

QUEST

An overarching control system

electricity
north west
Bringing energy to your door

OVERARCHING CONTROL SYSTEM

QUEST



QUEST Project Progress Report 4

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Project Partners

NESO
National Energy
System Operator

FUNDAMENTALS
smarter
gridsolutions

Schneider
Electric

IMPACT
FROM INSIGHT TO INFLUENCE

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Glossary

| Acronym | Description |
|--------------|---|
| ADMS | Advanced Distribution Management System |
| ANM | Active Network Management |
| AVC | Automatic Voltage Control – the systems that regulate system voltage at the transforming points on ENWL network |
| BaU | Business as Usual – refers either to business-as-usual deployment of QUEST following successful trials or current process impacted by QUEST |
| CB | Circuit Breaker |
| CI | Customer Interruptions |
| CID | Curtailment InDex- Refers to the permissible amount of curtailment applied to a DER before DNO incurs penalty, the exact amount of which is laid out in the connection agreement. |
| CML | Customer Minutes Lost |
| CT | Current Transformer |
| DER | Distributed Energy Resource |
| DERMS | Distributed Energy Resources Management System |
| DG | Distributed Generation |
| DBF | Demand Boost Full (CLASS Function) |
| DRF | Demand Reduction Full (CLASS Function) |
| DNO | Distribution Network Operator |
| DNP3 | Distributed Network Protocol 3 |
| EMS | Energy Management System |
| ENWL | Electricity North West Ltd. |
| FAT | Factory Acceptance Test |
| GSP | Grid Supply Point |
| ICCP | Inter-Control Centre Communications Protocol |
| IEC | International Electrotechnical Commission standards |

| Acronym | Description |
|----------------|---|
| IED | Intelligent Electronic Device |
| IIS | Interruption Incentive Scheme - regulatory performance incentive scheme based on CI and CML |
| ISMS | Information Security Management System |
| LCT | Low Carbon Technologies |
| LL | Load limiting (CLASS Function) |
| LOM | Loss of Mains |
| MOL | Merit Order List |
| MOMS | Merit Order Management System |
| NIST | National Institute of Standards and Technology |
| NMS | Network Management System |
| OT | Operational Technology |
| PFR | Primary Frequency Response (CLASS Function) |
| RBAC | Role Based Access Control |
| RTS | Real Time Systems |
| RTU | Remote Terminal Unit |
| SCADA | Supervisory Control and Data Acquisition |
| SE | Schneider Electric |
| SFR | Secondary Frequency Response (CLASS Function) |
| SGS | Smarter Grid Solutions |
| SIEM | Security and Information Event Management |
| SWBD | Switch Board |
| TSF | Tap Stagger Function (CLASS Function) |
| UI | User Interface |
| VT | Voltage Transformer |

1. Executive summary

1.1 The Project

For the purposes of this report, the following definitions apply:

- i. “project” refers to the NIC funded project to prove the system
- ii. “QUEST” refers to the overarching system including the necessary IT infrastructure
- iii. “Optimisation Software” refers to the software set up to enable QUEST

The project started in April 2021 and the finish date is December 2025. It will identify and trial novel methods to holistically integrate multiple, concurrent system voltage control and optimisation techniques across the whole distribution system. The method will be integrated into the NMS (Network Management System), thus providing the full co-ordination needed to unlock the available benefits.

In addition, the new holistic voltage control methodology will:

- Ensure the network operates as efficiently as possible, optimising the system voltage to connected customers and minimising losses.
- Further boost the benefits available from existing voltage management techniques.
- Facilitate the increased connection and use of LCTs.
- Maximise benefits to all customers through demand reduction at High Voltage (HV) and Low Voltage (LV).
- Explore the potential of reactive power absorb in supporting NG flexible services.

By providing a means of command arbitration, the optimisation software will ensure that potential clashes are avoided, and overall benefits are maximised through co-ordination of previously discrete techniques. Furthermore, the project will provide a solid foundation upon which issues associated with conflict resolution, i.e., independent activation of Distributed Energy Resources (DERs), can be addressed.

The project will explore the co-ordinated operation of voltage management techniques to enable a reduction of the built-in operating margins, creating capacity for our customers. The project will also develop and introduce a distribution network-wide, fully co-ordinated, overarching system to manage voltages, with an appropriate balance between centralised and decentralised control hierarchy. It will also allow for network forecasting for the different voltage control techniques by implementing an operational digital twin of the trial network to ensure network objectives are fulfilled, for example, compliance within settlement services.

The project will be delivered using the Whitegate GSP geographical network area (Appendix G).

1.2 Project progress

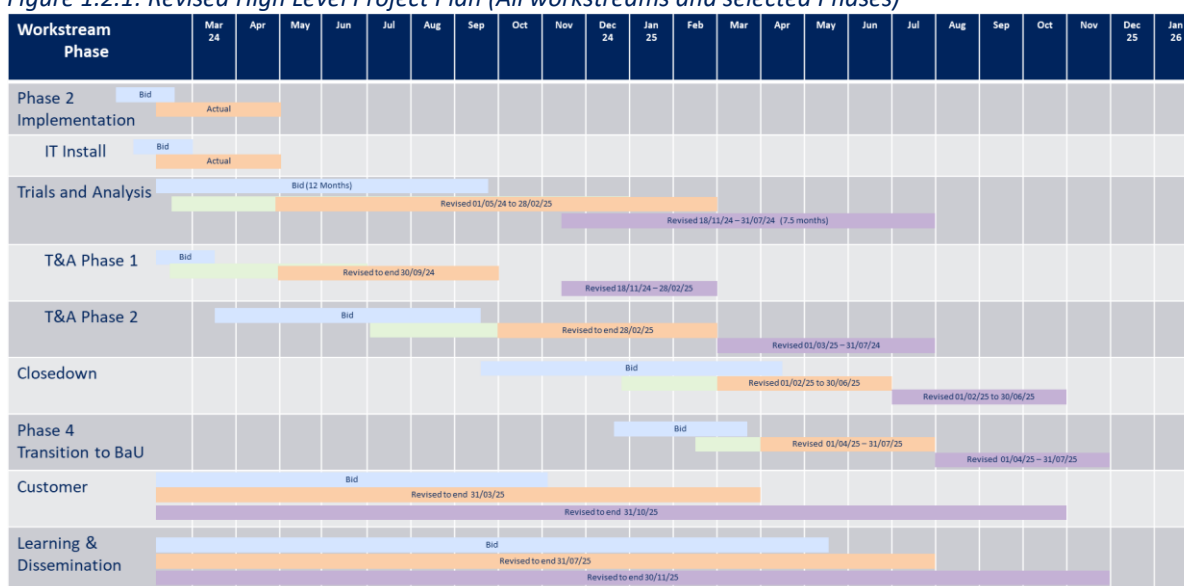
This is the fourth annual project progress report (PPR). This report covers the period from 8 December 2023 to 6 December 2024.

This period has seen ongoing issues and delay predominately associated with getting the underlying IT infrastructure to work, within an environment significantly changed by the continuing, and increasingly challenging, cyber threat. This has influenced some project deliverables, however despite this impact work on the core project has continued.

During this period, the initial build phase has been completed, and QUEST has been used to operate network equipment and change network voltages as designed. However, the initial testing within the trials and analysis phase identified some additional issues that ultimately required some reworking of the underpinning IT infrastructure and changes to the user protocols to further reduce the risk of unplanned operation of real time network.

A high-level revised project plan is shown in Figure 1.2.1.

