Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Oct 2026

Project Reference Number

NPG_NIA_062

Project Registration

Project Title

HOTGROUND

Project Reference Number

NPG_NIA_062

Project Licensee(s)

Northern Powergrid

Project Start

October 2026

Project Duration

1 year and 2 months

Nominated Project Contact(s)

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Project Budget

£276,305.00

Summary

Whilst there is good anecdotal evidence that the climate affects the performance of underground cables, there is limited understanding of the relationship between ambient air temperature, soil type, soil moisture and the temperature at the cable soil interface. This project aims to quantify this relationship, to then couple susceptible soil types with climate projects in different region and thus provide evidence of how areas with underground cables may be disproportionately affected by climate change.

Third Party Collaborators

ENERGY INNOVATION CENTER

UNIVERSITY Of NEWCASTLE UPON TYNE

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

Climate change is increasing the frequency, duration, and intensity of heatwaves across Great Britain. While overhead networks are known to be sensitive to extreme temperatures, the impacts of prolonged hot and dry conditions on underground electricity distribution cables are poorly understood and not explicitly addressed in current asset management practices. Existing standards and planning assumptions typically rely on historical climate conditions and simplified soil parameters, providing limited insight into how soil drying, reduced thermal conductivity, and elevated ground temperatures interact to increase the risk of cable overheating and failure. As a result, Distribution Network Operators (DNOs) lack an evidence-based method to identify where future heat-related risks to underground assets are most likely to occur, limiting their ability to plan proportionate, cost-effective resilience measures for customers.

Method(s)

The overall aim of HOTGROUND is to develop a robust, evidence-based methodology for identifying future heat-related risk hotspots for underground electricity cables under a changing climate. The project addresses a significant knowledge gap around how rising air temperatures, prolonged dry periods, soil characteristics and soil moisture conditions interact to influence underground cable temperatures and asset performance.

The project will combine historical network fault data, underground cable asset information, climate observations and geotechnical datasets to establish relationships between heatwave conditions and underground cable performance. Data will be sourced from established datasets including underground asset records, fault histories, temperature and rainfall observations, soil moisture datasets, land cover information and geological data. These datasets will be integrated into a single analytical framework to support model development and validation.

A thermo-mechanical soil model will be developed and calibrated to translate environmental conditions into estimates of soil and cable interface temperatures for different soil types and moisture conditions. This modelling approach will improve understanding of how thermal conditions surrounding underground cables evolve during extreme weather events and how these conditions vary geographically.

The calibrated model will then be coupled with UK climate projections to assess how underground cable overheating risks may change under future climate scenarios. Simulations will be undertaken for future time horizons, including 2030 and 2070, enabling assessment of long-term resilience risks and the potential impact of climate change on underground electricity distribution assets.

The outputs from these analyses will be used to develop spatial risk maps identifying areas where underground cables may experience elevated future thermal stress. These hotspot maps will provide a practical decision-support tool for asset management, resilience planning and future network investment decisions. The project will conclude with a technical report that documents the methodology, findings, validation results, uncertainties and recommendations for future design, operational and asset management practices.

The methodology represents a novel application of climate science, geotechnical modelling and network asset analysis, providing a proactive and scalable approach for understanding climate-related risks to underground electricity networks and supporting more targeted, cost-effective resilience planning across Great Britain.

Scope

HOTGROUND will assess the future resilience of underground electricity distribution cables across the entire Northern Powergrid licence area by examining how climate change may alter the thermal environment surrounding buried assets. The project will focus on understanding the interaction between air temperature, rainfall, soil moisture, soil type and land cover, and how these factors influence underground cable temperatures and the risk of overheating.

The project will combine historic fault records, underground cable asset data, meteorological observations, soil moisture information and geotechnical datasets to establish evidence-based relationships between environmental conditions and cable performance. A thermo-mechanical soil model will then be developed and coupled with future climate projections to assess how thermal risk may evolve under future climate scenarios through to 2070.

