

# QUEST

## An overarching control system

**electricity**  
**north west**  
Bringing energy to your door

OVERARCHING CONTROL SYSTEM

# QUEST



QUEST Project Progress Report 3

Issue: V1.0

Submission Date: 8 December 2023

### Project Partners

national **grid** ESO   **FUNDAMENTALS**   **Schneider**  
Electric

smarter **grid** solutions   **IMPACT**  
FROM INSIGHT TO INFLUENCE

## Version

Version	Date	Author	Status	Comments
Issue 1	07/12/23	Andrew Howard	Final	
V1.1	03/01/23	Andrew Howard	Correction	Appendix E Bank Statement Revised. Period covered corrected.

## Review

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## Contents

Glossary.....	5
1. Executive summary .....	7
1.1 The Project	7
1.2 Project progress	7
1.3 Risks	10
2 Project manager’s report .....	13
2.1 Project background	13
2.2 Project update	14
2.3 QUEST deliverables in this reporting period	15
2.4 Customer workstream	16
2.5 Learning and Dissemination workstream	16
2.6 Project trial and test area	17
3 Business case update .....	17
4 Progress against plan .....	18
5 Progress against budget.....	18
6 Bank account.....	19
7 Project deliverables.....	19
8 Learning outcomes.....	21
9 Intellectual Property Rights (IPR).....	22
10 Risk management.....	22
11 Consistency with full submission .....	22
12 Data Access Details .....	23
13 Accuracy assurance statement .....	23
14 Appendices.....	24
14.1 Appendix A: Status of current project risks	24
14.2 Appendix B: Project deliverables – Revised as per December 23 Extension Request	34

14.3	Appendix C: Project direction budget	35
14.4	Appendix D: Detailed project expenditure	37
14.5	Appendix E: Project bank account	38
14.6	Appendix F: Deliverables in full submission	39

## Glossary

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

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

# 1. Executive summary

## 1.1 The Project

For the purposes of this report, “the project” refers to the Network Innovation Competition (NIC) funded project, “QUEST” refers to the overarching system, and the “optimisation software” refers to the software used to enable QUEST.

The project started in April 2021 and the expected finish date is mid-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.

## 1.2 Project progress

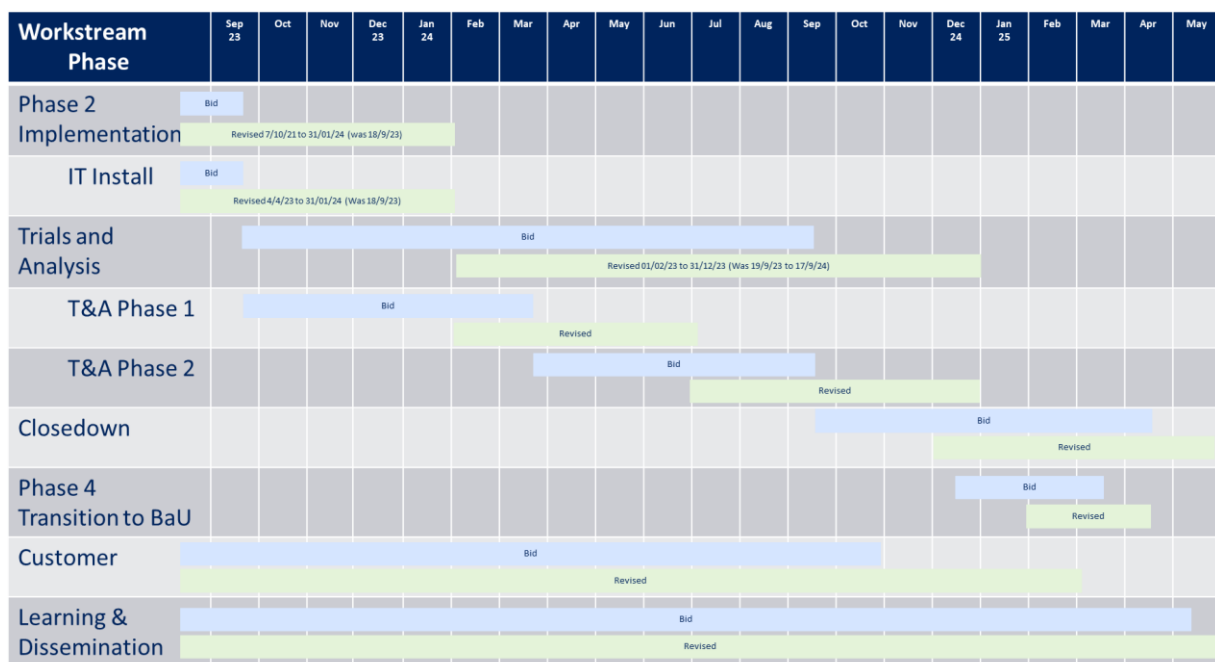
This is the third annual project progress report (PPR). This report covers the period from 9 December 2022 to 8 December 2023.