Figure 1.2.1: Revised High Level Project Plan (All workstreams and selected Phases)



Where possible, existing systems have been used to replicate a limited set of QUEST functions to help inform trial planning whilst the IT infrastructure was being put in place

The project has continued to progress those items less reliant on the IT infrastructure including:

Figure 1.2.2: Project milestones delivered in this reporting period

| Date | Milestone |
|------------|---|
| 16/12/2023 | On site upgrades complete (except ICCP constrained items) |
| 22/12/2023 | Deliverable 5: QUEST System Integration Lessons Learned Report and associated documents published |
| 14/02/2024 | Main ICCP tested within TEST environment |
| 15/04/2024 | Main ICCP link complete in PROD environment for Test |
| 18/04/2024 | First operation of onsite device from QUEST software |
| 23/04/2024 | QUEST Partner In Person Day (Manchester) |
| 24/04/2024 | Group operation of several voltage devices – Operational restriction applied |
| 30/04/2024 | Deliverable 5 Update of QUEST System Integration Lessons Learned Report published |
| 14/06/2024 | All ICCP links completed in PROD system (Build Phase completed) |
| 01/07/2024 | Full System Production Test – missing ICCP data points identified |
| 15/08/2024 | Area 2 Sensitive HV and EHV Customer engagement (November 2023 to August 2024) completed |
| 18/10/2024 | Production System available to recommence commissioning |
| 30/10/2024 | QUEST presentation at the Energy Innovation Summit, Liverpool (29-30/10) |

The fifth deliverable “QUEST System Integration Lessons Learned Report” along with several associated documents, was published on the 22/12/2023 and, as highlighted in last year's PPR, a supplementary update was published on the 30/04/2024.

The report, and associated documents, predominately focus on the major IT infrastructure issues and learning that have, unfortunately, dominated the project development. However, the report also covers the learning from the core objectives of the project which generally went as anticipated with minor challenges and lessons as would be expected with an innovation project. There were some additional delays on core deliverables where key resources or systems needed specific IT elements completed prior to next build or configuration stage. The report noted QUEST was the basis of two CIREP published papers, with the probability more papers will be produced based on the final project learning.

The project actual costs to date (end-Nov 24) are £6,682,461 and the estimated at completion cost is now £9,063,500 which is 1% over project budget (including contingency). Work continues to control remaining costs within budget.

1.3 Risks

The projects focus, for most of the year, has been to resolve the IT infrastructure issues and provide a suitable foundation for the QUEST trials. The significant risks reported last year remained for much of the year and will continue to project end.

R032 – Project Resource Issues– raised 12/12/22

This was raised In December 2022, when the QUEST project manager decided to leave ENWL.

Update – The transition of duties between project managers was completed smoothly, but there have been significant other project personnel changes both within ENWL and the partner organisations. The ENWL team is now completely refreshed since the commencement of the project, and whilst the risk from other changes remains, the mitigations in use will mean the impact is controllable.

R033 – IT Infrastructure (Operating Systems)– raised 24/02/23

The developing IT infrastructure low level design identified an ENWL knowledge constraint on a particular software product (Hyper-V) used in the creation of virtual machines by a project partner.

Update - The transfer of several IT responsibilities between ENWL IT and a project partner mitigated the initial risk, however the delivery was impacted by the remote access issues experienced by all partners. The build is now complete, but the split of responsibilities will remain through to the end of the project.

R034 – IT Infrastructure (System Access)– Raised 21/04/23

With the change in IT design, additional third-party resources would need secure access to the various infrastructure elements being built.

Update - During the build process this remained a challenge and added to delays, especially when an additional specialist resource was required for a specific project element. In this scenario the time taken to provide access was often longer than the intervention required. However, with the completion of the build phase the smaller teams required for support have been set up and access proven. Processes are in place to ensure access is maintained. Should new resource be required during the project this risk remains but has now been successfully negotiated several times.

R035 – IT Infrastructure (Secure File Transfer)– Raised 25/08/23

Designed infrastructure build process is ineffective for small changes required for configuration and fault resolution.

Update - During the build phase this item did cause delay to the project. With the completion of the build phase the requirement for this infrastructure has reduced, but the infrastructure will continue

to be used for support purposes. During the trial phase, ENWL have plans to upgrade elements of its current secure file transfer protocol (SFTP) systems that are used to support QUEST, the project is aware of this and adapt any process as and when required.

R036 – IT Infrastructure (Resources)– Raised 07/08/23

Risk that wider ENWL IT subject matter resources, delivery resource and change approval resources could not be committed to QUEST build and issue resolution at short notice. Core ENWL work under the Cyber Assessment Framework (CAF) remains a company priority.

Update - This will remain a significant risk through to the end of the project, mitigated during the trials and analysis phase as resource requirements will be limited to support and any unexpected fixes to the project infrastructure.

R018 - ANM ENWL System – Risk Escalated 28/07/23

The QUEST project has an interaction with ENWL’s ANM and Smart Street systems, which were under development at the start of the project, and therefore their development was logged as a lower-level risk.

Although ENWL has started offering flexible ANM connections, it should be noted that the full capabilities of the system are not yet mature and may result in changes during the QUEST project. It is also looking unlikely that a customer requiring a flexible ANM connections will occur on the Whitegate network during the period of the project trials.

Risk to QUEST is that the development of the ANM system may cause issues at the QUEST to ENWL ANM interface during future ENWL ANM changes.

Update - The ENWL ANM system is currently being tested within ENWL test environment. As a BAU system it is being developed in a manner that was envisaged for QUEST at the bid stage, i.e. within the corporate NMS system. This will pose a connection risk between the two systems. This risk is acknowledged by the ANM project team, but it is not a significant risk to that project.

The mitigation for the QUEST project is that it will integrate with the two SGS NMS systems to demonstrate core functionality / proof of concept. The project is also exploring if the SGS systems provide additional functionality that can benefit the project.

New Risks – Entering trials and analysis phase.

R037 – Reduced time frame for trials and analysis – Raised 01/04/24

The project intends to deliver the equivalent testing within a shorter time frame. This is possible because the trials are a programme of shorter time frame tests that can be condensed in the overall timeframe. However, the risk is that the reduced time contingency in the trials analysis phase increases the risk from any further delays, or trial issues.

R038 – Customer Engagement – Raised 01/10/24

Area 2 highlighted the difficulty in identifying and recruiting customers of significant knowledge and experience to meet the expectations in the bid document. There is a risk that this will continue. Mitigation includes trying multiple calls in varying forums to engage and create interest in relevant groups for participation.

R039 – User Control Features– Raised 01/10/24

An unexpected event occurred during testing/training which has led to a review of user profiles to prevent non authorised staff performing an authorised operational action. The resolution to this issue has led to some QUEST functionality only being possible by authorised control staff, thus changing the mix of resources anticipated for Trial and analysis.

R040 – Project Funding – Raised 01/11/24

The issues the project has faced, has taken time and resources to resolve. It has therefore used contingency funding to cover this extra work, and an element allocated for the expected delay. The further delays this year has again used existing and forecast use of contingency. Whilst ENWL believe the project will still be delivered with the project direction (including contingency) it is possible any further delay will leave the project at risk of overspending.

R041 – NESO Service changes – Raised 01/11/24

The project has been made aware that NESO are considering market changes that could require technical changes to the CLASS BaU system. Any changes are out of scope to the QUEST project. The project is working to ensure any changes do not impact the QUEST trials and analysis phase. Any change is likely to change to route to BaU for QUEST.

2 Project manager's report

2.1 Project background

To cater for the subsequent increase in electricity demand and generation caused by decarbonisation targets, DNOs have investigated and deployed techniques such as Customer Load Active System Services (CLASS), Smart Street and ANM. Whilst these systems have proven successful in helping DNOs to manage the network, they do have limitations. For example:

- They are often applied in isolation of one another and do not operate in a co-ordinated manner.
- It is possible that one technique could counteract another, resulting in reduced effectiveness and potentially failing to maintain operation within acceptable limits.
- They use worst-case planning assumptions, which build in large safety margins, resulting in operation below the theoretical maximum.
- They require a resilient communications infrastructure at all times and are set up to fail safe. Therefore, if there is a communications failure any voltage optimisation or ANM benefit is significantly reduced or removed.