A key project output will be the identification of geographical areas where climate change may create elevated overheating risks for underground cables. These hotspot assessments will be translated into spatial risk maps and practical recommendations that can support asset management, investment planning and network resilience strategies. The project will also provide an evidence base to inform future design standards, installation practices and operational decision-making for underground electricity networks.

The scope does not include physical intervention or modification of network assets. Instead, it is focused on developing a novel methodology, validated datasets and decision-support tools that enable network operators to proactively identify, assess and manage future climate-related risks. By improving understanding of underground cable vulnerability to extreme heat and prolonged dry conditions, the project will support more targeted and cost-effective resilience investment, helping maintain reliable electricity supplies for customers in a changing climate.

Objective(s)

The primary objective of HOTGROUND is to develop and validate an evidence-based methodology that identifies current and future climate-related overheating risks affecting underground electricity distribution cables. The project will improve understanding of how increasing temperatures, prolonged dry weather, soil characteristics and soil moisture conditions influence underground cable performance and long-term network resilience.

The project will collate and integrate historic underground cable fault data with environmental, geotechnical and climate datasets to establish relationships between heatwave conditions and asset performance. Using this evidence base, HOTGROUND will develop and test a thermo-mechanical soil model capable of estimating soil-cable interface temperatures under a range of environmental conditions.

A further objective is to combine the model with future climate projections to assess how underground cable thermal risks may evolve under future climate scenarios. This will enable forecasting of potential future vulnerability across the network and provide a stronger basis for long-term adaptation planning.

The project will also produce spatial risk mapping that identifies areas where underground cable assets may become more susceptible to overheating as climate change progresses. These outputs will support risk-based asset management, targeted resilience investment and more informed network planning decisions.

Ultimately, HOTGROUND aims to provide Northern Powergrid and the wider GB electricity sector with new knowledge, tools and methodologies that improve climate resilience, optimise future investment decisions and help maintain reliable electricity supplies for consumers in increasingly challenging environmental conditions.

Consumer Vulnerability Impact Assessment

Climate change is increasing the frequency, duration and intensity of heatwaves across Great Britain, creating new challenges for electricity network resilience. Vulnerable consumers are disproportionately impacted by extreme heat events, with older adults, particularly those aged 85 and over, young children, and individuals with underlying health conditions experiencing the greatest health risks. UK Health Security Agency evidence indicates that more than 10,000 deaths in the UK were associated with heatwaves between 2020 and 2024, demonstrating the growing societal impact of extreme temperatures.

At the same time, heatwaves can increase dependence on electricity as consumers rely more heavily on cooling technologies such as fans, air-conditioning systems, refrigeration equipment and electrically powered medical devices. For many vulnerable consumers, maintaining a secure electricity supply during periods of extreme heat is essential for health, wellbeing and safety.

HOTGROUND will support vulnerable consumers by improving understanding of how prolonged hot and dry weather conditions affect the performance of underground electricity cables. The project will develop an evidence-based methodology capable of identifying locations where underground assets may face elevated overheating risks under future climate scenarios. This will enable more targeted and proactive resilience planning, allowing network operators to prioritise investment and interventions in areas where supply interruptions are most likely to occur.

The outputs of the project will provide the capability to combine future climate risk assessments with customer vulnerability data, helping ensure that resilience measures can be prioritised where they deliver the greatest benefit. This supports a more risk-based and consumer-focused approach to network planning, improving the reliability of electricity supplies during extreme weather events and reducing the likelihood of disruption for those most dependent on continuous electrical services.

The project is not expected to create any adverse impacts for vulnerable consumers. Instead, it will generate new knowledge that supports long-term climate adaptation, strengthens network resilience and helps protect vulnerable households and communities from the increasing risks associated with extreme heat. By enabling better-informed asset management and investment decisions, HOTGROUND will contribute to maintaining reliable electricity supplies for all customers while providing particular benefits for those most affected by heat-related disruptions.

