Scottish & Southern Electricity Networks

TRANSMISSION

North of Beauly Dynamic Line Rating

Medium Sized Investment Project (MSIP) Submission

31st January 2023

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Contents

Executive Summary

Project Name	North of Beauly Dynamic Line Rating				
Project Reference	MSIP1002				
Investment Driver	Protection				
Start Year	2021				
End Year	2025				
Total Requested Allowances Estimate (£m 18/19)	£[redacted]				
Cost Estimate Accuracy (%)	-15% / +25%				
Project Spend to date (£m 18/19)	£[redacted]				
Current Stage Gate	Gate 2				
Spend Profile (£m 18/19)	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

In January 2022 we presented to Ofgem the case to develop and install a Dynamic Line Rating (DLR) system on the existing 275kV overhead line (OHL) from Beauly – Loch Buidhe and Loch Buidhe – Dounreay (the "North of Beauly DLR"). Ofgem approved the need for the North of Beauly DLR in October 2022, recognising that there was a need to mitigate network constraints ahead of planned reinforcement. This application therefore presents the current Class 2 estimate (-15% to +25%)[1] of associated project allowances for the approved North of Beauly DLR project. As agreed with Ofgem, we will provide an updated cost submission in May 2023.

Following approval of the project allowances, the DLR system will be installed by December 2023 and tested throughout 2024, leading to expected constraint benefits of up to [redacted] per year. The total requested allowance for this project is currently estimated at £[redacted], excluding operational expenditure (opex) costs which will be recovered through SpC 3.36 Opex Escalator. The requested allowances are made up of three main activities: DLR system costs, ANM costs and installation costs. The opex allowance of £[redacted] will be calculated through the Opex Escalator. This submission is being presented as part of the 2023 MSIP applications which have a cumulative value above 0.5% of ex ante average base revenue.

Since our January 2022 submission, we have continued to progress the project and further refine costs. Key activities over the last 12 months include:

- continued collaboration with the Met Office to define the optimal locations for the DLR sensor installation
- continued collaboration with the ESO to agree a process and method for data sharing with the ESO control room to ensure efficient operation of the DLR system

[1] Indicative cost estimate tolerance range

- preparations for the technology trial to determine the most appropriate sensor technology to deliver the required outputs for our network, which is now scheduled for January 2023.

Ahead of the technology trial in January 2023, our engineering team has conducted bench testing of the sensors to provide earlier insight into which technology will be most appropriate. This testing has suggested that conductor-mounted sensors could be most appropriate for the North of Beauly system and deployment environment. We will continue to test and monitor the range of sensor technologies available throughout the full trial beginning in January.

The findings of the technology trial will ultimately produce a whole system specification detailing the requirements of the DLR system which will inform our tender process, due to commence in March 2023. We expect to be able to provide an updated cost submission to Ofgem by May 2023, when fixed costs for the DLR sensors will be available. The updated cost submission in May 2023 will provide high-cost confidence evidence to allow Ofgem to complete its assessment. This approach minimises cost movements not only for ourselves, but also for consumers and mirrors the approach used in RIIO-T2 which led to Ofgem accepting the outturn cost of the refined procurement exercise.

We will continue to engage with Ofgem between now and our updated cost submission which should allow for an expedited review process in May 2023. In light of this, we anticipate a decision from Ofgem within three months of our updated cost submission.

1 Introduction

1.1 Scope

In accordance with Scottish Hydro Electric Transmission Plc's Special Licence Condition '3.14 Medium Sized Investment Projects Re-opener and Price Control Deliverable (MSIPRE)' we are submitting this reopener application in line with paragraph 3.14.6 (i) ii. 'system studies by the ESO or the licensee showing a need for DLR'. While the total cost of the project does not exceed the minimum threshold for MSIPs, this submission is being presented alongside other applications which have a cumulative value above 0.5% of ex ante average base revenue.

As agreed with Ofgem as part of our pre-submission engagement, this submission provides an initial view of the requested project allowances. We will be providing an updated cost submission by May 2023 with the final project allowances.