The QUEST project will aim to integrate the above voltage optimisation systems into one overarching, co-ordinated and optimised system, with appropriate balance between centralised (global) and decentralised (zone) control hierarchy. This will enable voltage optimisation for the whole distribution network. By viewing and controlling the whole network, QUEST will co-ordinate the often-competing objectives of these existing systems to ensure optimised operation whilst maximising benefits for customers. In addition, the QUEST software will allow demand and generation to automatically self-adjust in response to changing voltage requirements, creating an innovative, self-regulating distribution network.

QUEST optimisation software is the overarching software system that has the ability to control other individual systems on the network, i.e., Enhanced Automatic Voltage Control (AVC) including CLASS, Smart Street and ANM. These systems provide voltage control, thermal constraint management and demand control. Where appropriate, the QUEST voltage optimisation will optimise system voltages to provide additional benefits, for example, through reduction of system losses.

2.2 Project update

This is the fourth reporting period which was anticipated to be about outcome from the trials and analysis phase rather than continued build issues and the start of trials and analysis.

The building of the IT infrastructure to support the QUEST project, including all the ancillary systems, processes and interfaces has been the prime focus of the project, including partners, for the last 12 months.

The IT infrastructure is complete including all interfaces to real time network management system and the SGS ANM systems. The QUEST overarching software is installed and has controlled real world devices. All SGS ANM systems are complete and tested to the QUEST system and the trials and analysis phase has commenced.

The trials and analysis have been designed to start simple and build complexity during the trial period, with more complex optimisation and longer activation periods later in the period. The most complex and onerous testing will occur near the end of trials. This approach will test and prove individual elements early building confidence in the operation of the software, its interaction with BaU control systems, and prove several support and analysis processes refined during infrastructure build which are not yet proven.

Early trials and analysis activity also includes any final testing and commissioning of project elements and minor software nonconformities only possible once the build phase was complete.

With regards to specific project elements:

The onsite build works were effectively completed at the last PPR. There have been some minimal items of inspections and updates during the year, with the final elements of AVC testing requiring the complete ICCP and infrastructure to be in place to complete.

The QUEST software installation, and the SE infrastructure build, and configuration works have been completed this year as they are integrated with the projects IT infrastructure. The software has been used to control real world voltages, however the delays to the IT infrastructure, has meant we have yet to fully explore the full complexities of the software. This will be done during the trials and analysis phase.

The SGS provided ANM systems have been completed, integrated to the QUEST system, and are continuously receiving real time network information. Access and training beyond that required for core project requirements has been provided to ENWL. ENWL and SGS are exploring what additional learning may be possible to include in the trials and analysis phase.

Preparations with partners, but mostly SGS, have been ongoing on how best to conduct tests and how to collect information to use to confirm the optimisation and benefits generated by the QUEST system are robust by use of external modelling. Based on these discussions a longer-term trial plan has been developed, and processes in place to collect, transfer and use data from the trials. These processes will be tested, and evolve, during the trials and analysis phase.

Between November 2023 and August 2024, Impact conducted the Sensitive HV and EHV Customer engagement work package. This work was to identify and engage with higher voltage connected customer who may have equipment or processes that could be sensitive to voltage variation should they be exposed to the full range of variation allowed under the ESQCR. Voltage variation is increasing

due to the increasing volume of connected LCT technologies and the conflicting impacts of some of those technologies. QUEST, as an overarching voltage control methodology, also has the ability for voltage control for planned activity and mitigation for LCT effects. This engagement took longer than planned as significant effort was required to identify suitable customers, who had the knowledge and understanding of voltage and the impacts on their business, and who also were willing to commit the time to support the project. After the project secured sufficient support for an effective and statistically significant outcome the engagement was commenced and has proved successful. The detailed outcomes will be published separately.

The second phase of engagement with domestic customers has been deferred into 2025, to ensure that that cohort surveyed have the experience of their supply being under the control of QUEST and are therefore able to offer their experiences and if they were different to pretrial.

The key project management activities undertaken during this reporting period are summarised below:

- Deployment of the IT infrastructure to deploy the QUEST project
- Revision of the IT infrastructure to resolve initial issues
- Preparation with partners and ENWL resources for the trial and analysis phase including providing access and using test systems to develop knowledge and understanding, supported by training, both offline and on QUEST systems whenever available.
- Supporting Impact, and looking at a range of mitigation actions to increase the potential pool of suitable HV & EHV customers
- Continued escalation of QUEST within ENWL to improve and maintain its profile (and demand of resources) to support the project
- Continued regular engagement, weekly and bi-weekly project management meetings with partners (individuals and whole team) including ENWL IT
- External promotion of QUEST at the EIS and other internal and external events.

2.3 QUEST deliverables in this reporting period

The fifth project deliverable, “QUEST System Integration Lessons Learned Report” was delivered on the 22 December 2023 as an interim version.

An update was published on the 30 April 2024.

Deliverable 6 Customer Research Findings Report was expected in the QUEST bid to be delivered 31/10/24. This is now expected to be delivered by 26/09/25

Deliverable 7 QUEST Trials and Analysis Report was expected in the QUEST bid to be delivered 30/12/24. This is now expected to be delivered by 28/11/25

2.4 Customer workstream

As previously reported, the baseline work (pre-QUEST experience) for the domestic customer engagement was completed in August 2023.

The project then moved onto to the engagement with potentially sensitive HV and EHV customers, as referenced in the project bid as:

| | | |
|---|---|---|
| Area 2 <i>Sensitive customers</i> | HV & EHV connected customers from across the North West that operate sensitive equipment or who may have designed their equipment assuming narrow system voltage bands. | <ul style="list-style-type: none">• Establish the expectations of voltage sensitive customers, from a range of sectors.• Evaluate how they set up and operate their own equipment.• Explore potential impact and the guidance they require.• Develop guidance materials• Endorse guidance materials with customers. |
|---|---|---|

This work was led by our project partner Impact between March and August 2024 and delivered in phases including, Customer identification and recruitment, semi structured interviews, Focus Groups, and in-depth interviews.

The detailed findings from this work will be included within project Deliverable 6 “Customer Research Findings Report”.

The recruitment for this phase was challenging, both in identifying relevant organisations and individuals within that met the criteria for engagement but also held the interest and experience for that engagement to be worthwhile.

As we have found on previous projects, customers fully and quickly engage when they have an immediate issue with their electricity supply that impacts their business, but at most other times their electricity connection is rarely considered.

By the end of the engagement all customers were aware of the voltage challenges expected to be faced by the move toward a lower carbon economy and the impact QUEST could have. Their expectations of the risk of voltage changes to their operational business were increasing but remained low in comparison to other risks their businesses faced. A range of communication messages, channels and timings of receipt were analysed. All customers would appreciate additional DNO support, as soon as an issue were to arise that impacts their business.

2.5 Learning and Dissemination workstream

The QUEST project team has participated in several learning and dissemination events in this reporting period, the key events are:

- Deliverable 5 QUEST System Integration Lessons Learned Report, updated in April 2024.
- Updates to QUEST website throughout year.
- Presentation on QUEST at ENA's Energy Innovation Summit in Liverpool in October 2024.
 - A video update, displayed on the ENWL stand during the Summit, has been made available on the QUEST website, [here](#)¹.
- A presentation on ENWL voltage management, including QUEST, was made as part of an SE global seminar series.
- Presentation on QUEST, including CLASS and Smart Street, was made to a Utility Week event in November 2024.
- No formal industry steering groups (ISG) have been held this year, as the project has focussed on delivery in preparation for trials. ISGs will recommence in 2025.

In the next reporting period, the learning and dissemination workstream will undertake the following activities:

- Continue to update the ENWL website.
- Recommence ISG meetings.
- Publicise QUEST project in an engineering industry magazine.
- Publicise QUEST within ENWL and through its social media channels.
- Present the project at the 2025 industry conference.