This period has seen progress in several key activities, including completion of the onsite installation work, successful acceptance testing of QUEST software and commencement of customer engagement activities. The detailed low-level IT infrastructure design was completed, and significant effort has been committed to the delivery of this infrastructure.

However, this has proved problematic in its completion with delivery of the end-to-end QUEST IT solution still ongoing. Review of the overall project plan has been undertaken to re-evaluate the impact on the Trials and Analysis phase considering the limited testing undertaken to date. The root cause of the delay to completion of the end-to-end IT solution is a result of industry-wide enhancement of cyber security requirements, which has had, and continues to have, impact on the delivery complexity and supporting resource requirements. Ofgem have been informed of the planned project changes, which will add one month to the project delivery timeline.

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)



Whilst the project awaits completion of the underlying IT infrastructure, several limited, live trials of future QUEST functionality have been performed by accessing the new QUEST site equipment.

The project has also delivered several project milestones that have no, or limited, dependency on the project’s IT Infrastructure. These are shown in Figure 1.2.2.



Figure 1.2.2: Project milestones delivered in this reporting period

Date	Milestone
21&22/02/23	Two-day project partner workshop
27/02/23	Change of ENWL Project Manager
25/03/23	Completion of core bulk and primary substation installation work
26/04/23	Completion of QUEST software Factory Acceptance Test (FAT)
26/05/23	Approval for commencement of IT infrastructure build process
29/06/23	Interim Report - System Design Technology Build Lessons Learnt
05/07/23	SuperTAPP QUEST software ENWL acceptance test
21/07/23	Completion of final distribution OLTC installation
25/08/23	Completion of customer engagement (Area 1 - LV)
06/10/23	Completion of QUEST software System Acceptance Test (SAT)
24/10/23	Commencement of customer engagement (Area 2 – EHV & HV)
01/11/23	QUEST presentation at the Energy Innovation Summit, Liverpool
02/11/23	Completion of ancillary bulk and primary installation work (generators)

The fourth project deliverable “QUEST Interim Report - System Design and Technology Build Lessons Learned” detailed the project progress to date including lessons learned from:

- QUEST software development and testing
- Power system model development
- Site installation for the voltage control and Active Network Management (ANM) equipment
- The IT infrastructure design required to meet enhanced cyber security requirements

The report explained the difficulties facing the project from enhanced cyber security requirements, and detailed the actions, assumptions, and mitigation measures being applied to achieve project progress, and is available on our [website](#).

The project team is on track to deliver the fifth deliverable, “QUEST System Integration Lessons Learned Report”, due for submission on the 30 December 2023. As full end to end integration is not anticipated to be completed until February then ENWL propose this remains a living document until April 2024 to be updated with final lessons learned.

This is progressing well and will cover the many successfully delivered elements of the project; however, due to the issues with completion of the IT infrastructure build, some areas will report on progress to date, and therefore will be updated following the commencement of full live trials in Q1 2024.

The project actual costs to date (end-Nov) are £4,775,930 and the estimated at completion cost is now £9,096,501, which is 1% over project budget (including contingency). Work continues to control remaining costs within budget.

### 1.3 Risks

There have been several changes to the risk log since the last reporting period, the most significant is the addition of new risks, described below.

#### **R032 – Project Resource Issues – (new risk) – raised 12/12/22**

In December 2022, the QUEST project manager decided to leave ENWL. The risk was raised and the transfer of the project to another ENWL innovation programme manager was instigated. Formal transfer of responsibilities took place in March 2023. To support the handover of the project, a full in-person project partner meeting was brought forward to take place with both the original and new project manager present.

This risk has been extended as other original team members have left the project.

The risk relates to the loss of knowledge and experience from the project and possible impact on quality, and the risk that a change of personnel may impact delivery dates.

#### *Mitigation*

Knowledge gaps are being filled by reference to documented material, and ongoing discussion with project partners for improved context.

#### **R033 – IT Infrastructure (Operating Systems) – (new risk) – 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.

