Other impacts that have been assessed for significance are secondary effects, cumulative effects, synergistic effects, temporary and permanent effects, and the inter-relationship of effects. The scenario of "The Evolution of the Environment without the Plan" has also been assessed in the same format.

The TDPNI provides a list of the potential project options and alternatives that could be developed within the Plan period up to 2032. These are all the development "alternatives" available to the Plan. A number of these potential projects were screened out of requiring assessment as the works are of such a scale as not to be considered significant and / or are localised to within existing electrical transmission sites / substations, or as the proposals have gone beyond strategic planning to the detailed planning stage and so will only be considered for cumulative and in-combination impacts. The projects that were screened in and to be assessed in the SEA are presented in Table 8-1 below.

Table 8-1: Project options Screened In and Assessed in the SEA

| Project ID | Project Name | Development Type |
|---|---|---|
| **1** | Moyle Interconnector Capacity Increase | New Transmission Line cabling |
| **2** | Armagh and Drumnakelly Reinforcement | New Substation and Transmission Line |
| **3** | East Tyrone Reinforcement | Substation Extension |
| **4** | Newry Reinforcement | New Substation and New / Uprate Transmission Line |
| **5** | Coolkeeragh - Limavady - Coleraine 110 kV Uprating | Transmission Line Restring / Uprate |
| **6** | Drumnakelly - Tamnamore 110 kV Uprating | Transmission Line Underground Cables and Restring / Uprate |
| **7** | Ballylumford - Ballyvallagh uprate | Transmission Line Restring / Uprate |
| **8** | New NW 110 kV Switching Station | New Substation and New / Uprate Transmission Line |
| **9** | Coolkeeragh 110 kV Extension | Substation Extension |
| **10** | Energising Belfast | New Substation and Transmission Line |
| **11** | Eden-Carnmoney Reinforcement | Transmission Line Underground Cables and Restring / Uprate |
| **12** | Coolkeeragh-Killymallaght-Strabane 110 kV Uprating | Transmission Line Restring / Uprate |
| **13** | Omagh - Strabane 110 kV Uprating | Transmission Line Restring / Uprate |
| **14** | Mid Antrim Upgrade | New Substation and Transmission Line, Transmission Line Restring / Uprate |
| **15** | Northwest 110 kV Reinforcement | New Transmission Line |
| **16** | Omagh - Dromore Uprating | Transmission Line Restring / Uprate |
| **17** | Mid Tyrone Upgrade | New Transmission Line and Underground Cables |
| **18** | North Sperrin Generation Substation | New Substation, Substation Extension, New Transmission Line and Underground Cables |
| **19** | Cam Cluster | New Substation |
| **20** | Castlereagh 275 kV Redevelopment | New substation or Substation Extension |
| **21** | Coolkeeragh 275 kV Redevelopment | New substation or Substation Extension |
| **22** | Kells 275 kV Redevelopment | New substation or Substation Extension |
| **23** | Magherafelt 275 kV Redevelopment | New substation or Substation Extension |
| **24** | Tandragee 275 kV Redevelopment | New substation or Substation Extension |

Each project option available to the TDPNI has been assessed against the Strategic Environmental Objectives (SEOs). All potential positive and negative impacts are presented individually, with a text description, and then a summary graphic. In addition, a summary of the overall balanced potential effect has been presented for each environmental issue area. The scores assigned to impacts are from +3 to -3. If a development proposal is thought to have the potential for unacceptable impacts a score of -999 has been assigned. The purpose of adding numerical scores is to assist in the ranking of options and for potential incorporation of the environmental and social criteria into future decision making by the Plan team, as this can easily be tied into a multi-criteria analysis of alternatives if desired.

Each option available in the Plan has been assessed in the short, medium and long term for likely effects, the significance of the effects, and whether they are positive or negative effects. Other impacts that have been assessed for significance are secondary effects, cumulative effects, synergistic effects, temporary and permanent effects, and the inter-relationship of effects. The scenario of "The Evolution of the Environment without the Plan" has also been assessed in the same format. This was considered as the Do-Nothing Scenario.

No significant negative impacts are being anticipated from development and operation of the transmission developments, yet several slight to moderate, negative impacts have been identified. However many of these can be avoided or mitigated for in the next detailed design and construction / environmental management planning stages. For transmission infrastructure upgrade developments, the negative impacts identified are mainly restricted to the construction phase, leaving no significant medium or long term footprint on the wider environment. However new transmission infrastructure developments have the potential for short, medium and long term, slight to moderate negative impacts due to their permanent physical and visual disturbance, during and following construction. Mitigation measures have been proposed that can minimise the potential for these negative impacts, if adopted in the detailed planning and design stage. Areas that may be more sensitive to these transmission

developments have also been highlighted, to help inform SONI of the areas that should be avoided to minimise potential environmental impacts.

In the medium and long term the development of these transmission projects has the potential for slight to significant positive impacts, including the improved reliability of the grid network, support of economic growth, and facilitating the connection and supply of more renewable energy. These positive impacts in turn will help ensure that electricity supply is able to meet future demand, and that there is less reliance on fossil fuels into the future, resulting in better air quality and less GHG emissions. Furthermore, the projects in the TDPNI could play a key role in shaping a reliable and sustainable energy future for Northern Ireland and help achieve the 2030 renewable electricity target and Net Zero by 2050.

# 9 HABITATS REGULATION ASSESSMENT

The Habitats Directive (Council Directive 92/43/EEC) on the conservation of natural habitats and of wild fauna and flora obliges member states to designate, protect and conserve habitats and species of importance in a European Union context. Article 6(3) of the Habitats Directive requires that "Any plan or project not directly connected with or necessary to the conservation of a site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives." The Directive was transposed into Northern Ireland legislation through the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995.

Any proposed plan or project that has potential to result in a significant effect on a designated European site will require an AA. Case law has determined that the likelihood need not be great, merely possible, and that the precautionary principle must apply as set out in European Commission Guidance and as required by CJEU case law (i.e. C 127/02 'Waddenzee').

AA for the TDPNI is being carried out in parallel with the SEA process. This is done through the preparation of Habitats Regulation Assessment (HRA). The findings of the AA will be used to guide the development of the alternatives to be considered as part of the SEA. The first stage of the AA process is Screening, which is to determine whether implementation of the TDPNI has the potential to have a significant effect on designated European sites.

The HRA Screening of the 78 potential projects within the TDPNI identified that there is the potential for significant habitat loss, water quality and habitat deterioration, and disturbance and displacement impacts on European sites, in the development of 22 of the potential projects that could come forward during the Plan period.

- The possibility of likely significant Habitat Loss effects cannot be discounted for thirty two European sites or sites in the UK National Network of Sites without further evaluation and analysis, or the application

of measures intended to avoid or reduce the harmful effects of the potential projects on these sites.

- The possibility of likely significant Water Quality and Habitat Deterioration effects cannot be discounted for forty one European sites or sites in the UK National Network of Sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on these sites.

- The possibility of likely significant Disturbance and Displacement effects cannot be discounted for twenty four European sites or sites in the UK National Network of Sites without further evaluation and analysis, or the application of measures intended to avoid or reduce the harmful effects of the potential projects on these sites.

Having conducted further investigation and analysis; and having applied measures appropriate at a plan level intended to avoid or reduce the harmful effects of the implementation of the plan on European sites; and taking into consideration the safeguarding regime of lower level screening for appropriate assessment or appropriate assessment as the case may be at a project level for each of the projects brought forward from the TDPNI prior to those projects being consented under the planning code; it is concluded that implementation of the TDPNI will not adversely affect the integrity of any European site.

# 10 ASSESSMENT RECOMMENDATIONS AND MITIGATION ARISING FROM THE SEA AND HRA

Mitigation measures have been recommended where potential negative impacts on environmental topic areas have been identified from developing the alternative options (See chapter 8 of the Environmental Report). These mitigation measures aim to prevent, reduce and as fully as possible offset any significant adverse effects on the environment due to implementation of the projects within the TDPNI.

## 10.1 GENERAL MITIGATION

The principal mitigation recommendation is that the predicted negative effects should be considered further during the next stage of detailed planning and design, when the specifics of the development infrastructure options can be optimised through detailed feasibility studies and design in order to limit identified impacts on sensitive receptors.