2.6 Project trial and test area

As previously confirmed, the trial area remains the ENWL network usually supplied via the Whitegate Grid Supply Point (Appendix G).

All site works are complete, now the ICCP between QUEST and the NMS Scada is complete the final relay points can be commissioned during the start of trials and analysis.

Trials and analysis have commenced and will now run through to the end of July 2025.

A trial programme has been developed, in conjunction with SGS, and will deliver an increasing complexity of testing during the period as levels of functionality is tested and operational experience developed.

¹ www.enwl.co.uk/future-energy/innovation/key-projects/quest/quest-library/learning-and-dissemination/

The changes to user profiles have resulted in a slight change workload for testing, as a result QUEST now has three ENWL control engineers authorised to use the system and deliver the planned real-world trials.

3 Business case update

As noted, in this reporting period the project has had significant and enduring challenges with the supporting IT infrastructure, with the majority root cause being the impact on the industry from the major cyber security review and resulting programme.

However, the project business case and its main purpose is proving that the optimisation of voltage control across all network levels releases additional benefits and optimises those benefits as appropriate. The issues currently delaying the project do not impact this purpose, only delaying the start of trials.

The necessary project changes that have been made to date are still within the funding envelope of the project, albeit with the need to adjust some cost categories, e.g., contractor now providing a service originally budgeted as “Labour” and the use of the remaining contingency budget.

The changes required by the IT infrastructure issues and the change to the remaining project timelines will incur a net increase in project costs. However, it is still estimated that these can also be covered within the project’s funding envelope and the project partners’ support of the project.

4 Progress against plan

The project plan is monitored, reviewed, and updated on a continuous basis. This process takes into consideration potential risks that were documented in the full submission and any change to these risks. The process also considers newly identified risks and issues that are highlighted during the project lifecycle.

During the build phase connections were made between QUEST and real-world devices via the main ICCP in April 24. The build phase completed in June 24 when all ICCPs in the production system were completed, and data flows were working.

At the start of July 24, Control Engineer operation of the built system commenced which unfortunately highlighted several missing data points in the main ICCP, initiating a 4-month rework and retest of the ICCP across all systems.

An unplanned operation of several on-site devices also resulted in revisions to user accounts to ensure non authorised staff could not impact on site devices.

During October 2024, the system was ready to recommence control driven trials and analysis.

The original bid envisaged 12 months in which trials and analysis work would be performed. As a result of the project delays this was revised in December 23 and April 24 and the period in which trials and analysis would be performed was reduced to 8 months. This 8-month window remains unchanged but will now continue to the end of July 2025.

There are minor revisions to close down, customer and learning & dissemination activity to reflect the additional delay.

As detailed above, whilst all project deliverables, including updates, have been delivered to date, the IT infrastructure issues have significantly delayed the commencement of field trials.

5 Progress against budget

The project budget as defined in the project direction is shown in Appendix C.

Actual spend to date compared to project budget is summarised in Table 5.1 below. This report includes expenditure up to and including 30 November 2024.

It will be noted that the project is currently performing favourably, relative to budget. Project expenditure as at the end of November 2024 was £6,682,461 compared to a cost baseline of £8,466,795.

This variance in project expenditure to baseline cost is due to project delay, re timing and the consequential impact on invoices for directly and indirectly connected works. All partner project contracts are structured against a set of deliverables, where these deliverables are delayed payment is delayed. Several payments are associated with progress through the trial and analysis phase.

The project has made savings against budget in some areas and movement between areas to reflect changes of responsibilities. Savings in Equipment have been made both by a slightly reduced number of site interventions and some equipment cost savings to budget, some final invoicing is still to be completed.

The project is performing within overall budget, including contingency, in terms of cost despite the delays to the project and the costs associated with extended project. This is in part due to a strong commercial and project management governance in place within the project.

The small end of project Variance will be resolved during the year.

Table 5.1: Summary of project expenditure

| E'000s Excluding Partner Funding Ofgem Cost Category | Spend to date | | | Total Project | | | % Variance to Plan |
|--|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------------|
| | Actual | Plan | Variance | Forecast | Plan | Variance | |
| Labour | 1,647,604 | 1,874,328 | 226,724 | 1,994,545 | 1,988,643 | (5,902) | 0% |
| Equipment | 418,769 | 563,986 | 145,217 | 523,112 | 563,986 | 40,874 | 7% |
| Contractors | 1,306,702 | 1,669,667 | 362,965 | 1,977,232 | 1,960,565 | (16,667) | -1% |
| IT | 2,928,029 | 3,339,666 | 411,637 | 3,429,784 | 3,339,666 | (90,118) | -3% |
| Travel & Expenses | 202 | 16,085 | 15,883 | 16,294 | 16,085 | (209) | -1% |
| Payments to Users | 10,792 | 0 | (10,792) | 19,978 | 19,998 | 20 | 0% |
| Contingency | 210,033 | 688,277 | 478,244 | 707,511 | 707,511 | (0) | 0% |
| Decommissioning | 0 | 0 | 0 | 29,021 | 29,021 | 0 | 0% |
| Other | 160,331 | 314,787 | 154,456 | 366,023 | 373,959 | 7,936 | 2% |
| Total | 6,682,461 | 8,466,795 | 1,784,334 | 9,063,500 | 8,999,432 | (64,068) | |

Source: Ofgem Schedule to Project Direction - January 2021

Detailed expenditure is shown in Appendix D at project activity level.

6 Bank account

The project bank statement is shown in Appendix E. This statement contains all receipts and payments associated with the project for the year up to the end of November 2024.

7 Project deliverables

Due to the additional project delays the project deliverable dates have been updated to reflect the revised delivery plan.

Deliverable 5 “QUEST System Integration Lessons Learned Report” was delivered on time as per the original bid, but as an interim document to be updated by the end of April 25. The document was duly updated in April 25. Along with this PPR an additional appendix to deliverable 5 is also being published, this provides greater detail into the learnings from the IT challenges faced. Many of these learnings are outside the scope of the expected project learnings but may be valuable for future innovation projects being developed and dependent on IT infrastructure also under Cyber security assessment.

Deliverables 6, 7 and 8 will now be delivered in 2025 as shown in Table 7.1 below:

Table 7.1: QUEST project deliverables with revised deadline:

| Ref | Project Deliverable | Deadline | Evidence | Status / Revised Date |
|-----|--|----------|---|-----------------------|
| 1 | QUEST Initial Report - Use Cases | 31/07/21 | Document introducing the Project and detailing the use cases and scenarios. | Completed |
| 2 | QUEST System Design and Architecture Lessons Learned | 31/12/21 | Document explaining Project progress including the following outputs: <ul style="list-style-type: none"> Review of architecture options Specification for the network models and modelling regime | Completed |

| Ref | Project Deliverable | Deadline | Evidence | Status / Revised Date |
|-----|---|----------|--|--|
| 3 | QUEST Trials, Design and Specification Report | 30/06/22 | Document explaining Project progress including the following outputs: <ul style="list-style-type: none"> • Functional specification for chosen architecture • Functional specification for voltage control methodology • Trial design • Detailed site design | Completed |
| 4 | QUEST Interim Report - System Design and Technology Build Lessons Learned | 30/06/23 | Document detailing Project progress to date including lessons learned from: <ul style="list-style-type: none"> • QUEST software development and testing • Power system model development • Site installation for the voltage control and ANM equipment | Completed |
| 5 | QUEST System Integration Lessons Learned Report | 30/12/23 | Document detailing the lessons learned from the installation and commissioning of the QUEST system including system integration and the results of site acceptance testing. | Updated: 30/04/24 An IT update to be added |
| 6 | Customer Research Findings Report | 31/10/24 | Document detailing the outputs from the customer research. | Bid: 31/10/24 Apr24 Revision: 25/04/25 Nov 24 Revision: 26/09/25 |
| 7 | QUEST Trials and Analysis Report | 30/12/24 | Document detailing: <ul style="list-style-type: none"> • Final results from network trials • Final results from modelling trials • Output from the voltage demand relationship research • Any adaptation required to voltage control methodology | Bid: 30/12/24 Apr24 Revision: 27/06/25 Nov 24 Revision: 28/11/25 |
| 8 | QUEST Final Report | 30/04/25 | Report on the conclusion of the QUEST Project including all the lessons learned and detailing the next steps, including BaU transition. | 30/04/25 Apr24 Revision: 25/07/25 Nov 24 Revision: 19/12/25 |

| Ref | Project Deliverable | Deadline | Evidence | Status / Revised Date |
|-----|---|----------------|--|-----------------------|
| 9 | Comply with knowledge transfer requirements of the Governance Document. | End of Project | Annual Project Progress Reports which comply with the requirements of the Governance Document. Completed Close Down Report which complies with the requirements of the Governance Document. Evidence of attendance and participation in the Annual Conference as described in the Governance Document. | End of Project |