Success Criteria

- Delivery of a data repository that combines NPg underground cable assets, NaFIRS fault records and environmental datasets including soil type, land cover, rainfall, temperature and soil moisture (HADUK-Grid, Copernicus and BGS).
- Development of a thermo-mechanical model that translates ambient air temperature and rainfall into soil–cable interface temperatures for different soil types and moisture contents.
- Delivery of spatial “Hot-Spot” Risk Maps which highlight regions where the risk of faults resulting from underground cable temperatures are greatest.
- Delivery of final report which details the modelling approach, key findings, validation results, uncertainties and practical recommendations for design and operational standards

Project Partners and External Funding

School of Engineering, Newcastle University

Potential for New Learning

This project will deliver significant new learning for Northern Powergrid, the wider UK electricity sector and cross-sector infrastructure operators, in both methodology and application. Key new learning will include:

- A thermo‐mechanical soil model that translates weather conditions into soil–cable interface temperatures - This will introduce an innovative predictive tool for estimating subsurface thermal responses to heatwaves, supporting improved understanding of heat-related asset risks.
- Climate-Coupled Simulations for 2030 and 2070 to estimate future soil and cable temperatures - This will produce quantitative projections of future overheating risk, informing long-term planning, investment prioritisation and resilience strategy development.
- Generation of spatial 'hot‐spot' risk maps for underground cables - This will enable targeted resilience planning by identifying the most vulnerable soil and cable environments.
- Practical recommendations for design and operational standards - This will provide a clear evidence base for updating internal asset management practices and supporting future updates to national standards.

The combination of new learnings will set a new benchmark for proactive climate‐resilience planning for underground electricity networks. The methodology is scalable and will support future cross‐sector collaboration, particularly with infrastructure operators who also rely on buried assets sensitive to soil temperature and moisture.

Scale of Project

The Funding Licensee should justify the scale of the Project – including the scale of the investment relative to the potential benefits. In particular, it should explain why there would be less potential for new learning if the Project were of a smaller scale.

The scale of the project will include the entire Northern Powergrid licence area. The UK has one of the most varied geologies in the world and the factors that contribute to risk are likely to be quite spatially variable.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

Northern Powergrid licence area

Revenue Allowed for the RIIO Settlement

No funding has been provided within the current RIIO settlement that is expected to become surplus to requirements as a result of this project. HOTGROUND is developing a novel methodology to understand and assess future climate-related overheating risks to underground cables, and therefore does not duplicate any existing funded business-as-usual activity. The project seeks to generate new learning that will inform future asset management, resilience planning and investment decisions.

Indicative Total NIA Project Expenditure

The total NIA expenditure expected to be reclaimed for the HOTGROUND project is £276,305. This investment will fund the development of a novel methodology that combines climate projections, environmental datasets and thermo-mechanical soil modelling to identify future overheating risks to underground electricity cables and support long-term network resilience planning.

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The energy system transition requires electricity networks to remain resilient and reliable under a changing climate. As electrification of heat, transport and industry increases demand for electricity, network operators must better understand how climate-related risks could affect the performance and longevity of critical assets.

HOTGROUND will facilitate the energy system transition by providing a robust evidence base for understanding how increasing temperatures, prolonged dry periods and changing soil conditions may affect underground electricity cables in the future. The project will develop a novel methodology that combines climate projections with thermo-mechanical soil modelling to identify locations where underground assets may be at elevated risk of overheating as climate conditions change.

By enabling a more proactive and risk-based approach to asset management, the project will help ensure that future network investment is targeted where it delivers the greatest resilience benefits. This will support the efficient development of a climate-adapted electricity network capable of maintaining reliable supplies as electricity demand grows and weather patterns become more extreme.

The learning generated will improve understanding of future thermal constraints on underground assets, inform future asset specifications and installation practices, and support long-term network planning decisions. This will enable Northern Powergrid and other GB network operators to make better-informed investment decisions, reducing uncertainty and supporting a more resilient and efficient energy system.