1.2 Structure and content of MSIP Submission

Section 2: Project Background

This section provides an overview of the project background, covering the approved need and preferred solution of the project.

Section 3: Cost information

This section includes evidence of expenditure justification, cost drivers, forecasting and mitigation whilst identifying the costing approach and rationale for each element of the project.

Section 4: Conclusion

This section provides summary detail of the selected option. It sets out the scope and outputs, costs and timing of investment. The conclusion clarifies the next steps and reiterates the critical timeline of the project and key milestones such as Ofgem's decision.

1.3 Requirement Mapping

The mapping within the document relates to the required cost information as set out in the Reopener Guidance document.

Licence and Guidance Requirement	Submission Section
Statement that costs (incurred or expected) exceed the Materiality Threshold, but are less than £100m	Section 3.1
Statement that costs are confined to those incurred or expected on or after 1st April 2021	Section 3.1
Explanation of the basis of the calculation any amendments requested to allowances	Section 3.2
Amendments requested to outputs, delivery dates or allowances	Section 4

Table 1: Submission mapping

2 Project Background

2.1 Background

A significant quantity (up to [redacted], an increase of [redacted] since our 2022 submission) of renewable generation is currently contracted to connect in the Caithness area of our network, north of Beauly substation, with the volume of renewable generation continuing to grow as we progress towards the UK and Scottish Government's net zero targets. In addition to onshore generation, there is a number of offshore wind projects connecting to the network north of Beauly through the ScotWind leasing round which will play a key role in achieving the UK Government's target of 50GW of offshore wind by 2030.

Connection of this new generation is contingent on the proposed reinforcement of the existing Beauly – Loch Buidhe and Loch Buidhe – Spittal 275kV OHL, which has a Required In-Service Date (RISD) of 2030. Ahead of this reinforcement, and due to the volume of renewable generation looking to connect in the mid-2020s, there is expected to be network constraints in the area from 2024.

Working closely with the ESO a number of minimal build solutions that could mitigate constraints ahead of the planned reinforcement were explored, resulting in the recommendation to proceed with a DLR system from Beauly – Loch Buidhe – Dounreay. DLR is an innovative solution which can increase the electrical current carrying capacity of OHLs, either as a retrofit or as part of new circuit builds.

2.2 Needs Case & Preferred Option Overview

We submitted our needs case submission as part of the January 2022 MSIP window, with Ofgem approving the need and the preferred solution in September 2022.

2.2.1 Need approval

In September 2022, Ofgem approved the need for the North of Beauly DLR[2]. Ofgem agreed that there was a need to mitigate network constraints ahead of planned reinforcement and agreed that of the solutions considered, the preferred option met this need.

The north of Beauly DLR submission was presented alongside our proposal to install a DLR system on the existing Skye 132kV circuit from Edinbane to Broadford, which is already experiencing constraints. The Skye DLR project was proposed to install and monitor DLR technology for the first time on our network to better understand the technology through monitoring of performance against active constraints. The primary aim of the project was to obtain technical and operational learnings which would ultimately inform the Beauly DLR project, as well as any future DLR systems that could be deployed on our network as business as usual.

Ofgem rejected the needs case for Skye DLR in October 2022. While Ofgem recognised the benefits that DLR systems could deliver to consumers through constraint mitigation, it did not consider that the potential lessons learned from the Skye DLR system were sufficient justification for funding its delivery. Ofgem's view was that the Beauly DLR system would provide the technical and operational learnings required to inform future DLR projects.

[2] Decision on SHET's 2022 MSIP submissions

2.2.2 Preferred option approval

Within our initial MSIP submission we provided information on the optioneering process carried out to determine the optimal solution. We carried out a high-level options assessment to determine the most appropriate solution, considering a range of minimum build solutions. Following the outcome of the ESO CBA, our preferred option was a combination of DLR along the Beauly to Loch Buidhe to Dounreay 275kV OHL, as well as line re-profiling of the Beauly to Loch Buidhe 275kV OHL.