Further environmental studies based on the more detailed designs and construction methodologies should be undertaken as appropriate. These studies may involve, but are not limited to, marine, aquatic and terrestrial ecology surveys, ornithological and bat surveys, fish surveys, landscape and visual assessments, WFD assessments, geotechnical investigations and heritage surveys. Further Appropriate Assessment, to meet the requirements of the Habitats Directive, of the detailed designs and construction methodologies will be required at the project level, where potential impacts have been identified in this SEA and accompanying HRA for the TDPNI.

Before any works are carried out, detailed method statements and management plans (construction and environmental) should be prepared, including timing of works, information on the specific mitigation measures to be employed for each works area, and mechanisms for ensuring compliance with environmental legislation and statutory consents.

The timing of construction and maintenance works should be planned to avoid any potential for negative cumulative impacts or inter-relationships with other

schemes, plans or projects, yet look to optimise any potential positive cumulative impacts or inter-relationships.

Contractors should be required to prepare Construction Environmental Management Plans (CEMPs), which would include a requirement for related plans to be prepared, as appropriate, for project implementation, such as Erosion and Sediment Control, Invasive Species Management, Emergency Response, Traffic and Safety Management, Dust and Noise Minimisation, and Stakeholder Communication Plans.

Works should only be carried out once the method statements have been consulted on with competent authorities, such as the NIEA. At the project level it will not be sufficient to defer the production of construction method statements. These should be completed in the detailed design stage and may be subject to further Appropriate Assessment where potential impacts have been identified in this SEA and accompanying HRA for the TDPNI. Where there may be unavoidable impacts on protected habitats and / or species the necessary derogation licences should be applied for prior to seeking planning permission or approval for a scheme.

Marine construction and in-stream work have the greatest potential for negative impacts during spawning / breeding and early nursery periods for aquatic and marine protected species. No marine or instream works should occur during restricted periods for relevant species and consultation should be undertaken with the appropriate authorities in this regard. Monitoring of project-level mitigation measures should be undertaken during and after works, to ensure effectiveness.

All works and planning of works should be undertaken with regard to all relevant legislation, licensing and consent requirements, and recommended best practice guidelines. An ecological clerk of works should be appointed for environmental management of each infrastructure development, and where specific sensitive species may be impacted, an appropriate expert should also be appointed.

As established in Biodiversity Policy ENVP5* and Objective ENVO2*, biodiversity restoration and enhancement opportunities should be factored into the

implementation of transmission development projects, wherever possible, and this should and this should be monitored in order to ensure that the most appropriate and beneficial measures are being implemented.

## 10.2 SPECIFIC MITIGATION

Table 8-1 (reproduced as Table 10-1 below) of the Environmental Report provides environmental effect specific mitigation measures that should be adopted within the project stage development of options from the TDPNI to minimise the potential for any negative effects on the wider environment. For transmission development options that are selected to be further investigated these mitigation measures should be implemented and further developed at the next stages of more detailed design / feasibility and project level study.

Table 10-1 Proposed SEA Mitigation Measures (from Environmental Report)

| Potential Impact | Proposed Mitigation |
|---|---|
| 1 - Construction phase disturbance, such as noise and habitat degradation, to International, National or locally designated sites and species that are within close proximity to developments. | Good planning and timing of works, and good construction and management practices to keep impacts to a minimum. Environmental Management Plan (EMP) and Construction Management Plan (CMP) to be developed and agreed with relevant authorities and consultees prior to commencement of works. Adhere to SONI / EirGrid / best practice guidelines. Scoping of relevant specialist ecological surveys during the detailed planning stage and prior to any construction works.<br>Where applicable, prior to any vegetation clearance an ecologist should be contracted to undertake a 'pre-vegetation clearance' survey for signs of nesting birds and important species. Should important species be found during surveys the sequential approach of avoid, reduce or mitigate should be adopted to prevent significant impacts. Vegetation clearance should only occur outside the main breeding bird season - September to March.<br>Following construction, replanting, landscaping, natural revegetating and habitat enhancement, should be undertaken in line with appropriate guidelines that aim to improve local biodiversity and wildlife. This is likely to provide for medium and long term benefits to the biodiversity, flora and fauna near the working areas. Where possible, original sediment/soil should be reinstated to original levels to facilitate natural restoration and recolonisation of habitat. |

| Potential Impact | Proposed Mitigation |
|---|---|
| | Restricted working areas should be imposed to ensure minimal disturbance to sensitive habitats. |
| 2 - Construction phase sedimentation impacts on International, National or locally designated sites and species that are within close proximity to developments and where pathways are evident, as constructions works may mobilise sediments into watercourses. | Consultation with environmental bodies on construction methodology and appropriate timing of works to provide the least potential for sediment mobilisation to watercourses.<br>Good planning and timing of works, and good construction and management practices to keep the potential for impacts to a minimum. Minimise requirement for near or in-stream works through good planning. During construction and site establishment operations, silt fencing should be used to prevent disturbed soil reaching the aquatic zone. Any in-stream works should be carried out during low flow conditions and should cease during heavy rainfall and flood conditions, to reduce suspended solids in the river.<br>Buffer zones along waterways can provide mitigation during construction activities. Buffer zones must be of adequate dimensions and impede all free flow to waterways. Heavy machinery and site traffic should be excluded from these areas. |
| 3 - Increased risk of direct physical disturbance to International, National or locally designated sites and species that are within close proximity to developments, including hazards to birds through collision and electrocution. | To avoid or minimise the potential for bird collision with overhead conductors, bird flight deflectors or bird warning spheres should be installed in areas identified as being of high risk, or having bird species vulnerable to such impacts. Ornithological surveys should be undertaken during the detailed design stage to identify these sensitive areas and species. Any mitigation measures require monitoring programmes to ensure that they are effective, |
| 4 - Increased rate of spread of invasive species during restring or line development works. Mobile construction equipment traversing through areas of invasive species, potentially carrying these species into new areas. | Cleaning of equipment and machinery along with strict management protocols to combat the spread of invasive species. Pre and post construction surveys for invasive species may be recommended in areas of known invasive species risk.<br>If invasive species are found to be present, an Invasive Species Management Plan should be prepared to outline control and or removal measures to ensure such species are not spread during construction or operation of any future projects. |
| 5 - Creation of a new vector for mobile invasive species in the | Cleaning of equipment and machinery along with strict management protocols to combat the spread of invasive species. Pre and post construction surveys for invasive |

| Potential Impact | Proposed Mitigation |
|---|---|
| development of new transmission lines. Corridor clearing may act as a pathway for invasive species. | species may be recommended in areas of known invasive species risk.<br>If invasive species are found to be present, an Invasive Species Management Plan should be prepared to outline control and or removal measures to ensure such species are not spread during construction or operation of any future projects. |
| 6 - Construction phase disturbance impacts to marine or aquatic nursery<br>and spawning grounds, such as noise / vibration pollution and physical habitat disturbance. | Consultation with DAERA Inland Fisheries and DAERA Marine and Fisheries<br>Division at the detailed feasibility stage. Known marine spawning and nursery grounds should be avoided where possible, or invasive works minimised in these areas.<br>All works involving open cut crossings should be carried out during the period May to September to avoid interruption of salmonid spawning runs, spawning, incubation of eggs and the early developmental stages. |
| 7 - Construction phase sedimentation impacts to marine or aquatic nursery and spawning grounds, as construction works may cause sediment displacement and blanketing / smothering. | The planning of developments should aim to avoid known marine or aquatic nursery or spawning grounds. Where this cannot be avoided, construction timing should be well planned and works duration and invasive workings should be kept to a minimum in these areas. |
| 8 - Construction phase disturbance impacts, such as noise pollution (e.g. cable laying or excavation), to mobile marine and aquatic species (e.g. cetaceans) that are known to frequent the study area. | The planning of developments should aim to avoid known hotspot areas for mobile marine and aquatic species. Where this cannot be avoided, construction times should be kept to a minimum in these areas. Employing Marine Mammal Observers (MMOs) on board construction works vessels can help ensure that impacts of coastal works are minimised. Consultation with DAERA Inland Fisheries and DAERA Marine Environment Division at the detailed feasibility stage.<br>Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise should be followed for marine based cable laying activities.<br>For SACs which have seals as a site selection feature, the following ranges should be used for when screening for either Harbour or Grey Seals:<br>• All SACs within 135km of the project should be screening for Grey Seals (Halichoerus grypus) and<br>• All SACs within 50km should be screened for Harbour Seals (Phoca vitulina) |