8 Learning outcomes

This is ENWL's sixth large-scale innovation project, however whilst the project team identified early that cyber security was going to be a risk, the scale and complexity of how the risk manifested was unclear and ultimately underestimated.

The project underestimated the breadth of impact from the change in threat and from the ongoing Cyber Assessment Framework (CAF) which is business critical. This critical work has required the refocus of the majority of IT experts within the business with the resultant change in focus for less critical work.

The revised QUEST infrastructure design mitigated several security concerns but ultimately increased complexity and dependency on key experts whose availability is limited.

Raised levels of security awareness has also positively impacted the processes around change control, and as a result new innovative requirements face high levels of scrutiny and challenge.

ENWL employs a design philosophy where an initial, high-level design is approved, and then detailed design continues and is subject to further approvals. However, complexities of the QUEST design identified during the lower-level design stage have generated several changes. These changes are all subject to formal change approval and have compounded the resource and policy issues.

The need for third parties to access project software and infrastructure that could impact, even remotely, the live electricity network, has set challenges for both ENWL in allowing access but also for the third parties in adapting their system and processes to the change and additional constraints applied.

The final IT infrastructure developed for the project has become quite complex and there are additional support requirements in place for the rest of the project. However, when the project is successful this IT infrastructure will not be required for the BaU solution, with the developed QUEST software module just needing to be transferred into the core NMS.

As noted, Deliverable 5, as updated with its appendices, provides greater detail on these learning points.

9 Intellectual Property Rights (IPR)

ENWL is following the default IPR arrangements. No IPR has been generated or registered during this reporting period. The IPR implications of forthcoming project deliverables are currently being considered and will be reported in the next PPR.

10 Risk management

The issues resulting from the enhanced cyber security requirements previously detailed have impeded the achievement of the future project deliverables outlined in the project direction. The IT infrastructure to support QUEST trials is now complete but has delayed the project further and remains a source of delay risk to the project. Risks around the final integration of all subsystems remain, as elements have yet to be fully tested.

The project extension is believed to be reasonable and the project deliverable within this change.

The project risks identified in the QUEST full submission have been migrated into the QUEST delivery risk register, reviewed, and confirmed as still valid. Many of the project procurement and installation risks related to various activities are now closed as the associated activity has been completed. Risks will be monitored on a continuous basis, including the potential risks that were documented in the full submission. Project risks are described in detail in Appendix A.

11 Consistency with full submission

At the end of this reporting period, it can be confirmed that the QUEST project is being undertaken in accordance with the full submission.

12 Data Access Details

There was no data gathered in this reporting period. It is anticipated that there will be technical data gathered during the trials of system measurements which will be used to confirm the QUEST methodology. Due to the volume and nature of this data it will be available on request as per Electricity North West's innovation data sharing policy. Customer information captured as part of the Impact work will be summarised within the relevant project deliverables.

Electricity North West's [innovation data sharing policy](#) can be found on our website

13 Accuracy assurance statement

This report has been prepared by the QUEST Project Manager (Andrew Howard), reviewed by Innovation Technical Manager (Benjamin Ingham), and then reviewed and approved by Head of Network Innovation (Neil McClymont).

The financial information has been produced by the QUEST Project Manager and the project's finance representative, who review all financial postings to the project each month to ensure they are correctly allocated to the appropriate project activity. The financial information has also been peer reviewed by ENWL's risk, control, and assurance (finance) manager.

All efforts have been made to ensure that the information contained within this report is accurate. ENWL confirms that this report has been produced, reviewed, and approved following our quality assurance process for external documents and reports.

14 Appendices

14.1 Appendix A: Status of current project risks

(All project risks from QUEST bid and resultant project progress reports)