The DLR system is to include two fleets of sensors, the locations of which have been identified through an assessment of the surrounding geographical topology and orography. Sensors will be placed at each identified pinch point, which is expected to be equivalent to 21 locations. One fleet of sensors will consist of weather sensors and the other fleet will consist of DLR sensors. These will be used to run two parallel systems to allow corroboration in defining OHL rating.

The DLR sensors will measure, rather than calculate, conductor sag and temperature. The limiting segment of the OHL will be identified and fed into the DLR control system. The DLR control system will therefore be provided with two ratings – one calculated (from the weather sensors) and the other directly input (from the line/tower mounted sensors). Only one rating is needed and therefore the DLR control system will have a built-in corroboration method for self-checking and to ensure only a predefined limit of divergence between the two methods occurs. Although initially the DLR ratings are planned to be transmitted to the ESO as a Rating Sheet, following a full assessment of operability, the DLR control system for North of Beauly will use ANM functionality. The ANM system will be able to directly communicate with generator schemes which could be of use if SSEN Transmission were to offer new generator schemes, or modify existing contracted connection arrangements, to provide additional network access based on the dynamic changes in OHL rating. However, this is a future option and a secondary use of the DLR system. The main objective is to mitigate network constraints and therefore enhance the ESO's ability to manage the B0 boundary.

Initially the DLR system will provide a feed to the SSEN Transmission Control Room where this will be collated and reported to the ESO in the form of a Rating Sheet to allow the ESO control room to act appropriately to manage constraints on the network. Following full assessment of the operation and limits of ANM, the process can be updated to use ANM for this communication. The DLR system will be capable of providing an updated OHL rating every 15 minutes, however the resolution that will ultimately be used for managing the system will be determined by the ESO. Initial discussions with the ESO to determine what resolution is feasible for use in the ESO Control Room at this present time have suggested that a day ahead schedule broken down into one-hour units will be most appropriate.

The future of DLR on our networks is expected to include an increase in rating resolution, possibly to within an almost live timeframe, and for a network containing a number of DLR systems to be managed by ANM.

An overview of the DLR system for north of Beauly is provided in Figure 1.