| Potential Impact | Proposed Mitigation |
|---|---|
| 9 - Construction phase noise pollution disturbance impacts to people in close proximity to developments. | Disturbances can be kept to a minimum with good working practices, planning and timing. Adoption of Construction Best Practice. Noise-producing activities such as excavation and piling should only take place during daylight hours and monitoring of these activities should be ongoing. Continued liaison with local communities is advised with regard to complaints concerning noise and vibration emissions resulting from construction works. |
| 10 - Construction phase dust and sediment releases in close proximity to the developments, causing disturbance and negative health impacts to local people. | Disturbances can be kept to a minimum with good working practices, planning and timing. Adoption of Construction Best Practice. Development of dust minimisation plans in advance of works. Dust suppression measures in place during construction, for example establishing appropriate speed limits over unmade surfaces and establishing wheel washing facilities on construction sites. Continued liaison with local communities is advised with regard to complaints concerning dust releases resulting from construction works. |
| 11 - Construction / maintenance phase compaction or destabilisation of peat and other sensitive soils, from heavy equipment traversing an area. | The development of transmission infrastructure across areas of significant soil sensitivity should be avoided where possible at the design stage (e.g. areas of deep and active peat should be avoided where possible). Where areas of sensitive habitat need to be crossed during construction/maintenance works, measures to reduce the impact of vehicles on wetland or bog should be considered including the use, for example, of low pressure vehicles, wide wheel/tracks and the laying of protective geotextile on the vegetation to be crossed. Construction machinery should also be restricted to site roads and designated access routes. Machinery should not be allowed to access, park or travel over areas outside development construction zones. Where impacts cannot be avoided or reduced, further works should be carried out to compensate for these impacts, or to restore some aspect of the natural environment to an approximation of its previous condition (e.g. where disturbance of peat soils cannot be avoided, there should be some consideration given to possible re-seeding with native species to stabilise the peat and accelerate recovery of the vegetation). |
| 12 - Temporary or permanent loss of crops and/or agricultural land due to the disturbance of construction works required for the uprating of existing or | Good site management practices and construction management plans and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Adoption of Construction Best Practice. Consultation with landowners and/or tenants to identify speciality agricultural crops or lands that may require protection |

| Potential Impact | Proposed Mitigation |
|---|---|
| development of new transmission infrastructure over agricultural areas. | during construction. Consultation with landowners to develop compensation for lost crop value caused by construction works.<br>Land within the working area should be reinstated as near as practical to its former condition. |
| 13 - Construction phase disruption to current land uses, such as noise pollution and dust release from construction works. | Good site management practices and construction management plans and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Adoption of Construction Best Practice. Noise and vibration producing activities such as piling and excavation should only take place during daylight hours and monitoring of these activities should be ongoing in sensitive areas. Development of dust minimisation plans. Dust suppression measures in place during construction, for example establishing appropriate speed limits over unmade surfaces and establishing wheel washing facilities on larger construction sites. Continued liaison with local communities is advised with regard to complaints concerning noise pollutions and dust release resulting from construction works. |
| 14 - Construction phase potential for contaminated materials to be mobilised and tracked through the study area from historically contaminated sites or hazardous soils and activities, impacting on nearby soils and land uses. | Identification of historically contaminated areas and sites and careful route planning during the design stage to avoid these sites where possible, to prevent further contamination. Good management, planning and working practices to minimise contamination of nearby soils and land uses if works crossing historically contaminated sites or hazardous soils cannot be avoided. Good working practices may include installation of wheel wash and plant washing facilities. Strict management and regulation of construction activities. Sampling and analysis of sites prior to construction works in potentially hazardous areas, to establish potential risk. |
| 15 - Access difficulties in topographically unsuitable areas, such as upland and steep slope areas or historic mine sites, and where transport of construction equipment across these areas may be problematic. | Careful route planning during the design stage to avoid topographically unsuitable areas where possible. In some cases, where access for machinery is particularly difficult due to the sensitive nature of habitats or difficult terrain, the aerial transport of materials and machinery by helicopter may be considered. |
| 16 - Construction phase sedimentation impacts to water bodies e.g. | Good management and planning to keep water quality disturbance to a minimum. Precautions should be put into place to avoid or minimise the generation and release of |

| Potential Impact | Proposed Mitigation |
|---|---|
| construction works may destabilise soil materials, river banks and shorelines. | sediments into any watercourses. Any potential water quality issues from construction should be contained and treated to ensure no damage to natural waterbodies. Construction will have to be planned appropriately, using Best Available Techniques / Technology (BAT) at all times, to ensure water quality issues are kept to a minimum, with no significant adverse effects.<br>Develop, implement and enforce an Erosion and Sedimentation Control Plan (ESCP) where risks are identified to downstream European sites. |
| 17 - Construction phase pollution impacts to water bodies, e.g. construction works may accidentally release pollutants, such as fuels, oils and lubricants. | Pollution prevention guidance notes (PPGs) should be consulted, which provide detailed guidance and appropriate mitigation measures to avoid or reduce the impact on the water environment.<br>Develop, implement and enforce a Water Pollution Prevention and Environmental Emergency Response Plan for all work sites. This should include good site practices as described in the Good Practice Guidance notes proposed by EA/SEPA/NIEA.<br>All protective coatings used would be suitable for use in the aquatic environment and used in accordance with best environmental practice.<br>Storage facilities would contain and prevent the release of fuels, oils and chemicals associated with plant, refuelling and construction equipment into the environment.<br>Emergency and spill response equipment should be kept on hand during construction. |
| 18 - Difficult working conditions during construction and maintenance works due to interactions with coastal, pluvial or fluvial flood extents. | Individual developments to be subject to detailed Flood Risk Assessment at the detailed planning stage, where risk has been identified. Avoid flood extents where possible, or provide infrastructure that is both resilient to the potential flood risk and provides no transfer of flood risk once developed. Critical infrastructure should not be placed in floodplains where it may be impacted, or where it may be inaccessible during flood events. |
| 19 - Increases in local air emissions and reductions in local air quality from construction plant emissions, in areas of the proposed developments. | Development of dust minimisation plans. Dust suppression measures in place during construction to include regular dampening down of stock piles, establishing appropriate speed limits over unmade surfaces and establishing wheel washing facilities on construction sites. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable. |
| 20 - Increases in local GHG emissions from construction plant | Plan construction scheduling to minimise vehicle trips. |

| Potential Impact | Proposed Mitigation |
|---|---|
| emissions, in areas of the proposed developments. | Limit idling of heavy equipment unless needed for the safe operation of the equipment and verify through unscheduled inspections. |
| 21 - Difficult working conditions during construction and maintenance works due to interactions with climate change exacerbated coastal, pluvial or fluvial flood extents. | Individual developments to be subject to detailed Flood Risk Assessment at the detailed planning stage, where risk has been identified, including for climate change scenarios. Avoid climate change flood extents where possible, or provide infrastructure that is both resilient to the potential flood risk and provides no transfer of flood risk once developed. Critical infrastructure should not be placed in floodplains where it may be impacted, or where it may be inaccessible during flood events. |
| 22 - Temporary loss of GHG sequestering vegetation in clearance of development area, during and following the construction of new transmission lines, prior to re-establishment. | Good planning and timing of works to minimise construction footprint impacts. Following construction, replanting, landscaping, and natural revegetating, should be undertaken in line with appropriate guidelines that aim to improve local GHG sequestering vegetation cover. |
| 23 - Construction phase disturbance impacts to existing material assets and infrastructure such as transport networks, agricultural, aquaculture, fisheries, and recreation and amenity areas as construction works may interfere with the functioning of these assets, e.g. road closure or temporary loss of agricultural lands. | Development of good site management practices, traffic and construction management plans and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Minimise the frequency and duration of road closures. Adoption of Construction Best Practice. |
| 24 - Planning and construction constraints due to the presence of existing infrastructure or other planned developments. | Constraints should be identified, and described in as much detail as possible during the early stages of a project, so that awareness of them and their potential impact can be managed. Incorporation of potential impacts and risks associated with other planned developments at the detailed planning stage. Consultation with other asset owners to establish the best possible working arrangements with the least disturbance. |
| 25 - Permanent, direct loss of existing material assets, such as agricultural land, in the | Good spatial planning to minimise the potential for such impacts. Consultation with landowners to develop compensation for loss of assets, such as agricultural land, caused by development of new infrastructure. Good site |