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|---|---------------------------|----------------------|--------|
| Delivery | There is a risk that COVID-19 restrictions will impact Project delivery. This is especially true should we experience a second wave or a regional lockdown. This could have a significant effect due to the location of one of our Partners, potentially causing delays to Project completion. | 3 | 4 | Suitable partnership agreements that ensure collaborative working, value for customers' money and achievement of learning objectives in a timely manner have been identified for all Partners. A project initiation document will be issued to the Project Partners to ensure that all parties are ready. | 2 | 3 | Closed |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|---|---------------------------|----------------------|--------|
| Mobilisation | There is a risk that the Project Partners are not able to mobilise their resources in time because of other commitments leading to a delay in achieving potential milestones which could have a Project reputational and financial repercussion. | 3 | 4 | Suitable partnership agreements that ensure collaborative working, value for customers' money and achievement of learning objectives in a timely manner have been identified for all Partners. A project initiation document will be issued to the Project Partners to ensure that all parties are ready. | 2 | 4 | Closed |
| Technology | There is a risk of delay in development/integration of the overarching software, which leads to an overall Project delay. | 3 | 4 | We have selected an appropriate Project Partner with relevant experience to deliver this element of the Project and have ensured that the scope of work is clear and deliverable. Regular development meetings will be held to track progress against the plan. Due to additional requirements placed on the design by factors separate to the project there have been challenges with the integration, we are working with the project partners to mitigate the impact of these. See also R033, R034, R035 and R036 for additional details | 2 | 2 | Closed |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|---|-------------------|--------------|--|---------------------------|----------------------|--------|
| Technology | There is a risk to transformer delivery due to Brexit. Should no deal be reached between the UK and EU, World Trade Organisation import tariffs could be imposed on equipment sourced from the EU. Additional cross-border requirements may impact the lead times for taking delivery of electrical equipment | 3 | 3 | ENWL has a Brexit working group in place which draws together key business streams from across the company to assess Brexit implications. The working group will monitor developments during the transition period, which ends on 31st December 2020. Contingency: updates shared periodically with ELT and board. Increased stock holdings currently being maintained and ongoing dialogue with key suppliers. (08/12/23) Deliveries were managed in line with project. | 2 | 3 | Closed |
| Technology | There is a risk of delay in procurement/delivery of OLTC Transformers leading to a delay in implementation. | 2 | 4 | (03/06/21) The plan is order the transformers this year and keep them in storage for when required for installation next year (08/12/23) Deliveries were managed in line with project. | 1 | 4 | Closed |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|---|---------------------------|----------------------|--------|
| Technology | There is a risk that the final architecture design may be more complex than originally anticipated leading to an increase in cost and delivery timescales. | 3 | 5 | Proposed architecture in bid has been developed using experience of Project Partners. (14/06/24) Risk became major Issue and contributor to experienced project delay. Build Phase completed | 5 | 5 | Closed |
| Technology | There is a risk that customers may experience an outage during installation of the distribution substation equipment. | 2 | 2 | Pre-site surveys to identify suitable means of installation which avoid customer outages whether via backfeeds or generators. (08/12/23) Installations complete | 1 | 2 | Closed |
| Technology | There is a risk of increased cost for installation of BSP and Primary AVC schemes due to unforeseen issues such as increased cabling, etc. | 3 | 5 | (03/06/21) Preliminary site surveys to be conducted. (08/12/23) Installations complete | 1 | 2 | Closed |
| Technology | There is a risk that there is a need for unforeseen additional work during commissioning, leading to a requirement for additional resource to attend site to fix or replace. | 2 | 4 | Pre-installation surveys to identify commissioning requirements. (08/12/23) Installations complete, minor changes accommodated. | 1 | 2 | Closed |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|--|---------------------------|----------------------|--------|
| Trials and Analysis | There is a risk that the QUEST software does not perform as intended leading to a requirement for additional resource to carry out debugging/ development. | 3 | 4 | (03/06/21) We have selected a Project Partner who is familiar with our existing systems and software and whom has appropriate experience and technical expertise to perform this task. | 1 | 4 | Open |
| Trials and Analysis | There is a risk that implementation of the holistic voltage control methodology may have an impact on the network which leads to disruption or outage. | 1 | 5 | (03/06/21) The holistic voltage control methodology uses a combination of proven techniques. We will run the methodology in open loop to understand the actions it would take before allowing operation on the live network. | 1 | 5 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|---|---------------------------|----------------------|--------|
| Customer | There is a risk that customers could be adversely affected by implementation of the holistic voltage control methodology. This risk might result in a breakdown in customer relationship and reputation. | 2 | 3 | (03/06/21) We will engage with a variety of customers to understand how optimising voltage may affect their operations and identify any special requirements. We will adapt the Method to incorporate the needs of these specific users. To ensure that there is no public or reputational damage to ENWL, QUEST will embed a process to manage any customer impacts quickly and appropriately. | 1 | 2 | Open |
| Learning dissemination | There is a risk that attendance at events may be low due to other dissemination events/current restrictions preventing attendance. Learning may be inhibited due to stakeholders having different interests and learning styles. | 2 | 3 | ENWL will choose dissemination channels optimised to achieve maximum reach and coverage. | 1 | 2 | Open |
| Close Down | There is a risk that new obligations and guidance will be released on key deliverables, such as the Close Down Report leading to a longer preparation and review period required. | 3 | 3 | Communication channels from Ofgem will be monitored and any updates to such requirements identified as early as possible. | 1 | 3 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|-------------------------------|---|-------------------|--------------|---|---------------------------|----------------------|--------|
| OLTC Distribution Procurement | Due to the effects of the pandemic, there has been global increase on the cost plant materials of over 20%. | 2 | 5 | QUEST PM / procurement team to monitor this to understand if these increased costs are permanent, or if changes can be made within tests and trials to try and reduce costs. (08/12/23) Installations complete within project budget. | 1 | 3 | Closed |
| Cyber Security | Interaction of SGS ANM within ENWL NMS system have issues to cyber security requirements | 2 | 5 | (27/10/22) SGS and SE to have discussions with ENWL IT team to understand if what cyber security issues if may cause issue with system implementation. (extension Risk?) (27/04/23) LLD redone, ICCP costs and possible future delay possible 11/05/23 Further review and changes in IT design resulting in revised LLD V0.7 April 23. 11/12/23 Significant updates for cyber issues made, to be reported via lessons learnt | 5 | 5 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|---|---------------------------|----------------------|----------|
| Project work groups | Not being able to set up SharePoint access where external partners can access is hindering development of the project work with partners | 1 | 2 | This risk has now been mitigated due to the use of another platform. Which all project partners have access to and work off collectively | 1 | 2 | Closed |
| Technology | Due to the Covid Pandemic there has been 20% increase on materials | 2 | | (24/06/21) ENWL to monitor this price inflation and perhaps reduce the number of OLTC we use in trial. (08/12/23) Installations complete, within project budget. | 1 | 4 | Closed |
| Cloud ANM Integration | It has been identified that there may be issues implementing Cloud ANM with the trials due to ENWL security platforms. | 2 | 5 | (18/03/22) ENWL enterprise Architect to stay close to the project and ensure issues with Cloud ANM are kept to minimum. 11/12/23 - IT issues have led to compounding delay to Cloud ANM. Priorities and resources have been prioritised with ENWL enterprise Architect. (14/06/24) Build complete | 5 | 4 | To Close |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------------|--|-------------------|--------------|--|---------------------------|----------------------|--------|
| Project Partner resource Issues | Two project partners have lost key technical personal as they have left their respective organizations. This presents a real challenge as new members of the partners team will training given overview of the work done to date | 2 | 5 | (05/09/22) ENWL will conduct additional learning and dissemination sessions to support new partner team members get up to speed with project. 05/12/24 Project has had a turnover of members and re integration of new | 2 | 3 | Open |
| QUEST Tests and Trials | SS and ANM are due to be in BAU early 2023, if there are delays with the implementation of these systems this will affect QUEST trials | 2 | 5 | (21/07/21) ANM and SS PM aware of potential impact to QUEST and we are together to ensure there are no delays (29/11/23) Delays to ANM and SS have occurred, with ANM now due Q2 2024. QUEST impact mitigated by focus on SS assets & SGS ANM solutions. (01/12/24) ENWL ANM testing in progress, post build options to connect to be reviewed | 3 | 5 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|--|---|-------------------|--------------|--|---------------------------|----------------------|--------|
| Quality of the ANM and SS Systems being ready in 2023. | As the ANM and SS will be in the infancy of their BaU transition in March 2023 this will have impact on QUEST tests and trials. | 3 | 5 | (27/10/21) Maurice, Andy, and Steve to monitor this and see how these project transition to BAU. (28/07/23) Noted ENWL ANM would not have customers at start of trial. Anticipated mid trial connection. (01/12/24) ENWL ANM system is in test, and a revised QUEST connection is being considered by ANM team. SGS system mitigation exists | 3 | 5 | Open |
| Delivery Resource | Change in Resources (PM) may impact aspects of project deliver. Ext: July 23 - Last original ENWL change | 2 | 4 | ENWL to appoint replacement to achieve period of handover. Partner meeting to be brought forward to support handover. (01/12/24) Change in PM was well managed, and project has experience for managing other resource changes | 1 | 1 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|--|---|-------------------|--------------|--|---------------------------|----------------------|----------|
| Technology IT Infrastructure (Operating Systems) | The developing IT infrastructure low level design identified a knowledge constraint on a particular type of operating system (Hyper-V) used by a project partner. | 2 | 4 | ENWL and the project partners agreed the transfer of several infrastructure build and support activities (01/12/24) The transfer of responsibilities resolved the core risk, but has introduced additional maintenance complexity | 2 | 2 | To close |
| Technology IT Infrastructure (System Access) | With change in IT design, additional third-party resources would need secure access to the various infrastructure elements being built. | 3 | 5 | Secure access accounts to be set up against ENWL secure business processes. Secure manual USB file transfers to be used for Build process. (09/12/24) System access complete but ongoing issue to maintain during T&A | 2 | 2 | To Close |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---|---|-------------------|--------------|---|---------------------------|----------------------|----------|
| Technology IT Infrastructure (Secure File Transfer) | Designed Infrastructure build process is ineffective for small changes required for configuration and fault resolution. | 2 | 5 | ENWL have a secure file transfer protocol (SFTP) solution in use across the business, and a change was adopted to apply this to the QUEST IT infrastructure to resolve this risk (09/12/24) SFTP was set up but with issues covered in IT LL report. | 2 | 2 | To Close |
| Delivery IT Resource | Risk that wider ENWL IT subject matter resources, delivery resource and change approval resources could not be committed to QUEST build and issue resolution at short notice. | 4 | 4 | Internal escalation within ENWL, but CYBER is No1 priority for IT Escalated 07/08/23 & 06/11/23 (09/12/24) Proven issue captured in IT LL report | 5 | 4 | Open |
| Trials and Analysis | There is a risk that overall trial period being reduced from 12 months to 8 months will reduce quality of results | 4 | 2 | 01/04/24 - ENWL believe as Trials are a series of short period tests, then these can be condensed and delivered to the same quality within the shorter period | 4 | 2 | Open |