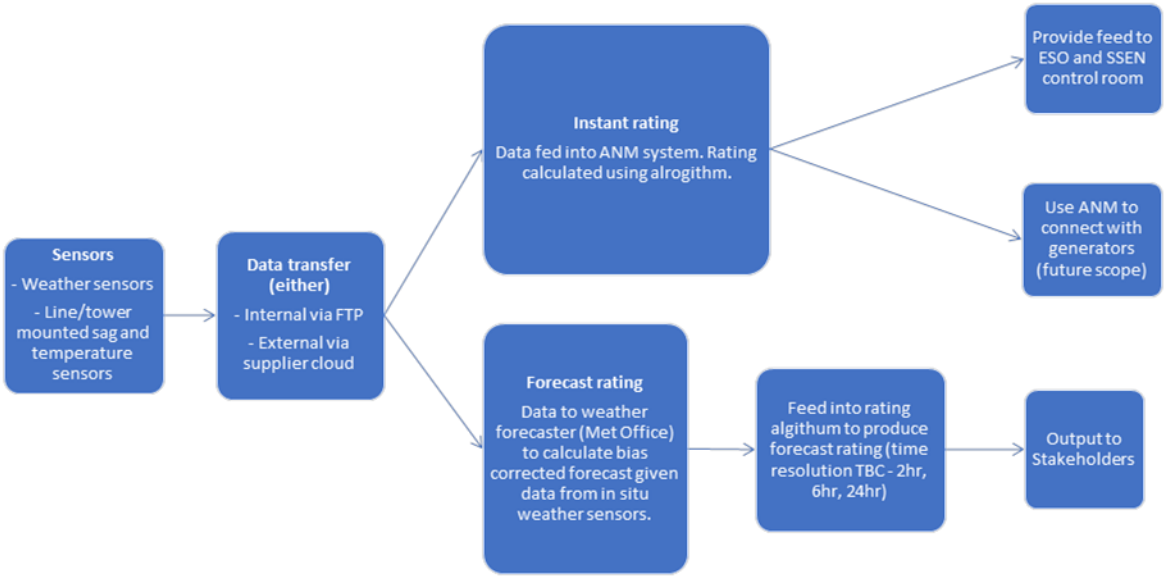

Figure 1: Overview of DLR System for North of Beauly

3 Cost Information

3.1 Costing Approach & Cost Breakdown

The total requested allowance for this project is currently estimated at £[redacted], excluding Closely Associated Indirect costs which will be calculated through SpC 3.36 Opex Escalator. As part of this MSIP submission we are therefore seeking full recovery for the capex costs, as detailed in Table 2. The costs set out within this submission only include costs incurred or expected to be incurred after 1 April 2021.

The Class 2 estimate includes for all pre-construction and construction costs. This has been developed and approved in full compliance with our Large Capital Project (LCP) Governance Manual (available on request).

Category	Requested allowances estimate (£m)	SSEN Transmission Project Cost Class	SSEN Transmission Indicative Estimate Tolerance	Supporting Documentation
Total	£[redacted]	Class 2	-15% / +25%	DLR_UM Submission Template

Table 2: Cost Breakdown

- The estimate has a Class 2 accuracy range from -15% / +25% based on the project status and scope maturity. Any material change in scope will result in the project cost estimate being updated accordingly.
- The estimate has been produced in line with our Costing Methodology and all principles contained therein adhered to.
- The final Class 3 estimate (-5/+10% accuracy) will be completed in March 2023 once all main construction contracts have been subject to competitive process and fully negotiated at Gate 3.

As agreed with Ofgem as part of pre-submission engagement, this submission sets out our initial view of requested allowances for the North of Beauly DLR project. We will aim to provide Ofgem with an updated cost submission by May 2023 when a Class 3 estimate will be available to inform the requested allowance for the project.

The general assumptions that have been made in developing the cost estimate are listed below:

- Cost Base: All costs are based on prices deemed to be 2018/2019 cost base unless stated otherwise.
- Due to current market volatility the cost estimate may be subject to price increases once tender returns are available from the supply chain.
- Opex costs (indirect & Network Operating Costs) are recovered through the Opex Escalator Mechanism and therefore we do not provide a breakdown of these costs.

Exclusions

The cost estimate which forms part of this submission excludes the following key items:

- Extreme weather events (meaning a worse than 1 in 10 probability for land-based activity, and equivalent provisions for marine-based activity).

- The imposition of additional terms or conditions of any statutory consent, approval or permission (including but not limited to planning consent).
- Movement of agreed outages by the System Operator.
- Changes in the project scope that could not have been reasonably anticipated during the assessment process.
- Foreign exchange (Fx), Metal Prices (LME) fluctuations are excluded at this time.
- Accommodation and Logistics.
- Any Public Road Improvements.
- DNO Diversions.

3.2 Procurement and Contracting Strategy

The works, goods and services outlined in Table 3 will be supplied via a combination of one-off regulated tenders and framework awards. A further explanation of each Work Package is provided below.

Work Package	Scope of Works	Quantities	Procurement Strategy
A	Dynamic Line Rating (DLR) System Trial	1 Trial	Request for Information via Find a Tender
B	DLR System	21 Units (DLR sensors) 21 Units (Weather Stations)	Regulated One Off – Competitive
C	Active Network Management (ANM) System	1 Unit	ANM Framework / Mini Competition

Table 3: Procurement of Works, Goods and Services

Work Package A – Pre-Market Engagement: DLR System Trial

Given the innovative nature of the DLR technology, we have approached the market to identify a range of different DLR technologies and allow these to be tested on the network in a trial to determine which type of technology meets the business's requirements. Using the information gained from completion of this trial, a whole system specification will be produced specifying the requirements of the DLR system. Our OHL specifications will be updated to include an option for DLR.

We undertook a Request for Information (RFI) via Find a Tender in December 2021. Five suppliers, covering a range of DLR sensor technologies, were identified through this exercise. A full Technical Authority review of the different suppliers and their respective DLR equipment was completed in May 2022. The five sensors will be taken forward to the trial which commenced in January 2023.