| Potential Impact | Proposed Mitigation |
|---|---|
| development footprint of new transmission infrastructure, e.g. new substations. | management practices and construction management plans, and consultation with the competent and statutory authorities prior to any works should enable all impacts to be kept to a minimum over a short timescale. Adoption of Construction Best Practice. |
| 26 - Construction phase impacts on the setting of heritage sites and features in close proximity transmission infrastructure, during uprating and construction works. | Where necessary a heritage impact assessment should be prepared in respect of any works to architectural or archaeological features in advance of any works being carried out to feed into detailed design. Consultation and agreement with the Department for Communities, Historic Environment Division, in advance of any works taking place in respect of protected archaeological or architectural features. Construction supervision by qualified project archaeologists, combined with sensitive construction methods and restoration to minimise potential for damages, in potentially sensitive areas. Heritage features damaged could be restored / preserved. Statutory consents and notices may be required prior to works taking place. |
| 27 - Permanent impacts on the setting of heritage sites and features in close proximity transmission infrastructure. | Impacts could be kept to a minimum through sensitive design and planning. Planning and design advice from qualified archaeologists. Statutory consents may be required prior to works. |
| 28 - Potential for loss of or damage to known and unknown heritage features in the development of transmission infrastructure. | Impacts could be kept to a minimum through sensitive design and planning. Planning and design advice from qualified archaeologists. Construction supervision by qualified project archaeologists, combined with sensitive construction methods and restoration to minimise potential for damages, in potentially sensitive areas. Statutory consents may be required prior to works. |
| 29 - Construction phase impacts on the local landscape and local visual amenity from construction equipment and works. | Impacts could be kept to a minimum through good site practice and planning (e.g. screened laydown areas and traffic management). Adoption of Construction Best Practice.<br>Landscape and Visual Assessment of options at the detailed feasibility and detailed planning stages to minimise the potential for impacts and provide site specific mitigation measures. |
| 30 - Permanent impacts on landscape and visual amenity from the development of new transmission infrastructure. | Impacts could be kept to a minimum through sensitive design and planning (e.g. vegetative screening and landscape management planning). Landscape and visual assessment and advice during detailed design. Public consultation on draft designs. Landscape and Visual Assessment of options at the detailed feasibility and |

| Potential Impact | Proposed Mitigation |
|---|---|
| | detailed planning stages to minimise the potential for impacts and provide site specific mitigation measures. |

## 10.3 HRA MITIGATION

In addition to the proposed SEA mitigation Table 10-2 demonstrates the HRA mitigation measures that will be adopted within the TDPNI to minimise the potential for any negative impacts on the European sites as arising from any of the potential projects.

Where avoidance is not possible adverse effects on site integrity will be avoided through project specific mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation. Mitigation measures shall aim to ensure that no adverse effect on the integrity of a European site.

Where impacts are identified at project level, appropriate mitigation will be developed to ensure the resulting impacts of the construction and operation of a project do not adversely affect the integrity of a European site in view of the site's conservation objectives. Best practice measures identified in EirGrid's benchmarking Evidence-Based Environmental Studies.

The following measures will be incorporated into future project specific HRAs and EcIAs, where appropriate. This list of mitigation measures is not designed to be exhaustive and shall be supplemented by project and site specific mitigation developed by project level Appropriate Assessment and Environmental Impact Assessment.

**Habitat loss**

Any and all works in or in proximity to a European site will be supervised by an experienced ecologist acting as an Ecological Clerk of Works (ECoW).

Direct habitat loss within European sites will be avoided for new-build infrastructure and avoided where reasonably practicable for refurbishment of infrastructure within European sites.

When construction occurs within a designated site, sensitive construction techniques will be used such as the use of bog mats for machinery access, particularly if underground cables are proposed or in remote peatland areas.

Ecological monitoring will be undertaken at sensitive sites during construction as appropriate. Such sites will be identified on a case by case basis.

Restricted working areas will be imposed to ensure minimal disturbance to sensitive habitats.

Re-distribute vegetation and soil stripped from the construction areas to provide a seedbank and do not re-seed with Perennial Ryegrass.

Land within the working area will be reinstated to its former condition or as near as is reasonably practicable.

**Invasive Species**

There is the potential for non-native invasive species to be present in proximity to a future project. The introduction of invasive species into a European site can affect the conservation objectives for qualifying habitats or species, potentially adversely affecting the integrity of the European site (e.g. affecting species distribution and abundance and/or out competing native species). Invasive species survey will be undertaken as part of the suite of ecology surveys for projects arising from the TDPNI if appropriate and in accordance with EirGrid (2012). If invasive species are found to be present an Invasive Species Management Plan will be prepared to outline control and or removal measures to ensure such species are not spread during construction or operation of any future projects.

**Peatland sites**

Areas of deep and active peat shall be avoided, where possible.

Detailed peat slip risk assessments shall be carried out as determined on a case by case basis for proposed developments in areas where peat substrates occur on sloped ground.

Construction machinery shall be restricted to site roads and designated access routes. Machinery shall not be allowed to access, park or travel over areas outside development construction zones.

Peat excavated during construction activity should not be stored (temporarily or otherwise) on areas of adjacent mire habitats or near flushes or drains. Temporary

storage of spoil material excavated during the construction phase developments should be stored at suitable locations away from surface watercourses.

All spoil material excavated during the construction phase should be reinstated following the completion of the construction phase of a proposed development.

Where disturbance of peat soils cannot be avoided, there should be some consideration given to possible re-seeding with native species to stabilise the peat and accelerate recovery of vegetation.

**Water Quality and Habitat Deterioration**

In all cases where works have the potential to impact on protected surface water or riparian habitats within or upstream of a European site, measures must be put in place to manage and minimise the risk of escape of elevated levels of suspended solids or polluting substances into watercourses.

Develop, implement and enforce an Erosion and Sedimentation Control Plan (ESCP) where risks are identified to downstream European sites.

The ESCP must include sufficient pollution control measures to prevent run-off, silt, hydrocarbons or any other harmful substances or substrates from entering any surrounding surface waters.

Storage facilities would contain and prevent the release of fuels, oils and chemicals associated with plant, refuelling and construction equipment into the environment.

All protective coatings used would be suitable for use in the aquatic environment and used in accordance with best environmental practice.

Develop, implement and enforce a Water Pollution Prevention and Environmental Emergency Response Plan for all work sites. This should include good site practices as described in NIEA Pollution Prevention Guidance (DAERA, 2016) and applicable CIRIA Technical Guidance (CIRIA, 2001; CIRIA, 2006) including methods and procedures to deal with any spills and the timely reporting of incidents.

- There shall be no in-stream crossing by machinery.

- Silty water will be collected in settlement ponds prior to discharge to watercourses.
- Buffering strips will be provided near watercourses.
- All works involving open cut crossings shall be carried out during the period May to September to avoid interruption of salmonid spawning runs, spawning, incubation of eggs and the early developmental stages.
- Where appropriate and practical, bank vegetation and bed material which has been removed shall be stored to facilitate its replacement when channel works in the vicinity of a watercourse have been completed.
- Works in the vicinity of a watercourse shall be carried out with reference to a water quality protection or surface water management plan for each site which shall ensure that:
- All necessary measures shall be taken to minimise the generation and release of sediments into all watercourses.
- Levels of suspended solids in the river shall be monitored during the course of the works.
- Precautions shall be put in place to avoid spillages of diesel, oil or other polluting substances.