#### *Mitigation*

ENWL and the project partners agreed the transfer of several infrastructure build and support activities. This will result in some elements of work budgeted as “Labour (ENWL)” being recorded as “Contractor” costs. During the build process several consequences were identified and raised as separate risks.

This risk was originally logged as a minor issue, but has since been escalated as the transfer of work has generated wider risks and issues.

### **R034 – IT Infrastructure (System Access) – (new risk) – Raised 21/04/23**

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

#### *Mitigation*

ENWL has a robust Business as Usual (BaU) process for account setup.

However, the standard IT processes have been tested by this project build, which as an innovation project has its own uniqueness and complexities. Issues include security vetting for non-UK citizens, remote access from outside UK, complexity of secure systems and firewalls to navigate, originality of QUEST design, additional personnel at short notice for a specific technical resolution, account validity periods and resetting of passwords.

Additional mitigations have been applied, including simpler processes for lower risk systems, improved communication routes to speed changes, change escalation for approval processes. However, the project has incurred a significant cumulative delay from this Issue.

### **R035 – IT Infrastructure (Secure File Transfer) – (new risk) – Raised 25/08/23**

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

The secure design required file transfer into the ENWL data centre via a manual USB process. Whilst this was sufficient for the major software build phase, it quickly became apparent that the volume of small changes, e.g., configuration files, made the manual process slow and ineffective and would result in additional project delay.

#### *Mitigation*

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.

However, adapting this standard solution to the complexities of the QUEST design has been challenging; problems experienced include firewalls into the secure QUEST zone and movement of files between ENWL and supplier systems within the QUEST zone. Due to the nature of the access the system is less reliable than anticipated, with periods of unavailability whilst fault finding occurs. Fault finding has required several specialist skill-sets from within ENWL and, on occasions, from our project partners, to be available concurrently to resolve particular issues, which has proven difficult to achieve at times. The ability to secure the necessary experts, usually from cyber tasks, in a reasonable timeframe is a significant reason contributing to the delays in completion of the IT build.

### **R036 – IT Infrastructure (Resources) – (new risk) – 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.

The ENWL work under the Cyber Assessment Framework (CAF) required by the Network and Information Systems Regulations 2018 has placed a significant business critical workload across all IT and other ENWL departments. From the commencement of build activity, it became apparent that delivery and response times would be significantly different to previous projects. These began to impact and exacerbate the technical delays on the project.

Owing to the revised secure design requirements for QUEST, there has been a need for expertise from several different IT experts. When issues have arisen there has been a continual need to collate these limited expert resources away from their other activities, resulting in deployment and prioritisation challenges.

#### *Mitigation*

The issue was formally escalated with Head of Network Innovation and the Heads of the ENWL IT departments, with certain changes to processes and practices agreed to help minimise delays. However, the risk remains significant as the cyber review, and its resultant programme, are nationally critical and therefore remain the highest priority whenever a conflict exists.

It is expected that once trials have commenced, the requirement for this constrained resource will significantly reduce.

### **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.

#### *Mitigation*

The project is trialling integration with three different ANM systems. The ENWL ANM development is also in partnership with SE and utilises common development resources.

## 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 third reporting period and, as highlighted in the Executive Summary, implementation challenges relating to IT infrastructure have impacted the commencement of full trials and, therefore, a review of project deliverable dates is underway.

Aside from the IT infrastructure issues, the remainder of the project remains effectively on plan, with minor variances being negated by the infrastructure slippage.

The installation of new AVC equipment at the project sites was completed in March 2023, with only minor works relating to adaptations for feeder customer generation left outstanding, awaiting system outages. These works were completed in November, including some additional feeders, once additional suitable authorised resources were contracted to cover personnel changes in the project.

The parallel work developing the QUEST functionality continued successfully and was accepted in July. The rollout of the software onto the majority of on-site equipment has been completed, with the last units to be complete by 15 December 2023. The resources for the rollout had been optimised with the knowledge of the IT infrastructure delays.

The installation of the seven distribution on line tap changing transformers was completed in July 2023. The last unit was delayed by a few months due to access and outage challenges relating to a care home at which the substation was located.

No additional plant installation work is required.

The development of the QUEST overarching software was completed, with the development of a functional specification based on all the previous use case work. The software was factory tested in April 2023 and system tested in October 2023.

The infrastructure issues resulted in a slight change for testing in that the system test was performed on identical infrastructure located at SE. This does result in a slight increase in risk when deployed on the identical infrastructure at ENWL. The risk of the software integration with real-world devices remains unchanged.

