SP Electricity North West

NIA ENWL043

VOLT: Visual Overhead Line Tracking

Progress Report

July 2026

Version History

Version	Date	Author	Status	Comments
1.1	03/07/2026	Martin Tejada	Final	Comments addressed and updated
1.0	26/05/2026	Martin Tejada	Draft	

Review

Name	Role	Signature
Geraldine Paterson	Innovation PMO Manager	G Paterson
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Approval

Name	Role	Signature & Date
R Moulton	Head of Innovation	R Moulton – 28 July 2026

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Glossary of terms

Acronym	Description
AAE	Atypical Air Environment
BAU	Business as usual
BVLOS	Beyond Visual Line of Sight
CAA	Civil Aviation Authority
CI	Customer Interruptions
CML	Customer Minutes Loss
CVA	Cost Value Analysis
DIB	Drone-in-a-box
DNO	Distribution Network Operator
EU	European Union
GB	Great Britain
GIS	Geographic Information System
GRA	Ground Risk Assessment
IPR	Intellectual Property Rights
LTE	Long-Term Evolution
MOD	Ministry of Defence
OHL	Overhead Line
PoC	Proof of Concept
RTK	Real-Time Kinematic
SME	Subject Matter Expert
TRL	Technology Readiness Level

SP Electricity North West

1. Project fundamentals

Project title	*VOLT – Visual Overhead Line Tracking*
Project reference	*NIA_ENWL_043*
Funding licensee(s)	Electricity North West Limited
Project start date	October 2025
Project duration	0 years and 4 months Updated July 26: to 0 years and 11 months (Sep 26)
Nominated project contact(s)	Martin Tejada

2. Project background

SP Electricity North West (SP ENW) operates a geographically extensive overhead line (OHL) network spanning over 12,000 km, much of which is in rural and hard-to-access areas. Maintaining network reliability across this dispersed infrastructure presents ongoing operational challenges, particularly in relation to fault identification and routine asset inspection. Traditional approaches rely heavily on ground-based patrols and manual inspections, which can be resource-intensive, time-consuming, and constrained by access limitations, especially during adverse weather events.

When faults occur, rapid identification of their location and root cause is critical to restoring supply and minimising customer impact. However, current processes often involve dispatching field teams with limited prior situational awareness, which can lead to delays in diagnosis and extended outages. These challenges are exacerbated during storm events, where access to affected assets may be delayed due to flooding, debris, or road closures, reducing visibility for field engineers and increasing fault clearance times.

Recent advancements in unmanned aerial systems, combined with an evolving regulatory landscape, have created new opportunities to address these challenges. In particular, Beyond Visual Line of Sight (BVLOS) drone operations enable remote, rapid, and repeatable inspection of network assets, as well as the identification of fault locations and causes over long distances.

Project VOLT aims to assess the feasibility and potential value of integrating BVLOS drone operations into SP ENW's network operations. The project focuses on evaluating the technical, operational, and regulatory requirements needed to enable scalable deployment of drone-based inspection workflows. In doing so, it will determine how these capabilities can enhance fault response, enable more proactive asset management, and improve network resilience, particularly for customers in remote or vulnerable situations.

3. Project scope

Project VOLT will assess the feasibility and value of BVLOS drone operations to benefit both customers and Distribution Network Operators (DNOs). Based on real locations and data from the SP ENW licence area, the project will compare different types of operations, including but not limited to rapid storm response, Drone-in-a-Box (DIB), vegetation encroachment monitoring, and integration with SP ENW fault detection technologies, to identify where the greatest value can be delivered.

Project VOLT is being delivered as a desktop study, including a comparison of drone operations and identification of the areas where these solutions could provide the greatest impact. The project also includes a regulatory landscape assessment, reviewing UK regulations and enabling mechanisms for BVLOS operations, alongside a comparison with EU policies. The findings will be consolidated into a strategic roadmap outlining next steps and implementation recommendations.

The project is expected to deliver benefits to GB customers across 3no key areas:

Financial:
- Reduce Customer Interruptions (CI)/ Customer Minutes Lost (CML) penalties by decreasing fault response times
- Reduce CI/CML penalties through proactive maintenance, preventing faults from occurring

Operational:
- Reduce downtime following storms or faults by enabling faster fault identification

Social:
- Provide quicker support to customers in remote areas

The project is structured around 4no work packages, covering technical feasibility, regulatory review, GIS analysis, and use case development. These will culminate in a final report summarising the outcomes of the study and providing clear recommendations for next steps.

4. Objectives

The project aims to:

1. Assess the technical viability of BVLOS Drone Operations in SP ENW license area
2. Assess the economic impacts and benefit of BVLOS Drone Operations in SP ENW license area
3. Review regulatory and compliance considerations
4. Provide recommendations and roadmap for potential futures trials and operational deployment

5. Success criteria

- **Workshop & Summary.** Collaborative session between SME's from both SP ENW and Skyports to share knowledge and explore other possible solutions for BVLOS Drone operations
- **GIS Analysis.** A spatial assessment of SP ENW's network using GIS to identify areas suitable for BVLOS deployment, associated risks, and zones with regulatory constraints.
- **Regulatory Landscape focus area.** Detailed review of UK BVLOS regulations, enabling mechanisms, and EU policy influences, with guidance on regulatory engagement and pilot PoC requirements.
- **Use Cases & Final Report.** A strategic roadmap summarising finding, commercial viability, and prioritised BVLOS use cases with feasibility rankings and implementation recommendations.