As per the Utilities Contracts Regulations, the trial will be conducted in a manner that allows and encourages the identification of a range of acceptable solutions or options. Processes will be in place to ensure avoidance of the development of relationships with any particular party which could hinder a fair and open process or limit competition. Any information gathered during such exercises will be shared with all interested parties at the stage of tender.

We discuss the different sensor technologies in further detail in Section 3.3. Ahead of the technology trial which began in January 2023, our engineering team conducted bench testing of the sensors to provide earlier insight into which technology will be most appropriate. This testing has shown that the conductor mounted type of sensor is most appropriate for the system and deployment environment.

Work Package B – DLR System Supply, Design and Install

The proposed Package B is to supply, design and install a DLR System which is capable of using local weather monitoring and conductor measurements to accurately determine the true real time rating of the conductor, therefore increasing the capacity to the circuit and alleviating the network constraints.

Input on the weather station specification was provided by the Met Office and suitable equipment has been identified. The weather stations will report live weather data from their location, and this will be input into the DLR control system.

Our current expectation is that the DLR system will be composed of 21 sensor units and 21 weather stations. The findings from the technology trial (Work Package A) will ultimately produce a whole system specification specifying the requirements of the DLR system which will inform the tender process. The competitive process must be robust, transparent and ensure equal treatment of potential bidders and protect information appropriately. A compliant EU regulated two-stage tender process (Prequalification and Invitation to Tender (ITT)) will be administered for all one-off contracts to provide the most economically advantageous solution for the consumer as it maximises the supply chain opportunities. Prequalification is currently planned for February 2023, and the ITT for March 2023.

Work Package C – ANM System

The proposed Package C is to supply, design and install an AMM System which measures the power flows at several measurement points on the network. The network is divided into zones which represent constraint points in the network and the system receives real time information from the measurement points.

[redacted] have installed a number of these ANM projects and therefore for the purposes of this submission, [redacted] have provided a cost estimate extrapolated from comparable completed projects and using the specific requirements of this DLR project. We will continue to engage with the wider supply chain ahead of the updated May 2023 submission to refine the ANM cost estimate as the specific requirements of the DLR scheme become more defined following the outcome of the technology trial.

Tender Evaluation Reports

We will prepare a detailed Tender Evaluation Report (TER) for all key contracts which describes the entire procurement process undertaken from inception to final recommendation. The TER is a mandatory SSE PLC governance requirement and captures a number of the key requirements tabled by the Regulator to justify the procurement process undertaken.

3.3 Cost Estimate Approach & Breakdown

The geographical location of Beauly, as well as this being the first time we have procured and installed a full DLR system, presents significant challenges during the development, planning, construction and operational phase.

The cost estimate for the different elements of the DLR system have been derived using a variety of sources. The table below identifies the costing approach and rationale for each of the main project activities. In the following sections, we provide further detail on how these costs have been derived.

Project Activity	Cost (£m)	Costing Approach	Ofgem Cost Certainty Category
DLR Trial	[redacted]	Actual Incurred Costs & Forecast Remaining	Fixed
DLR System	[redacted]	Internal estimate informed by DLR Trial RFI	Estimated
Installation	[redacted]	Internal estimate provided by Transmission Operations team	Estimated
ANM	[redacted]	Internal estimate from Flexible Solutions group	Estimated
Risk	[redacted]	RIIO-T2 Project Risk Allocation (8.2% of capex)	Estimated

Table 4: Cost breakdown

DLR sensor trial

There are two main types of technology available for DLR sensors; conductor mounted sensors (where sensors are installed directly on the OHL conductor) and tower/pole mounted sensors (where the sensor is installed on a transmission tower or wood pole). The primary measurement of a conductor mounted sensor is conductor temperature, vibration, angle of the conductor and LIDAR measurement to ground. The primary measurement of a tower mounted device is typically focused on the position of the conductor in space.

As set out in our 2022 submission, our plan was to trial a range of different DLR technologies and allow these to be tested on the network to determine which technology choice is best suited to meet the project's requirements. This will ensure that the technology and capabilities of the units deliver the required outputs for our network.