The testing identified a few minor bugs at both stages. The final testing identified six minor issues, of which two will be resolved by start of trial and the remaining by the end of Q1 2023. None of these bugs were significant enough to impact start of trials.

Work with SGS on the DeCentralised and Cloud ANM systems has continued through this period with functional specification, test plans and other low-level designs agreed. The IT issues have impeded the system build progress; however, the initial build of the DeCentralised systems on ENWL infrastructure was completed in November and is awaiting final integration with the rest of the system for final testing in Q1 2024. The Cloud ANM build, which is not on ENWL infrastructure, has also been

completed to the point where integration testing with the ENWL system is required. Although ENWL has started offering flexible ANM connections, it should be noted that the full capabilities of the system are not yet mature and there is a concern that there may be a delay in QUEST interfacing whilst that system gets up and running. The final testing of the ENWL ANM is conditional on ENWL having real customers connected and commissioned onto the network. As noted above, QUEST will interface with the SGS ANM systems in a similar manner to that of the ENWL system.

Customer engagement work commenced in this period, with the baseline work for domestic consumers agreed and completed in August 2023.

The initial engagement of HV and EHV customers has also been scoped, agreed and commenced. Progress is being made, but at a slower rate than planned due to difficulties reaching the suitable specialist within these organisations. However, the work is expected to complete before year end and well before commencement of trials.

Preparations for the trial period have commenced and been adapted to take account of resource changes in the project team and integration with other system operational processes. Whilst delayed by the stated infrastructure issues, the project team has carried out a number of manual network tests to confirm the outputs of the network modelling and simulation work carried out to date. The results, once analysed, will be used to refine the trial test plans and maximise learning from the trial period.

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

- Development of QUEST overarching software to meet published requirements.
- Completing all on site works, including relay development in time for trial period.
- Project monitoring and control, building on established innovation project management processes and compliance with governance. Including enhancing escalation routes within a changing organisation to mitigate the delays cyber-related challenges.
- Regular engagement, weekly and bi-weekly project management meetings with partners (individuals and whole team) have continued throughout personnel changes with progress update presented to all industry stakeholders at the Energy Innovation Summit. During this period the ENWL IT lead has joined these regular meetings to improve the communication and progress of IT-related issues.

## 2.3 QUEST deliverables in this reporting period

The fourth project deliverable, “QUEST Interim Report - System Design and Technology Build Lessons Learned” was delivered as planned on 30 June 2023 and published on the ENWL website alongside all associated project documentation.

This report focusses on the design and build of the overarching software and provides updates on site works and IT infrastructure and the power system modelling previously delivered.

The fifth project deliverable, “QUEST System Integration Lessons Learned Report” is due 30 December 23. An interim version will be published on time, but reflecting that the project is still completing full end-to-end integration. An amendment will be made in Q2 2024 once full trials have commenced all lessons learnt have been collated.

## 2.4 Customer workstream

Following an effective pause in this workstream whilst other project elements were delivered, the customer workstream was re-established to initially focus on the planned domestic baseline followed by the initial HV and EHV customer engagement.

Working within the Customer Engagement Plan (CEP), a domestic questionnaire was developed, reviewed, trialled, and amended prior to commencement of field survey work. The baseline was completed in August 2023 largely as anticipated from previous domestic engagement work.

A similar process was adopted for the initial HV and EHV customer engagement, with additional work required pre field survey, reflecting the additional complexity of what the engagement is to achieve, and the need to ensure the suitable specialist within each organisation was identified. The field survey work commenced in October 2023 and highlighted the continued difficulty in engaging with a suitable specialist. An improvement was identified in ENWL data sets and steady progress, if slower than originally anticipated, is being made.

## 2.5 Learning and Dissemination workstream

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

- Third annual QUEST project partners away day in February (brought forward to support ENWL project manager change).
- Updates to QUEST website throughout year.
- Two papers based on QUEST learnings were presented to CIRED in Rome, June 23 by SGS and SE. The papers were co-authored with ENWL and other partners as appropriate.
  - 10291 QUEST - An Overarching System Control Solution
  - 10295 Voltage Demand Relationship Modelling for Future Energy Scenarios
- Presentation on QUEST at ENA’s Energy Innovation Summit in Liverpool in November 2023
  - A video update, used on the ENWL stand during the Summit, has been made available on the QUEST website, [here](#)<sup>1</sup>.