| Project Phase /Workstream | Description | Probability Score | Impact Score | Mitigating Action | Revised Probability Score | Revised Impact Score | Status |
|---------------------------|--|-------------------|--------------|--|---------------------------|----------------------|--------|
| Customer | There is a risk that, following Area 2 recruitment, Area 3 may be increasingly difficult to recruit sufficient Knowledgeable customers | 4 | 3 | 25/11/24 - ENWL promoting QUEST to external forum, (some contacts raised. Trade associations to be targeted) | 4 | 3 | New |
| Trails and Analysis | There is a risk that changes to the QUEST user controls has transferred an increased dependence on limited HUB resources | 4 | 4 | 1/11/24 - Work with HUB to try and increase resource support | 4 | 4 | New |
| Funding | There is a risk that the additional costs incurred to date and those now expected to end of project will exceed allowed budget | 3 | 5 | 09/12/24 - Reprofileing of remaining work has confirmed that costs can be accommodated, by the use of the majority of the remaining approved project contingency | 3 | 5 | New |
| Trials and Analysis | There is a risk that NESO market changes will result in CLASS BaU changes that impact QUEST trials (e.g. restrict ability to test, availability of support systems/resources, impact on site availability) | 4 | 3 | 09/12/24 - Exact resultant changes in BaU class currently unclear but being monitored | 4 | 3 | New |

14.2 Appendix B: Project deliverables – Revised as per December 24 Extension Notification

| Ref | Project Deliverable | Deadline | Evidence | Status / Revised Date |
|-----|---|----------|--|--|
| 1 | QUEST Initial Report - Use Cases | 31/07/21 | Document introducing the Project and detailing the use cases and scenarios. | Completed |
| 2 | QUEST System Design and Architecture Lessons Learned | 31/12/21 | Document explaining Project progress including the following outputs: <ul style="list-style-type: none"> Review of architecture options Specification for the network models and modelling regime | Completed |
| 3 | QUEST Trials, Design and Specification Report | 30/06/22 | Document explaining Project progress including the following outputs: <ul style="list-style-type: none"> Functional specification for chosen architecture Functional specification for voltage control methodology Trial design Detailed site design | Completed |
| 4 | QUEST Interim Report - System Design and Technology Build Lessons Learned | 30/06/23 | Document detailing Project progress to date including lessons learned from: <ul style="list-style-type: none"> QUEST software development and testing Power system model development Site installation for the voltage control and ANM equipment | Completed |
| 5 | QUEST System Integration Lessons Learned Report | 30/12/23 | Document detailing the lessons learned from the installation and commissioning of the QUEST system including system integration and the results of site acceptance testing. | Updated: 30/04/24 An IT update to be added |
| 6 | Customer Research Findings Report | 31/10/24 | Document detailing the outputs from the customer research. | Bid: 31/10/24 Apr24 Revision: 25/04/25 Nov 24 Revision: 26/09/25 |
| 7 | QUEST Trials and Analysis Report | 30/12/24 | Document detailing: <ul style="list-style-type: none"> Final results from network trials Final results from modelling trials Output from the voltage demand relationship research Any adaptation required to voltage control methodology | Bid: 30/12/24 Apr24 Revision: 27/06/25 Nov 24 Revision: 28/11/25 |

14.3 Appendix C: Project direction budget

Project direction ref: ENWL / QUEST / 9 December 2022, Annex 1: Project budget

| Cost Category | Cost |
|------------------------------|------------------|
| Labour | |
| | 1,988,643 |
| Equipment | |
| | 563,986 |
| Contractors | |
| | 1,960,565 |
| IT | |
| | 3,339,666 |
| IPR Costs | |
| | - |
| Travel & Expenses | |
| | 16,085 |
| Payments to users | |
| | 19,998 |
| Contingency | |
| | 707,511 |
| Decommissioning | |
| | 29,021 |
| Other | |
| | 373,959 |
| Total | 8,999,432 |


Project planned spend to date:

| £'000s Excluding Partner Funding Ofgem Cost Category | Spend to date Plan |
|--|-----------------------|
| Labour | 1,874,328 |
| Labour - Project Management | 332,139 |
| Labour - Customer Engagement | 174,285 |
| Labour - System Design | 228,966 |
| Labour - Implementation | 805,312 |
| Labour - Trials & Analysis | 310,875 |
| Labour - BAU Transition | - |
| Labour - Learning & Dissemination | 22,751 |
| Equipment | 563,986 |
| Equipment - Implementation | 563,986 |
| Contractors | 1,669,667 |
| Contractors - Project Management | 519,335 |
| Contractors - System Design | 240,972 |
| Contractors - Implementation | 426,220 |
| Contractors - Trials & Analysis | 365,503 |
| Contractors - BAU Transition | 25,179 |
| Contractors - Learning & Dissemination | 10,200 |
| Contractors - Customer Engagement | 82,259 |
| IT | 3,339,666 |
| IT - System Design | 2,772,943 |
| IT - Implementation | 240,686 |
| IT - Trials & Analysis | 326,037 |
| Travel & Expenses | 16,085 |
| Payments to users | - |
| Contingency | 688,277 |
| Decommissioning | - |
| Other | 314,787 |
| Other - Project Management | 38,569 |
| Other - Accommodation | 100,864 |
| Other - Learning & Dissemination | 175,354 |
| Total | 8,466,795 |

14.4 Appendix D: Detailed project expenditure

| £'000s Excluding Partner Funding Ofgem Cost Category | Spend to date | | | Total Project | | | % Variance to Plan |
|--|------------------|------------------|------------------|------------------|------------------|-----------------|-----------------------|
| | Actual | Plan | Variance | Forecast | Plan | Variance | |
| Labour | 1,647,604 | 1,874,328 | 226,724 | 1,994,545 | 1,988,643 | (5,902) | 0% |
| Labour - Project Management | 271,790 | 332,139 | 60,349 | 379,135 | 374,743 | (4,391) | -1% |
| Labour - Customer Engagement | 107,910 | 174,285 | 66,375 | 215,628 | 215,628 | (0) | 0% |
| Labour - System Design | 236,635 | 228,966 | (7,669) | 236,635 | 228,966 | (7,669) | -3% |
| Labour - Implementation | 792,315 | 805,312 | 12,998 | 792,315 | 805,312 | 12,998 | 2% |
| Labour - Trials & Analysis | 207,062 | 310,875 | 103,812 | 317,895 | 310,875 | (7,020) | -2% |
| Labour - BAU Transition | - | - | - | 27,043 | 27,043 | - | 0% |
| Labour - Learning & Dissemination | 31,892 | 22,751 | (9,141) | 25,895 | 26,076 | 181 | 1% |
| Equipment | 418,769 | 563,986 | 145,217 | 523,112 | 563,986 | 40,874 | 7% |
| Equipment - Implementation | 418,769 | 563,986 | 145,217 | 523,112 | 563,986 | 40,874 | 7% |
| Contractors | 1,306,702 | 1,669,667 | 362,965 | 1,977,232 | 1,960,565 | (16,667) | -1% |
| Contractors - Project Management | 462,532 | 519,335 | 56,803 | 617,850 | 593,858 | (23,991) | -4% |
| Contractors - System Design | 231,854 | 240,972 | 9,118 | 246,212 | 240,972 | (5,240) | -2% |
| Contractors - Implementation | 350,033 | 426,220 | 76,187 | 412,860 | 427,594 | 14,734 | 3% |
| Contractors - Trials & Analysis | 171,229 | 365,503 | 194,274 | 378,356 | 380,013 | 1,657 | 0% |
| Contractors - BAU Transition | - | 25,179 | 25,179 | 155,043 | 151,729 | (3,314) | -2% |
| Contractors - Learning & Dissemination | 53,477 | 10,200 | (43,277) | 84,140 | 84,140 | - | 0% |
| Contractors - Customer Engagement | 37,578 | 82,259 | 44,681 | 82,771 | 82,259 | (512) | -1% |
| IT | 2,928,029 | 3,339,666 | 411,637 | 3,429,784 | 3,339,666 | (90,118) | -3% |
| IT - System Design | 2,651,896 | 2,772,943 | 121,047 | 2,857,022 | 2,772,943 | (84,079) | -3% |
| IT - Implementation | 234,453 | 240,686 | 6,233 | 241,453 | 240,686 | (767) | 0% |
| IT - Trials & Analysis | 41,680 | 326,037 | 284,357 | 331,309 | 326,037 | (5,272) | -2% |
| Travel & Expenses | 202 | 16,085 | 15,883 | 16,294 | 16,085 | (209) | -1% |
| Payments to users | 10,792 | - | (10,792) | 19,978 | 19,998 | 20 | 0% |
| Contingency | 210,033 | 688,277 | 478,244 | 707,511 | 707,511 | (0) | 0% |
| Decommissioning | - | - | - | 29,021 | 29,021 | 0 | 0% |
| Other | 160,331 | 314,787 | 154,456 | 366,023 | 373,959 | 7,936 | 2% |
| Other - Project Management | - | 38,569 | 38,569 | 38,569 | 38,569 | 0 | 0% |
| Other - Accommodation | 91,026 | 100,864 | 9,838 | 107,865 | 107,865 | 0 | 0% |
| Other - Learning & Dissemination | 69,305 | 175,354 | 106,049 | 219,589 | 227,524 | 7,935 | 3% |
| Total | 6,682,461 | 8,466,795 | 1,784,334 | 9,063,500 | 8,999,432 | -64,068 | -1% |