**Disturbance and Displacement**

**Birds**

Where feasible, site clearance involving the cutting or destruction of vegetation and hedgerows shall not take place in the bird breeding season between March 1st and August 31st inclusive.

Mitigation measures to reduce disturbance effects on feature species birds may include but not be limited to:

Timing of works (e.g. avoiding works in or close to SPAs during the bird breeding season [March to August inclusive] or avoiding works in the vicinity of SPAs with over wintering birds between the months of November and March inclusive)

Avoid working simultaneously with other projects which could also cause disturbance.

**Screening of works to reduced disturbance impacts.**

On the advice of relevant ornithological experts and agencies, conduct surveys where the risk of collision on migratory routes cannot be excluded at screening stage. Bird warning devices shall be put in place where crossings of sensitive flight corridors cannot be avoided and where a collision risk occurs.

Surveys focusing on feature species which can move outside the confines of a European site shall be conducted to ensure any significant areas of supporting habitat (e.g. foraging areas for feature species birds in close proximity to, but outwith an SPA; or otter holts out with an SAC, etc.) would be identified and avoided or appropriate mitigation measure put in place.

**Otters**

Works shall avoid active otter holts. In the event that an otter holt cannot be avoided by the works, it will be necessary to seek a derogation licence from NIEA to exclude otters from the holt. No works shall be undertaken within 150m of any holts at which breeding females or cubs are present.

No wheeled or tracked vehicles (of any kind) shall be used within 30m of non-breeding otter holts. Light work, such as digging by hand or scrub clearance shall also not take place within 30m of such holts, except as agreed with NIEA under licence.

**Marine Mammals**

Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010) will be followed for marine based cable laying activities.

## 10.4 MONITORING

The SEA Directive requires that the significant environmental effects of the implementation of the TDPNI are monitored in order to identify, at an early stage, unforeseen adverse effects and in order to undertake appropriate

remedial action. The proposed monitoring programme in Table 10-2 is based on the Targets and Indicators established in the SEOs. This monitoring plan will be adopted into TDPNI and should be undertaken in advance of development of the next cycle of the TDPNI, to enable the outcomes to influence the development of the Plan. Annual environmental review by SONI could also incorporate some or all of this monitoring.

## Table 10-2 Proposed Environmental Monitoring of the TDPNI (From Environmental Report)

| SEO | Indicator | Target | Proposed Data Source(s) |
|---|---|---|---|
| **Objective 1 – Biodiversity, Flora and Fauna**<br>Avoid damage to, and where possible enhance, biodiversity, flora and fauna.<br><br>**Sub-Objectives**<br>1A - Preserve, protect, maintain and, where possible, enhance internationally protected species and habitats.<br><br>1B - Preserve, protect, maintain and, where possible, enhance national and local nature conservation sites, protected habitats and species and other known species of | • Conservation condition of designated habitats and species within International / European sites (SACs, SPAs, Ramsar sites).<br>• Status of designated habitats and species within national and local sites.<br>• Status of protected and priority habitats and species. | • No negative change, or a positive change, in the conservation status of designated habitats and species within International / European sites.<br>• No negative change, or a positive change, in the conservation status of designated habitats and species within national and local sites.<br>• No negative change, or a | • DAERA National Site Network reporting (every 6 years) for European sites / Article 17 Habitats Directive reporting and Article 12 Birds Directive reporting for RoI.<br>• DAERA Condition Assessment reporting for ASSIs.<br>• Local Authority – Local Area Plans<br>• DAERA reporting of protected |
| **Objective 2 – Population and Human Health**<br>Minimise the risk to, and provide benefit for, the community and human health.<br><br>**Sub-Objectives**<br>2A - Minimise disruption and displacement to the local population, while providing robust transmission infrastructure.<br><br>2B - Minimise risks to human health and social | • Population density within proximity to potential transmission system developments.<br>• Perceived health of the local population within proximity to potential transmission system developments.<br>• Socially sensitive areas within | • Low population density within proximity to transmission system developments.<br>• No negative change, or a positive change, in the health of the population within proximity to transmission system developments.<br>• No socially sensitive areas within | • NISRA census data.<br>• NISRA statistics on population health.<br>• NIO data on NI Peace Lines<br>• DSD data on Neighbourhood Renewal Areas |
| **Objective 3 – Geology, Soils and Landuse**<br>Minimise damage to the function and quality of the soil resource in the study area in | • Loss or damage to protected geological / geomorphological | • No effects on protected geological / geomorphological | • DAERA Condition Assessment reporting for ASSIs |

| | | | |
|---|---|---|---|
| construction and operation of transmission infrastructure. | national designated sites (UNESCO Geoparks, ASSIs).<br>• Loss or damage to sensitive soils and land uses, e.g., peatlands, ancient woodland, commercial forestry, cultivated lands.<br>• Interactions with potentially hazardous soils and activities, e.g., PPC sites, mines, quarries, | national designated sites (UNESCO Geoparks, ASSIs).<br>• No loss of, or damage to, sensitive soils and land uses.<br>• No interaction with hazardous sites and topographically unsuitable areas. | • Woodland Trust, LPSNI, NIEA, GSNI, and Forest Service data<br>• Local Area Plans |
| **Objective 4 – Water**<br>Avoid impacts on the status or quality of water bodies and avoid interaction with areas of flood risk.<br><br>**Sub-Objectives**<br>4A - Support the objectives of the WFD and Marine Strategy by avoiding damage to or deterioration of water status, quality and resource. | • WFD status of surface, coastal, transitional and groundwater bodies within proximity to potential transmission system developments.<br>• Status of sensitive waterbodies, e.g., drinking and bathing waters within proximity to potential transmission system developments.<br>• Medium probability flood extents | • No negative change, or a positive change, in the status of surface water and groundwater bodies, including sensitive water bodies, and potential to contribute to the achievement of water body objectives under the WFD.<br>• No deterioration in the status of NI seas, and potential to contribute to the achievement of Good Environmental Status | • WFD reporting of water body status in RBMPs by DAERA / EPA reporting in RoI.<br>• Monitoring undertaken by DAERA Marine and Fisheries Division under the Marine Strategy / by the EPA under the MSFD in RoI.<br>• DfI data for the NIFRA and FRMP. |
| **Objective 5 - Air Quality**<br>Minimise risk to local air quality and contribute to improving regional emissions. | • Development in air quality sensitive areas.<br>• Enable increased renewable energy connection to reduce requirements for fossil fuel | • No transmission system developments within air quality sensitive areas.<br>• Number of transmission system developments that may facilitate | • Local Authority, DAERA data – Annual air quality monitoring summaries and Continuous air quality monitoring. |

| | | | |
|---|---|---|---|
| **Objective 6 - Climatic Factors**<br>Adaption of infrastructure to potential climatic change and reduction of GHG emissions from the energy supply sector in line with national commitments.<br><br>**Sub-Objectives**<br>**6A -** Adaption of infrastructure to potential climatic change. | • Medium probability climate change (cc) influenced flood extents - Pluvial and fluvial 100 year + cc and coastal 200 year +cc flood extents.<br>• Enable increased renewable energy connection to reduce requirements for fossil fuel burning. | • No transmission system developments within areas of climate change flood risk, unless resilient to flooding.<br>• Number of transmission system developments that may facilitate increased renewable energy connection. | • DfI data for the NIFRA and FRMP.<br>• Met Office regional information.<br>• SONI / NIE – Annual Reporting and Plans. |
| **Objective 7 - Material Assets**<br>Provide new, robust electrical transmission infrastructure with minimal disruption to other assets and infrastructure. | • Transmission infrastructure developed or upgraded.<br>• Potential for impacts on transport (road, rail, air) and energy infrastructure (gas).<br>• Potential for loss of or impacts to | • Number of transmission system developments developed or upgraded.<br>• No disruption to transport and energy infrastructure.<br>• No loss of agricultural land | • SONI / NIE – Annual Reporting and Plans.<br>• SGN data, Transport NI and Translink data<br>• LPSNI data, CORINE Landcover, DAERA Agricultural Census data |
| **Objective 8 - Cultural Heritage**<br>Protect International, National and Local Heritage Designations, and areas of heritage potential, and their settings. | • Potential for impacts on archaeological heritage features or their setting.<br>• Potential for impacts on architectural heritage features or their setting. | • No negative change, or a positive change in the condition or setting of international, national and local heritage designations, in development and operation of infrastructure.<br>• All new archaeological | • SONI / NIE – Annual Reporting and Plans.<br>• Statistics on recorded breaches in relation to historic sites.<br>• Heritage at Risk NI (HARNI) Register, with regard to holdings in the rural landscape. |
| **Objective 9 - Landscape and Visual Amenity**<br>Minimise the potential for negative impacts on the character and quality of landscapes / seascapes or visual amenity. | • Landscape / seascape sensitivity to infrastructure development.<br>• Potential for impacts on visually sensitive areas, such as AONBs | • No negative change, or a positive change, in visual amenity or landscape / seascape character, in development and operation of infrastructure. | • Landscape / Seascape Character Assessments or update to the NI Countryside Survey. |

| | | | |
|---|---|---|---|
| | | | • SONI / NIE – Annual Reporting and Plans.<br>• Local Development Plans. |

# APPENDIX A: PROJECT TERMS

This appendix explains terms that are used to describe projects in the following appendices.