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<sup>1</sup> [www.enwl.co.uk/future-energy/innovation/key-projects/quest/quest-library/learning-and-dissemination/](http://www.enwl.co.uk/future-energy/innovation/key-projects/quest/quest-library/learning-and-dissemination/)



- 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 2024.

The yield summary learning point flagged in last year's PPR has been included within the delivered overarching software within its existing funding envelope.

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 2024 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.

As noted, all site works will be complete in December 2023 ready for the commencement of trials.

In preparation for the trials, revised processes have been developed to ensure QUEST remains in step with the real network, whilst QUEST trials and other BaU activity is closely co-ordinated.

QUEST now has a senior ENWL control engineer assigned to the project to run and co-ordinate the trial works and subsequent learnings.

## 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 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".

The changes anticipated by the IT infrastructure issues and the change to the remaining project timelines will incur a net increase in project costs. However, it is planned 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.

To date, in Trial Phase 1 ENWL has only been able to conduct limited manual network trials due to delays with the development and commissioning of the end-to-end QUEST solution. The current plan is to be able to commence full network trials on Monday 5 February 2024. To achieve maximum learning value from the QUEST project, the project team should endeavour to complete further testing after September 2024 and therefore extend the trial period to 31 December 2024, and condense the closedown to complete the project one month later than planned (31 May 2025).

It is recommended that the learnings would be robust if 12 months of full system trials could be delivered. It is important to ascertain performance of the full QUEST solution across all four seasonal loading conditions, so a compromise is proposed that reduces the 12-month trial period by one month, but ensuring that heavily-loaded months are included.

The project is also seeking to condense and parallel some work some items to reduce the review period to project end.

Following the trial period, the initial plan included a period of six to seven months to review the data from the trial period, to develop the final learning from the project and to perform the appropriate learning, dissemination, and closedown activities. ENWL have planned to reduce this period to five months such that the project should complete by June 2025.

As detailed above, whilst all project deliverables 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 01 December 2023.

It will be noted that the project is currently performing favourably, relative to budget. Project expenditure as at the end of November 2023 was £4,775,930 compared to a cost baseline of £7,091,596.

This variance in project expenditure to baseline cost is due to delays within elements of the project causing delays to 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. A number of payments are associated with the end of the implementation phase.

Within Contractors-Learning and Dissemination, the contract phasing of payments is earlier to that in the bid, resulting in an apparent overspend which will resolve by the end of the project.

The project has made small savings to budget in some areas and movement between areas to reflect changes of responsibilities. The project is performing within overall budget in terms of cost, which is due to a strong commercial and project management governance in place within the project.

*Table 5.1: Summary of project expenditure*

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date			Total Project			% Variance to Plan
	Actual	Plan	Variance	Forecast	Plan	Variance	
Labour	916,245	1,467,725	551,480	1,992,098	1,988,643	(3,456)	0%
Equipment	387,494	563,986	176,492	564,879	563,986	(893)	0%
Contractors	1,008,369	1,125,731	117,362	1,985,215	1,960,565	(24,650)	-1%
IT	2,348,282	3,093,907	745,625	3,408,468	3,339,666	(68,802)	-2%
Travel & Expenses	0	16,085	16,085	16,294	16,085	(209)	-1%
Payments to Users	0	0	0	19,998	19,998	0	0%
Contingency	0	583,504	583,504	707,002	707,511	509	0%
Decommissioning	0	0	0	29,021	29,021	0	0%
Other	115,541	240,660	125,119	373,526	373,959	432	0%
<b>Total</b>	<b>4,775,930</b>	<b>7,091,596</b>	<b>2,315,666</b>	<b>9,096,501</b>	<b>8,999,432</b>	<b>(97,069)</b>	

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 up to the end of November 2023.

## 7 Project deliverables

There was a single deliverable due for submission in this reporting period, "QUEST Interim Report - System Design and Technology Build Lessons Learned". This report was submitted to Ofgem on 29 June 2023 and uploaded to the QUEST website.

All deliverables are shown in Table 7.1 below. Deliverable five is due later this month, but will be an interim report with an updated final report to follow post-commencement of trials.