The methodology is expected to be transferable across Great Britain, providing value beyond the Northern Powergrid licence area and supporting wider sector adaptation to climate change. By identifying future vulnerability before failures occur, HOTGROUND will help networks respond proactively to emerging climate risks, protecting consumers while supporting the reliable and resilient electricity infrastructure required for the transition to net zero.

How the Project has potential to benefit consumer in vulnerable situations:

Consumers in vulnerable situations are disproportionately affected by extreme heat events, making electricity network resilience increasingly important as the climate changes. Older people, particularly those aged 85 and over, young children, and individuals with existing health conditions are more susceptible to heat stress and associated health impacts. According to the UK Health Security Agency, more than 10,000 deaths in the UK were associated with heatwaves between 2020 and 2024, highlighting the growing public health challenge posed by rising temperatures.

During heatwaves, many vulnerable consumers become increasingly reliant on electricity to power fans, air-conditioning systems, refrigeration and essential medical equipment. Any interruption to electricity supplies during these periods can therefore have significant consequences for health, wellbeing and safety.

HOTGROUND will help address this challenge by improving understanding of how prolonged hot and dry weather affects underground electricity cables and the risk of asset failure. By identifying locations where climate change may increase overheating risks, the project will enable more targeted and proactive resilience planning, helping network operators prioritise interventions before failures occur.

The methodology and risk maps developed through the project will support evidence-based investment decisions that strengthen network resilience in areas of greatest climate-related risk. In the future, these insights could be combined with customer vulnerability data and Priority Services Register information to help ensure resilience measures deliver the greatest benefit to those most dependent on a reliable electricity supply.

By reducing uncertainty around future heat-related asset risks and supporting more effective resilience planning, HOTGROUND will contribute to maintaining secure electricity supplies during extreme weather events, providing particular benefits to vulnerable consumers who are most affected by heat stress and power interruptions.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved

n/a

Please provide a calculation and/or description of the expected benefits of the solution

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of how replicable the Method is across GB

Project is using data that is both available and applicable to all parts of GB, the results are likely to give a reasonable indication of increased risk in the UK in general; however, the method developed will be applicable to the whole of GB and once the datasets for the different DNOs are collated, the task of rolling out GB wide should be straightforward.

Please provide an outline of the costs of rolling out the Method across GB.

The methodology to be adopted by the project is applicable to all of GB, depending on how different the soil types are in other licence areas will influence the cost of a GB wide rollout. Producing climate profiles, soil moistures for different DNOs is straightforward; however, bespoke thermal-mechanical soil models may be required. A GB wide rollout will be less than the cost of this project.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

Involve Research, Development or Demonstration - Please select all that apply

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☑ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The learning generated through HOTGROUND will provide Network Licensees with a new evidence-based methodology for understanding and managing the impacts of climate change on underground electricity assets. The project will improve understanding of how soil type, soil moisture, rainfall patterns and increasing temperatures influence underground cable thermal performance, helping network operators better assess future climate-related risks.

The thermo-mechanical modelling approach and climate-risk assessment framework developed by the project can be applied by electricity distribution network operators across Great Britain to identify areas where underground cables may be exposed to elevated overheating risks under future climate scenarios. This will support more informed asset management, resilience planning and long-term investment decision-making.

The spatial hotspot risk maps produced by the project will help Network Licensees adopt a more targeted and risk-based approach to network resilience, enabling interventions to be prioritised where climate-related asset risks are greatest. This can improve the efficiency of future investment programmes, reduce the likelihood of heat-related asset failures and support the maintenance of reliable electricity supplies for consumers.

The learning will also inform future cable design practices, installation specifications, network planning assumptions and climate adaptation strategies. As the methodology is based on datasets and climate projections that are available nationally, it has the potential to be readily replicated and adapted across other licence areas, allowing the wider GB electricity sector to benefit from the project's findings.