**Estimated Completion Date (ECD)**: the estimates provided are subject to:

- The planning process where applicable;
- The construction progress; and
- Availability of transmission outages and commissioning; and
- May be liable to change.

**Project Capex:** The anticipated capital expenditure associated with a project, comprising the combined total of the TSO (SONI) and TO (NIE Networks) costs.

**Stage:** the stage the project has progressed to on the data freeze date. The SONI approach to project development consists of three parts, namely:

**Part 1** – Planning
**Part 2** – Outline Design
**Part 3** – Consents

Once projects have progressed beyond Part 3, SONI enter into a Project Agreement with NIE Networks for the construction phase. These projects are marked as **NIE Networks** within the tables below.

Asset replacement projects are carried out by NIE Networks outside SONI's Grid Development Process.

# APPENDIX B: PLANNED NETWORK DEVELOPMENTS

This appendix details active TDPNI 2023 projects and their driver(s), need(s), location, stage and ECD, as at the data freeze date 01 May 2023. Projects are categorised by planning area[61]. Also shown are changes in project cost estimates (where applicable) since TDPNI 2021-2030.

Please note the following label:

- " TYNDP/ TYNDP_Project_No" or " RegIP/ RegIP_Project_No" included with a project's title signifies that it is in ENTSO-E's most recent TYNDP or RegIP North Sea. Projects included in the TYNDP are projects of pan-European significance. Projects included in the RegIP North Sea are projects of regional significance. These projects are listed in Appendix C; and
- "*" included with a project's length signifies that the circuit length is an estimate at this time.

[61] Some projects are in, or have the potential to be in, both planning areas.

## NIE Networks Asset Replacement Projects

There are 41 projects in NIE Networks' Asset Replacement Plan; these projects are listed in Table B-1 below.

Table B-1 NIE Networks Asset Replacement Projects (41 Projects)

| Project Title | Type | km | Project Capex | Capex Changes since 2021 | ECD |
|---|---|---|---|---|---|
| Ballylumford-Eden 110 kV Circuit Uprate | Refurbish/Replace/Uprate/Modify | 15 | £15.5M | 0 | 2023 |
| Ballylumford Switchgear Replacement | Uprate/ Modify | 0 | £17.4M | 0 | 2027 |
| Coolkeeragh–- Magherafelt 275 kV Circuits Refurbishment | Refurbish/ Replace | 56 | £41M | 0 | 2023 |
| Enniskillen Main Transformer 1 and 2 replacement | Refurbish/ Replace | 0 | £2.1M | 0 | 2024 |
| Glengormley Main Transformer B Replacement | Refurbish/ Replace | 0 | £1.4M | +£0.2M | 2025 |
| Hannahstown Shunt Reactor Replacement | Refurbish/ Replace | 0 | £1.4M | N/A | 2025 |
| Hannahstown inter-bus transformer 1 replacement | Refurbish/ Replace | 0 | £3.2M | +£0.4M | 2025 |
| Hannahstown 275 kV Structures, Busbars and Disconnectors Replacement | Refurbish/ Replace | 0 | £6M | 0 | 2024 |
| Tandragee Shunt Reactor Replacement | Refurbish/ Replace | 0 | £1.4M | 0 | 2025 |
| Kilroot 275 kV CT Replacement Phase 1 | Refurbish/ Replace | 0 | £0.9M | 0 | 2025 |
| Strabane Main 110 kV refurbishment | Refurbish/ Replace | 0 | £2.6M | 0 | 2023 |
| RP6 275 kV Tower Maintenance | Refurbish/ Replace | 0 | £7M | 0 | 2025 |
| RP6 110 kV Tower and Overhead Line Maintenance | Refurbish/ Replace | - | £7M | 0 | 2025 |
| RP6 110 kV Cable Maintenance | Refurbish/ Replace | - | £0.7M | 0 | 2025 |

| Project Title | Type | km | Project Capex | Capex Changes since 2021 | ECD |
|---|---|---|---|---|---|
| RP6 110 kV Transmission Protection | Refurbish/ Replace | 0 | £1.7M | 0 | 2025 |
| RP6 275 kV Transmission Protection | Refurbish/ Replace | 0 | £2.8M | 0 | 2025 |
| RP6 22 kV Transmission Protection | Refurbish/ Replace | 0 | £0.1M | 0 | 2025 |
| Miscellaneous RP6 Works | Refurbish/ Replace | 0 | £3.4M | 0 | 2025 |
| Banbridge Main Transformer 1, 2, 3 and 4 replacement | Refurbish/ Replace | 0 | £2.4M | -£0.1M | >2025 |
| Ballylumford 275 kV CVT Replacement | Refurbish/ Replace | 0 | £0.1M | N/A | >2025 |
| Castlereagh inter-bus Transformer 1 Replacement | Refurbish/ Replace | 0 | £3.2M | +£0.5M | >2025 |
| Castlereagh inter-bus Transformer 3 replacement | Refurbish/ Replace | 0 | £3.2M | +£0.4M | >2025 |
| Castlereagh – Rosebank Tower Line Removal | Refurbish/ Replace | 0 | £1M | N/A | >2025 |
| Cregagh Refurbishment | Refurbish/ Replace | 0 | £8M | +£6M | >2025 |
| Donegall Main (North) transformer replacement | Uprate/ Modify | 0 | £1.2M | +£0.2M | >2025 |
| Dungannon Main transformer 1 replacement | Refurbish/ Replace | 0 | £1.2M | +£0.2M | >2025 |
| Hannahstown 110 kV Pantograph and CT Replacement | Refurbish/ Replace | 0 | £1.1M | N/A | >2025 |
| Kells Shunt Reactor Replacement | Refurbish/ Replace | 0 | £1.53M | 0 | >2025 |
| Kilroot 275 kV CT Replacement Phase 2 | Refurbish/ Replace | 0 | £0.57M | 0 | >2025 |
| Kilroot CVT Replacement | Refurbish/ Replace | 0 | £0.43M | 0 | >2025 |
| Loguestown Transformer 1 and 2 Replacement | Refurbish/ Replace | 0 | £2.4M | N/A | >2025 |

| Project Title | Type | km | Project Capex | Capex Changes since 2021 | ECD |
|---|---|---|---|---|---|
| Noise Enclosures | Uprate/Modify | 0 | £1.6M | N/A | >2025 |
| Rathgael 110 kV Structures Replacement | Refurbish/ Replace | 0 | £0.25M | 0 | >2025 |
| Standby Generators | Uprate/Modify | 0 | £1M | N/A | >2025 |
| Tandragee inter-bus Transformer 1 & 2 replacement | Refurbish/ Replace | 0 | £6.4M | +£3.7M | >2025 |
| RP7 275 kV Tower and Overhead Line Maintenance | Refurbish/ Replace | 0 | £8M | 0 | >2025 |
| RP7 110 kV Tower and Overhead Line Maintenance | Refurbish/ Replace | 0 | £9M | 0 | >2025 |
| RP7 110 kV Cable Maintenance | Refurbish/ Replace | 0 | £1.4M | 0 | >2025 |
| RP7 110 kV Transmission Protection | Refurbish/ Replace | 0 | £1.4M | 0 | >2025 |
| RP7 275 kV Transmission Protection | Refurbish/ Replace | 0 | £2.7M | 0 | >2025 |
| Miscellaneous RP7 works | Refurbish/ Replace | 0 | £3.8M | 0 | >2025 |

## Projects in the North and West Planning Area

There are 16 development projects in the North and West Planning Area; these projects are listed in Table B-2 below.