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"> <li>Review of architecture options</li> <li>Specification for the network models and modelling regime</li> </ul>	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"> <li>Functional specification for chosen architecture</li> <li>Functional specification for voltage control methodology</li> <li>Trial design</li> <li>Detailed site design</li> </ul>	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"> <li>QUEST software development and testing</li> <li>Power system model development</li> <li>Site installation for the voltage control and ANM equipment</li> </ul>	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.	30/12/23 Revised Initial 30/12/23  Updated 30/04/24
6	Customer Research Findings Report	31/10/24	Document detailing the outputs from the customer research.	31/10/24  Revised 28/02/25
7	QUEST Trials and Analysis Report	30/12/24	Document detailing: <ul style="list-style-type: none"> <li>Final results from network trials</li> <li>Final results from modelling trials</li> <li>Output from the voltage demand relationship research</li> </ul>	30/12/24  Revised 31/04/24

Ref	Project Deliverable	Deadline	Evidence	Status / Revised Date
			<ul style="list-style-type: none"> <li>Any adaptation required to voltage control methodology</li> </ul>	
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 Revised 31/05/25
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 has ultimately increased complexity and also 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 a number of 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.

Deliverable five, “QUEST Interim Report - System Design and Technology Build Lessons Learned” will explore learning outcomes in greater detail, but beyond the themes of IT infrastructure learning around the below topics will be included:

- Design process from Concept to Fine detail and impact of detail to design.
- Improving communication technologies, with non-UK based personnel.
- Project management through key resource changes.

## 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 not yet fully complete. Risks around the final integration of all subsystems remain, as these have yet to be tested, and based on recent experience further unexpected cyber-related issues may arise.

The requested project extension is believed to be reasonable and the project deliverable within its 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 (Victoria Turnham).

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	1	4	open

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	to Close
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 years and keep them in storage for when required for installation next year  (08/12/23) Deliveries were managed in line with project.	1	4	to Close

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.	1	5	Open
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	to Close
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	5	to close
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	4	to close

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.	2	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 quickly and appropriately manage any customer impacts.	1	3	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 being 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	to close
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.	5	5	Open
Project work groups	Not being able to set up SharePoint access were 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 SharePoint platform. Which all project partners have access to and work off collectively	1	2	Open

Project Phase /Workstream	Description	Probability Score	Impact Score	Mitigating Action	Revised Probability Score	Revised Impact Score	Status
Technology	Due to the Covid Pandemic there has being 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	to close
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.	5	4	Open
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.	2	5	Open

Project Phase /Workstream	Description	Probability Score	Impact Score	Mitigating Action	Revised Probability Score	Revised Impact Score	Status
QUEST Tests and Trials	SS and ANM are due to be in BAU early 2023, if there is delay 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.	3	5	Open
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.	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.	2	2	New



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 a number of infrastructure build and support activities	2	2	New
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.	2	2	New
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.	2	2	New
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	5	4	New

## 14.2 Appendix B: Project deliverables – Revised as per December 23 Extension Request

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"> <li>Review of architecture options</li> <li>Specification for the network models and modelling regime</li> </ul>	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"> <li>Functional specification for chosen architecture</li> <li>Functional specification for voltage control methodology</li> <li>Trial design</li> <li>Detailed site design</li> </ul>	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"> <li>QUEST software development and testing</li> <li>Power system model development</li> <li>Site installation for the voltage control and ANM equipment</li> </ul>	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.	30/12/23 Revised Initial 30/12/23 Updated 30/04/24
6	Customer Research Findings Report	31/10/24	Document detailing the outputs from the customer research.	31/10/24 Revised 28/02/25
7	QUEST Trials and Analysis Report	30/12/24	Document detailing: <ul style="list-style-type: none"> <li>Final results from network trials</li> <li>Final results from modelling trials</li> </ul>	30/12/24 Revised 31/04/24

Ref	Project Deliverable	Deadline	Evidence	Status / Revised Date
			<ul style="list-style-type: none"> <li>Output from the voltage demand relationship research</li> <li>Any adaptation required to voltage control methodology</li> </ul>	
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 Revised 31/05/25
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

### 14.3 Appendix C: Project direction budget

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

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


Project planned spend to date:

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date Plan
<b>Labour</b>	<b>1,467,725</b>
Labour - Project Management	255,062
Labour - Customer Engagement	84,752
Labour - System Design	228,966
Labour - Implementation	805,312
Labour - Trials & Analysis	76,897
Labour - BAU Transition	-
Labour - Learning & Dissemination	16,735
<b>Equipment</b>	<b>563,986</b>
Equipment - Implementation	563,986
<b>Contractors</b>	<b>1,125,731</b>
Contractors - Project Management	386,769
Contractors - System Design	240,972
Contractors - Implementation	391,045
Contractors - Trials & Analysis	71,346
Contractors - BAU Transition	-
Contractors - Learning & Dissemination	5,671
Contractors - Customer Engagement	29,927
<b>IT</b>	<b>3,093,907</b>
IT - System Design	2,772,943
IT - Implementation	240,686
IT - Trials & Analysis	80,278
<b>Travel &amp; Expenses</b>	<b>16,085</b>
<b>Payments to users</b>	<b>-</b>
<b>Contingency</b>	<b>583,504</b>
<b>Decommissioning</b>	<b>-</b>
<b>Other</b>	<b>240,660</b>
Other - Project Management	18,745
Other - Accommodation	73,037
Other - Learning & Dissemination	148,878
<b>Total</b>	<b>7,091,596</b>

## 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	
<b>Labour</b>	<b>916,245</b>	<b>1,467,725</b>	<b>551,480</b>	<b>1,992,098</b>	<b>1,988,643</b>	<b>(3,456)</b>	<b>0%</b>
Labour - Project Management	226,562	255,062	28,500	378,200	374,743	(3,456)	-1%
Labour - Customer Engagement	4,900	84,752	79,852	215,628	215,628	0	0%
Labour - System Design	136,347	228,966	92,619	228,966	228,966	(0)	0%
Labour - Implementation	537,052	805,312	268,260	805,312	805,312	(0)	0%
Labour - Trials & Analysis	2,244	76,897	74,653	310,874	310,875	1	0%
Labour - BAU Transition	-	-	-	27,043	27,043	-	0%
Labour - Learning & Dissemination	9,140	16,735	7,596	26,076	26,076	0	0%
<b>Equipment</b>	<b>387,494</b>	<b>563,986</b>	<b>176,492</b>	<b>564,879</b>	<b>563,986</b>	<b>(893)</b>	<b>0%</b>
Equipment - Implementation	387,494	563,986	176,492	564,879	563,986	(893)	0%
<b>Contractors</b>	<b>1,008,369</b>	<b>1,125,731</b>	<b>117,362</b>	<b>1,985,215</b>	<b>1,960,565</b>	<b>(24,650)</b>	<b>-1%</b>
Contractors - Project Management	348,718	386,769	38,052	611,573	593,858	(17,714)	-3%
Contractors - System Design	231,854	240,972	9,118	246,212	240,972	(5,240)	-2%
Contractors - Implementation	319,725	391,045	71,320	424,744	427,594	2,850	1%
Contractors - Trials & Analysis	65,254	71,346	6,092	381,246	380,013	(1,232)	0%
Contractors - BAU Transition	-	-	-	155,043	151,729	(3,314)	-2%
Contractors - Learning & Dissemination	38,290	5,671	(32,618)	84,140	84,140	-	0%
Contractors - Customer Engagement	4,529	29,927	25,399	82,258	82,259	0	0%
<b>IT</b>	<b>2,348,282</b>	<b>3,093,907</b>	<b>745,625</b>	<b>3,408,468</b>	<b>3,339,666</b>	<b>(68,802)</b>	<b>-2%</b>
IT - System Design	2,348,282	2,772,943	424,661	2,835,706	2,772,943	(62,763)	-2%
IT - Implementation	-	240,686	240,686	241,453	240,686	(767)	0%
IT - Trials & Analysis	-	80,278	80,278	331,309	326,037	(5,272)	-2%
<b>Travel &amp; Expenses</b>	<b>-</b>	<b>16,085</b>	<b>16,085</b>	<b>16,294</b>	<b>16,085</b>	<b>(209)</b>	<b>-1%</b>
<b>Payments to users</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>19,998</b>	<b>19,998</b>	<b>-</b>	<b>0%</b>
<b>Contingency</b>	<b>-</b>	<b>583,504</b>	<b>583,504</b>	<b>707,002</b>	<b>707,511</b>	<b>509</b>	<b>0%</b>
<b>Decommissioning</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>29,021</b>	<b>29,021</b>	<b>0</b>	<b>0%</b>
<b>Other</b>	<b>115,541</b>	<b>240,660</b>	<b>125,119</b>	<b>373,526</b>	<b>373,959</b>	<b>432</b>	<b>0%</b>
Other - Project Management	-	18,745	18,745	38,154	38,569	415	1%
Other - Accommodation	69,060	73,037	3,977	107,865	107,865	(0)	0%
Other - Learning & Dissemination	46,481	148,878	102,397	227,507	227,524	18	0%
<b>Total</b>	<b>4,775,930</b>	<b>7,091,596</b>	<b>2,315,666</b>	<b>9,096,501</b>	<b>8,999,432</b>	<b>-97,069</b>	<b>-1%</b>