6. Performance compared to the original project aims, objectives and success criteria

Formal project commencement was delayed until May 2026 due to finalising contracts; however, some effort was expensed by SP ENW and the project partners prior to contract signature. Initial work has been based on publicly available information which will be refined and validated with SP ENW network specific data.

A project extension has been made on the Smarter Networks Portal to accommodate these delays, and this report also includes progress from 31 March to July 2026.

Despite the early delays, the project's original aims, objectives, and success criteria remain unchanged and continue to guide delivery.

The initial findings of the feasibility study identified priority use cases, assessed their viability, and initially quantified potential benefits of BVLOS drone deployments.

6.1. Key Technical and Operational Learnings

The research showed that BVLOS drone operations are technically feasible across a large proportion of the SP ENW network. GIS analysis has shown that most overhead line assets can be accessed under current regulatory and operational constraints, with up to 67% of the network potentially serviceable from substation-based deployment models.

The analysis showed that drones could significantly improve operational response times, reducing fault identification time, indicating that drone-enabled workflows could materially improve network performance and reduce customer impact.

6.2. Limitations, Risk and Regulatory Implementation Challenges

One of the key learnings from the project is that the regulatory environment remains one of the main constraints to large-scale drone deployment. While frameworks such as BVLOS AAE provide a viable pathway, approvals are still location-specific and require detailed justification.

The project also identified challenges related to airspace constraints, including restricted airspace and military areas, which would require early engagement with stakeholders such as the Civil Aviation Authority (CAA) and Ministry of Defence (MoD) to enable operations in the vicinity of these areas.

Additional limitations include the Ground Risk Assessment (GRA) which prohibit drone operation in densely populated areas, limiting drone usage to remote countryside and remote locations. Which brings another challenge on its own, Long-Term Evolution (LTE), commonly known as 4G Cellular Network, coverage.

Although LTE coverage would vary in different sections of the network, and in overall in the SP ENW network the LTE coverage is strong, there are localised areas with weak or no signal, particularly in regions with complex terrain. These coverage gaps can lead to potential loss of connectivity, requiring additional infrastructure such as Real-Time Kinematic (RTK) relay stations to maintain control and ensure operational resilience and safety. As a result, LTE limitations increase deployment complexity and require careful planning to avoid restricting operational capability.

Additionally, drone corridors present an implementation challenge for BVLOS operations. Current regulatory frameworks often require flights to follow predefined routes closely aligned with linear infrastructure, such as overhead lines, which can restrict flexibility in flight planning. Corridor-based operations may also require separate approvals for each route, making large-scale deployment more complex and time-consuming. In areas where overhead line continuity is not maintained, establishing viable corridors becomes more challenging, potentially requiring regulatory adaptations such as route smoothing or the introduction of additional infrastructure. As a result, while drone corridors support safe and structured operations, they also introduce constraints that must be carefully managed to enable scalable deployment.

These findings highlight that regulatory engagement, and airspace coordination must be treated as core activities in future projects, rather than supporting tasks. Achieving scalable BVLOS deployment will depend not only on technical capability, but also on the ability to proactively navigate regulatory requirements, secure timely approvals, and coordinate with key stakeholders. As such, early and continuous engagement, combined with a clear strategy for addressing regulatory, infrastructure, and operational constraints, will be essential to enable wider rollout and realise the full benefits of drone-based solutions.

6.3. Next Steps

We will collect input and feedback from internal Stakeholders within the company, this input added to the report finding will serve as the foundation for a PoC development. This proposed PoC shall focus on deploying DIB BVLOS drone operations in a defined geographic area to validate the operational model under “real-world conditions”.

The PoC should prioritise high-value use cases such as responsive fault finding and storm response. As part of the project a section of the SP ENW licence area using 4no substation, was used to simulate DIB deployment and estimate potential benefits. This same area could be used for a PoC trial location.

The PoC trial should aim the following objectives:

1. Demonstrating regulatory compliance through successful authorisation and operation
2. Validating operational workflows between drone operators and SP ENW teams
3. Quantifying improvements in fault response times and customer impact
4. Assessing the scalability of the solution across a wider network

However, large-scale rollout will depend on further regulatory development, successful demonstration through PoC trials, and the ability to integrate drone operations into existing business processes.

7. Required modifications to the planned approach during the course of the project

The initial approach to the project included an early workshop with key SP ENW personnel to collect feedback on current drone operations, including pain points, costs, and limitations, and to identify which challenges could be addressed or supported by drone solutions.

Due to the contractual delays abovePerformance compared to the original project aims, objectives and success criteriathe timing and focus of the project workshop was amended, the workshop will now take place at the end of the project and will be used to review and validate the findings, assumptions, and proposed solutions presented in the final report.

This modification meant that early-stage stakeholder input was limited compared to the original plan. However, the project partner was able to progress the core analysis and report development using available information, ensuring that delivery timelines were maintained.

Although this approach was not ideal, it represented reasonable compromise. The close-down workshop will therefore focus on refining and confirming the outputs. Overall, this adjustment has not impacted the project objectives or expected outcomes, and the revised approach continues to support delivery of the intended learning.

8. Lessons learned for future projects

The outputs and learning from this project have provided the confidence and the basis for the next phase of the research. SP ENW are currently scoping a second phase to trial the use of drones as part of our fault response.

9. Data access & quality details

The data used for the initial analysis for this report can be found in SP ENW Open Data repository on the following link: SP ENW - GIS - Control Areas — SP Electricity North West.

SP ENW's CI and CML cost used for the evaluation of the Cost Benefit Analysis (CBA).

10. Foreground IPR

No foreground intellectual property rights (IPR) have been generated during the course of this project. All outputs are limited to research findings and analysis.

11. Standards documents

Not applicable.