Ahead of the trial, we undertook a RFI with a number of DLR suppliers which provided us with a range of DLR sensor costs for different technology types. These are shown in table 5. Each supplier has provided a cost to purchase an individual unit.

Supplier	Technology type	Cost per unit [3]
[redacted]	Conductor mounted	£[redacted]
[redacted]	Conductor mounted	£[redacted]
[redacted]	Tower/pole mounted	£[redacted]
[redacted]	Conductor mounted	£[redacted]
[redacted]	Conductor mounted	£[redacted]

Table 5: Range of costs for purchase of a single sensor unit

[redacted] costs have been converted from Euro to GBP, while [redacted] has been converted from USD to GBP. A conversion rate of 0.8836 Euro to GBP and 0.816 GBP to USD has been used based on Information available on 17th January 2023 at 06:57 from Bloomberg.com.

The technology trial had been due to commence in September 2022, however due to delays in obtaining the necessary information from the supply chain and subsequent rescheduling of outages to install the sensors, the trial was initiated in January 2023. Ahead of the January 2023 trial, we carried out bench testing of the sensors to better understand the technology types. The bench trial has allowed for an initial judgment on device suitability to our network, as well as allowing operational staff to be trained in the fitting of devices.

In January 2023 the sensors were installed on a live circuit, which allows us to immerse the sensors in a real-world scenario and draw conclusions on accuracy, durability, reliability and maintainability. This will provide us with the knowledge to produce a specification for the DLR sensor device required to go to tender. It is expected that we will be able to draw initial conclusions from the full technology trial within three months in time to inform the ITT, with our knowledge being further strengthened within the trial year.

DLR system

We will continue to test and monitor the range of sensor technologies available throughout the full trial which began in January 2023, however the initial bench testing has suggested that the conductor mounted sensor technology could be most appropriate for the North of Beauly system and deployment environment. For that reason, our cost estimate is based on this technology type. While we will be issuing an ITT to ensure there is a fair and open process, we have based our current cost estimate on the [redacted] conductor mounted sensor given that it provides the technology that will most likely form the basis of the whole system specification specifying the requirements of the DLR system which will inform the tender process. From discussions with the supplier, we are aware that procuring multiple sensors would likely result in a bulk order discount and this has been reflected in the cost estimate.

The weather station costs have been informed by studies from the Met Office, as described in section 3.3. Suitable equipment has been identified and the costs estimated from purchase of similar unit from [redacted] for another Large Capital Project.

The table below provides a summary of the unit cost associated with each component of the DLR system and the total cost based on a bulk order for the number of units required. As explained, our current estimate for the DLR sensor unit is based on the cost of the [redacted] conductor mounted sensor. The unit cost presented in table 8 includes a bulk order discount from the supplier based on the requirement to purchase 21 units for the full DLR system.

Equipment	Unit Cost	Number of Units	Total Cost
DLR Sensor Units	£[redacted]	21	£[redacted]
Weather Station	£[redacted]	21	£[redacted]

Table 6: Summary of DLR system costs

Installation

The installation of the DLR equipment will be delivered in-house by our Transmission Operations team. The cost estimate for this activity has been created with consideration given to the location of the specific towers, numbers of field personnel required, types of field personnel required, equipment needed, transportation needed and consideration of outage durations. This knowledge and level of detail provides greater accuracy and cost confidence of the estimate, as regional and site-specific factors can be incorporated. It should be noted that this is our current estimate; we are aware that labour costs could increase (potentially around 10-15%) ahead of our updated cost submission in May 2023 due to inflation labour rates.

The labour costs associated with the installation are taken from our approved charging statement which sets out the day rate for specific roles within SSEN Transmission. The DLR installation works will be delivered over 2 planned outages by two teams, each made up of 4 linespeople, a Site Foreman and Engineer and 3 further outages with an Engineer 2 Foremen and 4 linespeople. We have provided the detailed estimate as part of the supplementary information which provides a breakdown of the costs.