Table B-2 Planned Projects in the North and West Planning Area (16 Projects)

| Project Title | Type | Km | DRIVERS | | | | NEEDS | | | | | Stage (Part) | Project Cost[62] | | | Capex change since 2021 | ECD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | New Connection | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | | Total | TSO | TO | | |
| Cam Cluster Substation (NEW) | New Build | 0 | ✓ | | ✓ | | | | ✓ | | | 1 | £5.2m | £0.2M | £5.3M | n/a | 2029 |
| Coolkeeragh 110 kV extension | Uprate/ Modify | 0 | | ✓ | | | | ✓ | ✓ | | | 2 | £12.2M | £0.7M | £11.5M | -£7M | 2029 |
| Coolkeeragh – Killymallaght - Strabane 110 kV Uprate | Uprate/ Modify | 15 | | ✓ | ✓ | | ✓ | ✓ | | | | 1 | £20M | 0.18M | £19.8M | +£2.3M | 2031 |
| Coolkeeragh – Limavady – Coleraine Uprate (NEW) | Uprate/ Modify | 95 | | ✓ | ✓ | | ✓ | ✓ | | | | 1 | £15.1M | £0.1M | £15M | N/A | 2027 |
| Limavady Transformer Replacement (NEW) | Uprate/Modify | 0 | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | 1 | £3M | 0 | £3M | n/a | 2026 |
| Gort 110/33 kV 2nd Transformer | New Build | 0 | | ✓ | ✓ | | | ✓ | ✓ | | | 3 | £1.41M | £0 | £1.41M | 0 | 2024 |
| Mid-Antrim Upgrade | New Build | 0 | | ✓ | ✓ | | | ✓ | ✓ | | | 2 | £30.6M | £5.25M | £25.3M | +£4.M | 2029 |
| North Sperrin Generation Substation (NEW) | New Build | 40 | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | 1 | TBC | TBC | TBC | n/a | TBC |
| North West of NI 110 kV Reinforcement | New Build | 21 | | ✓ | ✓ | | ✓ | ✓ | | | | 1 | £33.6M | £3M | £30.6M | +£3.8M | 2030 |
| Mid Tyrone Project | New Build | 53 | | ✓ | ✓ | | ✓ | ✓ | | | | 1 | £44M | £3.0M | £40M | -£24.2M | 2029 |

[62] Projects consist of TSO & TO costs, this breakdown is shown only for projects that have pre-construction approved TSO costs

| Project Title | Type | Km | DRIVERS | | | | NEEDS | | | | | Stage (Part) | Project Cost[62] | | | Capex change since 2021 | ECD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | New Connection | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | | Total | TSO | TO | | |
| Omagh Main – Dromore Uprate | Uprate/ Modify | 9 | ✓ | | ✓ | | ✓ | ✓ | | | ✓ | NIE Networks | £5.4M | £0.1M | £5.3M | +£1.2M | 2023 |
| Strabane – Omagh 110 kV Uprate | Uprate/Modify | 36 | | ✓ | ✓ | | | ✓ | | | | 1 | £12M | £0.5M | £11.5M | +£0.5M | 2031 |
| Coolkeeragh T1 Transformer cabling uprate | Uprate/ Modify | 0 | | ✓ | | | | ✓ | | | | 1 | £0.6M | 0 | £0.6M | 0 | 2026 |
| East Tyrone Reinforcement Project | New Build | 0 | | ✓ | | | | ✓ | ✓ | | | 1 | £7.9M | £2.3M | £5.6M | +£5.5M | 2024 |
| North West Special Protection Scheme upgrade | Uprate/ Modify | 0 | | ✓ | ✓ | | | ✓ | | | | NIE Networks | £0.33M | £0.01M | £0.32M | 0 | 2023 |
| Coolkeeragh 275 kV Redevelopment | Uprate/ Modify | 0 | | ✓ | | | | | ✓ | | ✓ | 1 | £18.2M | £0.18M | £18M | -23.2M | 2031 |

## Projects in the South-East Planning Area

There are 18 development projects in the South-East Planning Area; these projects are listed in Table B-3 below.

Table B-3 Planned Projects in the South-East Planning Area (18 Projects)

| | | | DRIVERS | | | | NEEDS | | | | | | Project Cost | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Title | Type | km | New Connection | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | Stage (Part) | Total Cost | TSO | TO | Capex Change Since 2021 | ECD |
| Energising Belfast | Refurbish/Replace/New Build | 25 | | ✓ | | | ✓ | | | | ✓ | 2 | £45.5M | £2.9M | £42.6M | +£3.9M | 2027 |
| Carnmoney – Eden Reinforcement | Refurbish/Replace/Uprate/Modify | 12 | | ✓ | | | ✓ | | | | ✓ | 2 | £31M | £3.1M | £29.3M | +£14.3M | 2028 |
| Kells 110/33 kV Cluster | New Build | 0 | | | ✓ | | | ✓ | ✓ | | | 3 | N/A[63] | n/a | n/a | N/A | 2025 |
| Ballylumford – Ballyvallagh 110 kV Uprate (NEW) | Uprate/Modify | 17 | | | ? | | ? | | ? | | | 1 | £8.3M | £0.3M | £8M | N/A | 2030 |
| Larne Transformer Replacement (NEW) | Uprate/Modify | 0 | | | ✓ | | | ✓ | ✓ | | | 1 | £3M | 0 | £3M | N/A | 2026 |
| Drumnakelly - Tamnamore 110 kV Uprate | Uprate/ Modify | 22 | | ✓ | ✓ | | ✓ | ✓ | | | | 1 | £22.5M | £3.8M | £18.4M | +£12.8M | 2027 |

[63] Cluster substation projects are funded according to the NIE Networks "Statement of Charges For Connection to Northern Ireland Electricity Networks' Distribution System" - http://www.nienetworks.co.uk/documents/connections/statement-of-charges

| | | | DRIVERS | | | | NEEDS | | | | | | Project Cost | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Title | Type | km | New Connection | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | Stage (Part) | Total Cost | TSO | TO | Capex Change Since 2021 | ECD |
| Airport Road Main 110/33 kV substation | New Build | 0 | | ✓ | | | | ✓ | ✓ | | | 3 | £6.7M | £0.9M | £5.9M | £0.6M | 2026 |
| Armagh and Drumnakelly Reinforcement | New Build | 17 | | ✓ | | | | ✓ | ✓ | | | 1 | £27.1M | £1.5M | £22.6 M | +£3M | 2029 |
| Newry Reinforcement | New Build | TBD | | ✓ | | | | ✓ | | | | 1 | £29.3M | £3.5M | £25.8 M | n/a | 2030 |
| Shunt Reactors - Castlereagh, Tandragee and Tamnamore | New Build | 0 | | ✓ | | | | ✓ | | | | NIE Networks | £6.3M | n/a | £6.3M | +£2.1M | 2028 |
| Castlereagh 110 kV Switchgear replacement | Uprate/ Modify | 0 | | ✓ | | | | ✓ | | | | NIE Networks | £3.1M | n/a | £3.1M | 0 | 2027 |
| Tandragee 110 kV Switchgear replacement | Uprate/ Modify | 0 | | ✓ | | | | ✓ | | | | NIE Networks | £2.7M | n/a | £2.7M | 0 | 2027 |
| Castlereagh 275 kV Redevelopment | Uprate/ Modify | 0 | | ✓ | | | | | ✓ | | ✓ | 1 | £24.6M | £2.1M | £22.5 M | -£11M | 2033 |
| Kells 275 kV Redevelopment | Uprate/ Modify | 0 | | ✓ | | | | | ✓ | | ✓ | 1 | £24.6M | £2.1M | £22.5 M | -£7M | 2031 |

| | | | DRIVERS | | | | NEEDS | | | | | | Project Cost | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Project Title | Type | km | New Connection | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | Stage (Part) | Total Cost | TSO | TO | Capex Change Since 2021 | ECD |
| Magherafelt 275 kV Redevelopment | Uprate/ Modify | 0 | | ✓ | | | | | ✓ | | ✓ | 1 | £24.6M | £2.1M | £22.5 M | +£13.5M | 2031 |
| Tandragee 275 kV Redevelopment | Uprate/ Modify | 0 | | ✓ | | | | | ✓ | | ✓ | 1 | £25.3M[64] | £2.1M | £23.2 M | -£2.7M | 2038 |
| North South 400 kV Interconnection Development ( TYNDP/ 81) | New Build | 137 (34)[65] | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | 3 | £119.2M [66] | £16.2 M | £103 M | 0 | 2027 |
| Moyle Interconnector Capacity Increase | New Build | 1 | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | 1 | £9.5M | £0.5M | £9M | +£2.3M | 2028 |