14.5 Appendix E: Project bank account

| LLOYDS BANK  | | Archive Balance and Transaction Report | | 14-Jan-2025 8:13:56 AM Page 1 of 1 | |
|--|------------------|---|--------|--|----------------|
| Client ID: | | 14121616 | | | |
| Reporting Period: | | 08-Dec-2023 to 13-Dec-2023 | | | |
| Bank Name: | | Lloyds | | | |
| Account Number / Name / Currency Code: | | 308012-21586468 / ELECTRICITY NORTH WEST LIMITED - QU / GBP | | | |
| Closing Ledger Balance As At: | | 08-Dec-2023 | | Closing Ledger: | 4,051,550.70 |
| Posting Date | Type | Details | Debits | Credits | Ledger Balance |
| 11-Dec-2023 | Interest Payment | INTEREST (GROSS) ,INTEREST (GROSS) | | 11,019.58 | 4,062,570.28 |
| | | Totals | | 11,019.58 | |
| | | End of Report Ledger Balance | | | 4,062,570.28 |
| <p>Transaction and balance information is correct as at the date and time stamp printed at the top of this report but may be subject to change. Lloyds Bank plc Registered Office: 25 Gresham Street, London EC2V 7HN. Registered in England and Wales no. 2065. Telephone: 0207 626 1300. Authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority under Registration Number 119278. Eligible deposits with us are protected by the Financial Services Compensation Scheme (FSCS). We are covered by the Financial Ombudsman Service (FOS). Please note that due to FSCS and FOS eligibility criteria not all business customers will be covered.</p> | | | | | |

Client ID: 14121616
 Reporting Period: 13-Dec-2023 to 31-Dec-2024
 Bank Name: Lloyds
 Account Number / Name / Currency Code: 308012-21586468 / ELECTRICITY NORTH WEST LIMITED - QU / GBP
 Closing Ledger Balance As At: 08-Jan-2024 Closing Ledger: 4,062,570.28

| Posting Date | Type | Details | Debits | Credits | Ledger Balance |
|-------------------------------------|------------------------|------------------------------------|--------------|------------|----------------|
| 09-Jan-2024 | Interest Payment | INTEREST (GROSS) | | 9,037.83 | 4,071,608.11 |
| 09-Feb-2024 | Interest Payment | INTEREST (GROSS) | | 9,682.62 | 4,081,290.73 |
| 11-Mar-2024 | Interest Payment | INTEREST (GROSS) | | 9,705.64 | 4,090,996.37 |
| 09-Apr-2024 | Interest Payment | INTEREST (GROSS) | | 9,101.07 | 4,100,097.44 |
| 09-May-2024 | Interest Payment | INTEREST (GROSS) | | 9,435.84 | 4,109,533.28 |
| 10-Jun-2024 | Interest Payment | INTEREST (GROSS) | | 10,088.06 | 4,119,621.34 |
| 09-Jul-2024 | Interest Payment | INTEREST (GROSS) | | 9,164.75 | 4,128,786.09 |
| 09-Aug-2024 | Interest Payment | INTEREST (GROSS) | | 9,818.59 | 4,138,604.68 |
| 09-Sep-2024 | Interest Payment | INTEREST (GROSS) | | 9,841.94 | 4,148,446.62 |
| 09-Oct-2024 | Interest Payment | INTEREST (GROSS) | | 9,547.11 | 4,157,993.73 |
| 11-Nov-2024 | Interest Payment | INTEREST (GROSS) | | 9,888.05 | 4,167,881.78 |
| 05-Dec-2024 | Inter Account Transfer | P9-12, 24, P1-8 TO 02749020 300002 | 1,829,903.02 | | 2,337,978.76 |
| 09-Dec-2024 | Interest Payment | INTEREST (GROSS) | | 7,661.18 | 2,345,639.94 |
| Totals | | | 1,829,903.02 | 112,972.68 | |
| End of Report Ledger Balance | | | | | 2,345,639.94 |

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14.6 Appendix F: Deliverables in full submission

| Ref | Project Deliverable | Deadline | Evidence |
|-----|---|----------|--|
| 1 | QUEST Initial Report - Use Cases | 31/07/21 | Document introducing the Project and detailing the use cases and scenarios. |
| 2 | QUEST System Design and Architecture Lessons Learned | 31/12/21 | Document explaining Project progress including the following outputs: Review of architecture options Specification for the network models and modelling regime |
| 3 | QUEST Trials, Design and Specification Report | 30/06/22 | Document explaining Project progress including the following outputs: <ul style="list-style-type: none"> Functional specification for chosen architecture Functional specification for voltage control methodology Trial design Detailed site design |
| 4 | QUEST Interim Report - System Design and Technology Build Lessons Learned | 30/06/23 | Document detailing Project progress to date including lessons learned from: <ul style="list-style-type: none"> QUEST software development and testing Power system model development Site installation for the voltage control and ANM equipment |
| 5 | QUEST System Integration Lessons Learned Report | 30/12/23 | Document detailing the lessons learned from the installation and commissioning of the QUEST system including system integration and the results of site acceptance testing. |
| 6 | Customer Research Findings Report | 31/10/24 | Document detailing the outputs from the customer research. |
| 7 | QUEST Trials and Analysis Report | 30/12/24 | Document detailing: <ul style="list-style-type: none"> Final results from network trials Final results from modelling trials |

| Ref | Project Deliverable | Deadline | Evidence |
|-----|---|----------------|---|
| | | | <ul style="list-style-type: none"> Output from the voltage demand relationship research Any adaptation required to voltage control methodology |
| 8 | QUEST Final Report | 30/04/25 | Report on the conclusion of the QUEST Project including all the lessons learned and detailing the next steps, including BaU transition. |
| 9 | Comply with knowledge transfer requirements of the Governance Document. | End of Project | <p>Annual Project Progress Reports which comply with the requirements of the Governance Document.</p> <p>Completed Close Down Report which complies with the requirements of the Governance Document.</p> <p>Evidence of attendance and participation in the Annual Conference as described in the Governance Document.</p> |

14.7 Appendix G: Whitegate GSP geographical network area