Section	Duration	Labour Cost *	Plant Cost	Total
BYL-FYL	5 Days	[redacted]	[redacted]	[redacted]
DNG1	5 Days	[redacted]	[redacted]	[redacted]
LT1	4 Days	[redacted]	[redacted]	[redacted]
NGU1	3 Days	[redacted]	[redacted]	[redacted]
TD1	3 Days	[redacted]	[redacted]	[redacted]
Total	**20 Days**	[redacted]	[redacted]	[redacted]

Table 7: Summary of installation costs

It should be noted that the estimate includes overtime provision for anti-social hours required to minimise outage disruption to customers when delivering this project. We have benchmarked these costs against market information to ensure these are efficient and provide further information on the benchmarking of costs against market in section 3.4.

Active Network Management (ANM) System

The design, build and installation of the ANM system is expected to be performed by [redacted]. For the purposes of this submission [redacted] has provided an initial estimate for this activity at £[redacted]. This cost estimate for this activity has been created with consideration to the expected operation, need for testing and potential integration into other Transmission and ESO systems. We expect to further refine this cost estimate through engagement with the wider supply chain team ahead of the updated cost submission in May 2023.

3.4 Project Benchmarking & Metrics

Due to the innovative nature of the project and that we have not embarked on a full DLR system project previously, we have been unable to benchmark the current DLR unit estimate against internal or regulator cost metrics. However, the updated costs in May 2023 for the DLR system will be based on the competitive tender process described in section 3.2. The outcome of this process will be high-cost certainty and the most economic and efficient cost for consumers. This means that all of the main packages of work will have an efficiency benchmark applied, as shown in Table 8, providing Ofgem with the high-confidence evidence required to complete its assessment of requested allowances.

Project Activity	Efficiency benchmark
DLR system	Competitively tendered and high-cost confidence
ANM	Benchmarked against [redacted] projects
Installation	Benchmarked against independent contractor rates (as shown in table 9).
Risk	RIIO-T2 benchmark

Table 8: Installation cost benchmarking

We are able to benchmark our installation cost estimate, as shown in Table 9. It should be noted that this is based on our current estimate; we are aware that labour costs could increase (potentially around 10-15%) ahead of our updated cost submission in May 2023 due to inflation labour rates.

Resource	Cost Estimate Rate	Balfour Beattie Rate	OMSI Rate	Siemens Rate	Efficiency against benchmark (%)
Engineer	[redacted]	[redacted]	[redacted]	[redacted]	13%
Foreman	[redacted]	[redacted]	[redacted]	[redacted]	11%
Linesman	[redacted]	[redacted]	[redacted]	[redacted]	9%
Prelims	0%	28%	28%	30%	N/A
Fee	0%	12%	15%	15%	N/A

Table 9: Installation cost benchmarking

3.5 Risk

The North of Beauly Dynamic Line Rating project is managing risk in accordance with ISO31000, the International Standard on Risk Management, and the agreed SSE Large Capital Projects (LCP) Governance Manual and requirements therein.

The Project has a Risk Management Plan that sets out the approach and process the Project will use to manage risk (threats and opportunities) over the lifetime of the Project.

Within the Risk Management Plan are the key risks (threats and opportunities) the project faces, the risk process that the project will follow to manage risk, project teams roles and responsibilities in respect of managing risk, and that the Project is using KERIS, the SSE LCP Risk Management Information System (RMIS) for managing risk on the project.

KERIS will act as the repository for all project risks (threats and opportunities) as it allows the users to create and assess all risks, impact assess these risks and track mitigating risk actions through to successful closure. All risks and actions are assigned owners who are then accountable for updating the KERIS system. Risk owners can simultaneously access the RMIS, that is an ongoing project activity to ensure that risk data is captured, up to date and can be used to support project decision making. To supplement the ongoing updates to the RMIS, the North of Beauly Dynamic Line Rating project team holds strategically timed risk workshops to collectively review and challenge the Project Risk Register ahead of each key gate stage.

The development of the project risk register follows the LCP Governance Gated Process in the Manual, and the risk register is a live document that evolves through continuous updates and contributions from the project team over the life of the project.