[64] Of which £2.1M is expected to be spent in the period of this TDPNI

[65] The total length is 137 km: 103 km in Ireland and 34 km in Northern Ireland

[66] Included in this amount are the costs associated with obtaining planning consent plus the cost of developing the new substation at Turleenan and the cost of looping the existing 275 kV double circuit overhead line into that new substation. The cost increase since 2019 is due to inflation. Final costs may change following NIE Networks procurement

Projects in Both Planning Areas:

There are 2 development projects that are in multiple Planning Areas; these projects are listed in Table B-4 below.

Table B-4 Planned Projects that are in Both Planning Areas (2 Projects)

| Project Title | Type | km | DRIVERS | | | NEEDS | | | | | Stage (Part) | Project Capex | | | Capex Changes Since 2020 | ECD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Security of Supply | RES Integration | Market Integration | Inter-Regional Power Flow | Local Constraints | Connection | Inter-connection | Asset Condition | | Total CAPEX | TSO | TO | | |
| CVT Upgrade for Harmonic Measurement | Uprate/Modify | 0 | ✓ | | | ✓ | ✓ | | | | NIE Networks | £0.7M | £0 | £0.7M | 0 | 2024 |
| Filter Tuning/Replacement | Uprate/Modify | 0 | ✓ | | | ✓ | ✓ | | ✓ | | 1 | TBC | TBC | TBC | TBC | ON HOLD |

# APPENDIX C: NORTHERN IRELAND PROJECTS IN EUROPEAN PLANS[67]

## How are Northern Ireland transmission projects included in ENTSO-E's TYNDP?

Licensed TSOs, who are members of ENTSO-E, and third-party promoters propose transmission projects to ENTSO-E for inclusion in ENTSO-E's TYNDP. If these projects match the project of pan-European significance criteria below, they are included in the TYNDP.

### Criteria for Inclusion in TYNDP

A project of pan-European significance is a set of Extra High Voltage assets, matching the following criteria:

- The main equipment is at least 220 kV if it is an AC overhead line or at least 150 kV otherwise and is, at least partially, located in one of the 34 countries represented within ENTSO-E;
- The project increases the grid transfer capability across a network boundary within the ENTSO-E interconnected network[68] or at its borders[69];
- The grid transfer capability increase (expressed in MW) meets at least one of the following minimums:
    - At least 500 MW of additional Net Transfer Capacity; or
    - Connecting or securing output of at least 1 GW/ 1000 $km^2$ of generation; or
    - Securing load growth for at least 10 years for an area representing consumption greater than 3 TWh/ year.

[67] For the avoidance of doubt, the term "Northern Ireland Projects in European Plans" refers to Northern Ireland projects in ENTSO-E's TYNDP and RegIP NS and Northern Ireland projects designated Projects of Common Interest.

[68] For example, additional Net Transfer Capacity between two market areas.

[69] That is, increasing the import and/or export capability of ENTSO-E countries in relation to others.

## SONI Projects in TYNDP 2022 and RegIP NS

Table C-1 below lists the Northern Ireland projects we proposed, that are in ENTSO-E's most recent final versions of TYNDP and RegIP NS. These were issued in 2022 respectively.

Table C-1 Our projects in European TYNDP 2022

| TYNDP No. | Project Title |
|---|---|
| 81 | North South 400 kV Interconnection Development |

## Northern Ireland Projects of Common Interest (PCIs)[70]

The European Commission (EC) oversees the designation of Projects of Common Interest (PCI). The PCI selection is a process separate from the TYNDP process. However, to be eligible for PCI status, inclusion in the last available TYNDP is an explicit condition. There are no Northern Ireland PCIs on the fifth PCI list. The list was published by the European Commission in November 2021 and is available here[71].

Previously the North South 400 kV Interconnection Development project was designated as a PCI. This has been removed in the 5th list.

The TEN-E Regulation is currently being amended. The draft text includes provisions for Projects of Mutual Interest (PMIs) between EU member states and third countries. The PCIs that were removed in the published 5th list will be re-evaluated after the updated Regulation enters into force and possibly qualify as PMIs.

## Northern Ireland e-Highway 2050 projects

The e-Highway 2050 is a study project funded by the EC aimed at building a development plan for the European transmission network from 2020 to 2050. The development plan supports the EU's overall policy objectives with regard to energy and decarbonising the European economy. Table C-3 below lists the Northern Ireland projects included in the e-Highway 2050 plan.

Table C-3 Northern Ireland projects in e-Highway 2050 plan

| TYNDP No. | Project Title |
|---|---|
| 81 | North South 400 kV Interconnection Development |

[70] https://ec.europa.eu/energy/topics/infrastructure/projects-common-interest_en?redir=1

[71] https://ec.europa.eu/energy/sites/default/files/fifth_pci_list_19_november_2021_annex.pdf

## How are Northern Ireland and European Plans related?

It is worth highlighting how the TDPNI and the European plans and designations are related. Figure C-1 below illustrates the relationship. All our capital projects, irrespective of size, are described in the TDPNI.

Only high voltage projects that involve a large increase in transmission capacity are included in European plans. Of those only a small number of large cross border projects which increase the import and/ or export capability of ENTSO-E countries are designated Projects of Common Interest.


Figure C-1 Relationship between Northern Ireland and European Plans

# APPENDIX D: REFERENCES

**Our Published Documents**


I. SONI Transmission System Security and Planning Standards, September 2015

II. All Island Ten Year Transmission Forecast Statement 2021-2030

III. All Island Generation Capacity Statement 2022 – 2031

IV. Shaping Our Electricity Future Roadmap 1.1, July 2023

V. Tomorrow's Energy Scenarios NI 2020, July 2020

VI. Tomorrow's Energy Scenarios System Needs Assessment NI 2020, June 2021

VII. Transmission Interface Arrangements, November 2021


**ENTSO-E Published Documents**


VIII. TYNDP 2022

IX. RegIP North Sea, 2020


**Local Legislation**


X. The Electricity Order (Northern Ireland) 1992 No. 231

XI. The Electricity Safety, Quality and Continuity Regulations (Northern Ireland) 2012

XII. Climate Change Act (Northern Ireland) 2022


**European Legislation**


XIII. Birds and Natural Habitats Regulations, 2021

XIV. Cross-border Exchanges in Electricity Regulation (EC) No 714/ 2009

XV. Environmental Impact Assessment Directive

XVI. Habitats Directive

XVII. Internal Market in Electricity Regulation 2019/ 943/ EC

XVIII. Internal Market in Electricity Directive 2019/ 944/ EC

XIX. Promotion of the Use of Energy from Renewable Resources Directive 2018/ 2001/ EC

XX. Energy Efficiency Directive 2012/ 27/ EC

**Utility Regulator Published Documents**

XXI. TSO Licence granted to SONI

XXII. Transmission Licence granted to NIE Networks

XXIII. NIE Networks RP6 Regulatory price Control, Utility Regulator, 2017

**Government Published Documents**

XXIV. Energy Strategy for Northern Ireland, 2022

**Other Published Documents**

XXV. NIE Networks RP7 Business Plan, 2023