## 14.5 Appendix E: Project bank account

LLOYDS BANK 		Balance and Transaction Report			03-Jan-2024 8:37:20 AM Page 1 of 1	
<b>Client ID:</b>		14121616				
<b>Reporting Period:</b>		09-Dec-2022 to 07-Dec-2023				
<b>Bank Name:</b>		Lloyds				
<b>Account Number / Name / Currency Code:</b>		308012-21586468 / ELECTRICITY NORTH WEST LIMITED - QU / GBP				
<b>Closing Ledger Balance As At:</b>		06-Jan-2023			<b>Closing Ledger:</b>	5,882,225.71
Posting Date	Type	Details	Debits	Credits	Ledger Balance	
09-Jan-2023	Interest Payment	INTEREST (GROSS)		4,963.63	5,887,189.34	
11-Jan-2023	Inter Account Transfer	1085791670 TO 02749020 300002	69,055.31		5,818,134.03	
09-Feb-2023	Interest Payment	INTEREST (GROSS)		6,426.32	5,824,560.35	
16-Feb-2023	Inter Account Transfer	1088181590 TO 02749020 300002	212,324.67		5,612,235.68	
09-Mar-2023	Interest Payment	INTEREST (GROSS)		6,382.61	5,618,618.29	
21-Mar-2023	Inter Account Transfer	1090208685 TO 02749020 300002	103,872.07		5,514,746.22	
11-Apr-2023	Interest Payment	INTEREST (GROSS)		7,646.73	5,522,392.95	
13-Apr-2023	Inter Account Transfer	1091766756 TO 02749020 300002	346,185.96		5,176,206.99	
09-May-2023	Interest Payment	INTEREST (GROSS)		6,368.44	5,182,575.43	
11-May-2023	Inter Account Transfer	1093547565 TO 02749020 300002	457,165.98		4,725,409.45	
09-Jun-2023	Interest Payment	INTEREST (GROSS)		6,441.42	4,731,850.87	
27-Jun-2023	Inter Account Transfer	PERIOD 2 TO 02749020 300002	62,603.96		4,669,246.91	
10-Jul-2023	Interest Payment	INTEREST (GROSS)		9,466.09	4,678,713.00	
31-Jul-2023	Inter Account Transfer	NIC PROJECT TO 02749020 300002	151,009.75		4,527,703.25	
09-Aug-2023	Interest Payment	INTEREST (GROSS)		10,271.19	4,537,974.44	
11-Sep-2023	Interest Payment	INTEREST (GROSS)		11,425.75	4,549,400.19	
09-Oct-2023	Interest Payment	INTEREST (GROSS)		9,771.86	4,559,172.05	
09-Nov-2023	Interest Payment	INTEREST (GROSS)		10,842.09	4,570,014.14	
07-Dec-2023	Inter Account Transfer	IAT P06 QUEST TO 02749020 300002	98,312.87		4,471,701.27	
07-Dec-2023	Inter Account Transfer	IAT P04 QUEST TO 02749020 300002	113,210.09		4,358,491.18	
07-Dec-2023	Inter Account Transfer	IAT P07 QUEST TO 02749020 300002	103,487.48		4,255,003.70	
07-Dec-2023	Inter Account Transfer	IAT P08 TO ENWL TO 02749020 300002	155,391.80		4,099,611.90	
07-Dec-2023	Inter Account Transfer	IAT P05 QUEST TO 02749020 300002	48,061.20		4,051,550.70	
<b>Totals</b>			<b>1,920,681.14</b>	<b>90,006.13</b>	<b>4,051,550.70</b>	
<b>End of Report Ledger Balance</b>					<b>4,051,550.70</b>	

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. Authorized 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.

## 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"> <li>• Functional specification for chosen architecture</li> <li>• Functional specification for voltage control methodology</li> <li>• Trial design</li> <li>• Detailed site design</li> </ul>
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"> <li>• QUEST software development and testing</li> <li>• Power system model development</li> </ul> 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"> <li>• Final results from network trials</li> <li>• Final results from modelling trials</li> <li>• Output from the voltage demand relationship research</li> </ul>

Ref	Project Deliverable	Deadline	Evidence
			<ul style="list-style-type: none"> <li>Any adaptation required to voltage control methodology</li> </ul>
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>