Ultimately, HOTGROUND will reduce uncertainty around the future performance of underground cables in a changing climate and provide Network Licensees with practical tools to support proactive climate adaptation, improved network resilience and better outcomes for consumers.

n/a

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed. Networks must explicitly mention similar projects that they have considered and how these differ.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

Northern Powergrid has reviewed existing innovation activity across the electricity sector, including projects funded through NIA, NIC, LCNF and SIF mechanisms, and has not identified any project that specifically combines climate projections, soil moisture dynamics, geotechnical characteristics and thermo-mechanical modelling to assess future overheating risks for underground electricity distribution cables.

While a number of previous innovation projects have explored climate resilience, weather impacts on network assets and adaptation planning, these have primarily focused on overhead line performance, flooding risks, asset vulnerability assessments or broader climate adaptation strategies. HOTGROUND addresses a distinct challenge by focusing specifically on the interaction between extreme heat, soil drying and underground cable thermal performance.

The project's innovative element is the development of a methodology that integrates climate change projections with thermo-mechanical soil modelling to estimate future soil-cable interface temperatures and identify geographical hot spots where climate-related overheating risks may increase. To the best of Northern Powergrid's knowledge, this approach has not previously been developed or applied within the GB electricity network sector.

The project will utilise nationally available climate and environmental datasets, together with network asset and fault data, to generate new learning that can be replicated across Great Britain. Rather than duplicating existing work, HOTGROUND builds upon broader climate resilience research by addressing an identified evidence gap relating to underground cable performance under future climate conditions.

The outputs will provide network operators with new tools and evidence to support climate adaptation, risk-based asset management and resilience investment planning, creating knowledge that is complementary to, rather than duplicative of, previous innovation activities undertaken across the energy sector.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

To the best of Northern Powergrid's knowledge, no other Network Licensee has undertaken a project that specifically combines climate change projections, soil moisture analysis, geotechnical characteristics and thermo-mechanical modelling to identify future overheating risks for underground electricity distribution cables.

While other network innovation projects have investigated climate resilience, extreme weather impacts and network adaptation, these have generally focused on broader resilience assessments, flooding risks, overhead line performance or asset vulnerability studies. HOTGROUND addresses a distinct and currently underexplored challenge relating to the impact of prolonged heatwaves and changing soil conditions on underground cable performance.

Should similar climate adaptation projects be identified elsewhere in the sector, HOTGROUND remains differentiated through its focus on underground cable thermal behaviour, the development of a climate-coupled thermo-mechanical soil modelling methodology and the production of spatial hotspot risk maps that can directly support asset management and resilience investment decisions.

The project is intended to complement, rather than duplicate, existing innovation activities by addressing a recognised evidence gap in climate resilience planning for underground electricity assets. Any learning generated will be openly disseminated to support adoption and replication across other Network Licensees, maximising value for consumers across Great Britain.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

Project is coupling climate models with thermo-mechanical numerical model to produce future climate induced thermal profiles at the soil cable interface. To the best of our knowledge this is the first time this has been done in the UK for energy networks.

Relevant Foreground IPR

The project is expected to generate relevant foreground intellectual property in the form of an integrated dataset combining underground cable asset information, fault records, climate data, soil characteristics, land cover and soil moisture information, together with a novel methodology that integrates climate projections and thermo-mechanical soil modelling to assess future overheating risks to underground electricity cables.

The project will also generate spatial risk mapping techniques, modelling approaches and analytical processes that support climate resilience planning for underground electricity networks.

Background IPR may be required in relation to existing Northern Powergrid asset and fault data used to develop and validate the methodology. However, the foreground IPR created through the project will primarily relate to the new datasets, modelling framework, analytical methods and risk assessment outputs developed during project delivery.

Data Access Details

Data generated through the HOTGROUND project will be made available in accordance with Northern Powergrid's obligations under the RIIO-2 Network Innovation Allowance (NIA) Governance Document and the company's data sharing policies.