Risk will be reviewed by the Project Manager with:

- Updated reports detailing the status of Risks and Actions to highlight risks/ actions requiring attention; and
- Monthly report, showing risk progress (new risks, opportunities, new actions, and closed items); risk gaps, usage, quality of the information being recorded and where the risk focus needs to be going forward for the Project.

The risk value represented (8.2% of project costs) is calculated by the same methodology as detailed and substantiated in our RIIO-T2 Business Plan Submission. A risk register for North of Beauly DLR has been provided in the supplementary evidence.

4 Project Delivery & Price Control Deliverable

The project is managed using the SSEN Transmission Large Capital Project governance framework which ensures that the project is governed, developed, approved and executed in a safe, consistent and effective manner. As part of this governance a project programme and Project Development Plan are used to guarantee sufficient resources are in place, reporting mechanisms are present and a clear event schedule is followed. We have provided these documents as listed in Appendix B.

The introduction of a technology-based Price Control Deliverable (PCD) will be most appropriate for this project as the output is dependent on the annual variability of wind.

We propose that the PCD for this project is: *"installation of a DLR system from Beauly to Loch Buidhe and Loch Buidhe to Dounreay consisting of weather and line mounted sensors."*

Our current programme is based on installing the DLR system by December 2023, with the project being fully complete in 2024 following 12 months of testing before the system is fully operational. As the project is due for completion in 2024/25 financial year, we are currently proposing that the PCD delivery date is set for 31st March 2025. We will look to confirm the proposed PCD in the May 2023 update to reflect any changes that may materialise following completion of the technology trial, as well as further engagement with the supply chain and Ofgem.

North of Beauly DLR Spend Profile	Delivery Date	21/22	22/23	23/24	24/25	25/26	Total
	31st March 2025	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 10: North of Beauly DLR PCD Spend Profile

5 Conclusion

In September 2022, Ofgem approved the need for the North of Beauly DLR recognising the need to mitigate network constraints ahead of planned reinforcement. This submission presents the associated project allowances to develop and install a DLR system on the existing Beauly – Dounreay 275kV OHL circuit.

Since our submission in January 2022, we have continued to progress the project and further refine our cost estimate. The key activities undertaken to further develop and refine our cost estimate include the preparations and initiation of the technology trial which has, to date, allowed us to perform bench testing on a range of sensors to provide earlier insight into which technology will be most appropriate for the North of Beauly DLR system. This testing has suggested that conductor mounted sensors are expected to be the most appropriate for the system and deployment environment, and therefore we have used conductor mounted technology choice to inform our cost estimate. These costs will be subject to change following our procurement activities in Q1 2023. We will provide an updated cost submission in May 2023.

Therefore, the current estimate of RIIO-T2 allowances requested for this project is £[redacted], with the opex allowance of £[redacted] being provided through the Opex Escalator mechanism.

Next steps

Following submission of this MSIP application, we will continue the technology trial which began in January 2023 where the DLR sensors were installed on a live circuit and immersed in a real-world scenario. We will continue to monitor the sensor technologies and ultimately the findings from the trial will be included in the specification for the ITT, which is currently scheduled for March 2023. We will continue to engage with the ESO to fully define and document the rating schedule communication process.

We expect to be able to provide an updated cost submission to Ofgem by May 2023 when we will have fixed costs for the DLR sensors. Following this updated cost submission, we anticipate a decision from Ofgem three months.

Appendix A Glossary of terms

Acronym	Definition
DLR	Dynamic Line Rating
OHL	Overhead line
ESO	Electricity System Operator
CBA	Cost Benefit Analysis
ANM	Active Network Management
LCP	Large Capital Project
RFI	Request for Information
ITT	Invitation to Tender

Appendix B List of supplementary documents and evidence

Title	Description
North of Beauly DLR Programme	Programme of key milestones for the North of Beauly DLR project
North of Beauly DLR Keris Risk Output	Risk register of current risks for the North of Beauly DLR project.
DLR_UM Submission Template	The accompanying uncertainty mechanism submission template based on the estimated costs for North of Beauly DLR.