Interested parties may request access to project outputs, methodologies and non-confidential datasets through Northern Powergrid's innovation dissemination channels and data sharing processes. Where possible, project data will be anonymised, aggregated or de-sensitised prior to release to ensure compliance with data protection, cyber security and commercial confidentiality requirements.

Some datasets used within the project, including network asset records, fault histories, geospatial asset information and commercially sensitive operational data, may not be released where doing so could compromise network security, customer confidentiality or contractual obligations. In such cases, summary results, analytical methodologies, modelling approaches and key findings will be shared to maximise learning across the sector while protecting sensitive information.

The project will utilise a number of publicly available datasets, including climate, rainfall, soil moisture and geological data, which can be accessed directly from their respective data providers. Project reports, learning outcomes and technical recommendations will be published through the Smarter Networks Portal and other appropriate dissemination channels to support knowledge transfer across

the GB electricity sector.

Please identify why the Network Licensees will not fund the project as a part of it's business and usual activities

HOTGROUND is not a business-as-usual activity because it seeks to develop and validate a novel methodology that has not previously been used by Northern Powergrid or, to the best of our knowledge, elsewhere within the GB electricity sector. The project combines climate projections, soil moisture analysis, geotechnical characteristics and thermo-mechanical modelling to understand how future climate change may affect the thermal performance of underground electricity cables.

Current asset management and network planning practices are based primarily on historical operating conditions, standard design assumptions and established engineering approaches. There is currently insufficient evidence to justify incorporating climate-coupled thermal modelling of underground cable assets into routine network investment decisions. Significant technical uncertainty remains regarding the relationship between climate change, soil conditions and cable overheating risk.

The project involves research activities, specialist modelling development, large-scale data integration and the creation of new analytical techniques that extend beyond the scope of normal operational and asset management activities. The outcomes are uncertain and there is no guaranteed business case or operational benefit until the methodology has been developed, tested and validated.

As the project carries technical and delivery risks associated with developing an unproven methodology, it would not be appropriate to fund through business-as-usual allowances. NIA funding enables Northern Powergrid to undertake this exploratory research, generate sector-wide learning and evaluate the potential benefits before any future consideration of deployment within standard asset management practices.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the project

HOTGROUND can only be undertaken with support from the Network Innovation Allowance because it involves the development and validation of a novel methodology that carries significant technical, operational and investment risk, with uncertain outcomes and no guaranteed route to business-as-usual deployment at this stage.

The project seeks to address an emerging challenge associated with climate change by combining climate projections, environmental datasets and thermo-mechanical soil modelling to assess future overheating risks for underground electricity cables. While there is growing evidence that extreme heat and prolonged dry weather may affect underground asset performance, there is currently insufficient evidence to justify significant business-as-usual investment in this area. The project is therefore required to generate the knowledge, evidence and confidence needed before future operational or asset management decisions can be made.

The primary technical risk relates to the development and validation of a new modelling methodology capable of accurately representing the interaction between climate conditions, soil properties and underground cable temperatures. There is uncertainty regarding the strength of these relationships and the extent to which future climate scenarios will affect underground asset performance.

There are also operational risks associated with integrating multiple large datasets, including climate records, soil information, fault histories and asset data, and ensuring that the outputs are sufficiently robust to support network decision-making. In addition, there is uncertainty over whether the findings will identify clear geographic hotspots or whether additional research will be required before implementation.

From a commercial perspective, there is currently no established business case for undertaking this work through standard asset management activities because the benefits are long-term, strategic and sector-wide rather than linked to a specific asset intervention. Without NIA support, it would be difficult to justify investment in a research activity where the outputs, benefits and future deployment pathways remain uncertain.

NIA funding is therefore essential to enable Northern Powergrid to investigate this emerging climate resilience challenge, develop new learning for the benefit of the wider GB electricity sector and establish whether the methodology can support future risk-based investment and climate adaptation decisions.

This project has been approved by a senior member of staff

☑ Yes