

The logo for Electricity North West, featuring the word "electricity" in blue and "north west" in green, with a stylized green leaf icon to the left.

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Respond Project Progress Report

Version 1.0

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RESPOND

VERSION HISTORY

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REVIEW

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GLOSSARY OF TERMS

Adaptive Protection	The use of adjustable protection settings that can be changed in real time
Association of Decentralised Energy (ADE)	Leading industry advocate of an integrated approach to delivering energy services using combined heat and power and district heating. Previously known as the Combined Heat and Power Association (CHPA)
CAT	Customer acceptance testing
Circuit breaker	Device that interrupts the flow of current in an electric circuit
CEP	Customer engagement plan
Combined heat and power (CHP)	Simultaneous generation of usable heat and power (usually electricity) in a single process
Demand side response (DSR)	Actions undertaken by distribution network operators to influence customers to change their electricity use, in terms of quantity and/or time of use
Distribution network operator (DNO)	The owner and/or operator of an electricity distribution system and associated assets
Engaged customer panel (ECP)	A panel of industrial and commercial customers used to help shape the customer survey approach and survey materials.
FAT	Factory acceptance testing
Fault Level Assessment Tool (FLAT)	Intelligent software which assesses near real time fault current peaks on the network and decides to enable or disable the mitigation technologies
Fault current	Actual current which flows during a fault
Fault Current Limiting service (FCL service)	A distributed generation and/or industrial and commercial customer-provided response to reduce overall fault current on the distribution network
Fault current mitigation technology	Device that responds to the flow of fault current in an electricity network and ensures that the fault current remains within network switchgear and circuit ratings
Fault level	Prospective maximum current which will flow during a fault
FlexDGrid	Second Tier LCN Fund fault level mitigation project run by Western Power Distribution
I_s-limiter	A fault current mitigation technology
LCN Fund	Low Carbon Networks Fund
Near real time	A measure of the frequency of the calculation by the Fault Level Assessment Tool. For Respond this will be every five minutes
NMS	Network management system
PPR	Project progress report

Primary substation	A point on the network where the voltage changes from 33kV to 11kV or 6.6kV
Protection relays	Device that analyses power system voltages and currents to detect faults and sends signals to circuit breakers to open
Successful delivery reward criteria (SDRC)	Key milestones to be delivered throughout the project
Substation	A point on the network where voltage transformation occurs
Switchgear	Device for opening and closing electrical circuits (including circuit breakers)

1 EXECUTIVE SUMMARY

1.1 The Respond project

This is the fourth six-monthly project progress report (PPR) for the Respond project. This project was approved under the name Fault Level Active Response (FLARE). This report covers the period from June 2016 to the end of November 2016.

Respond is seeking to demonstrate that a network's fault level can be estimated in near real time, and in responding to that estimation, a series of innovative technical and commercial techniques can be initiated to reduce the fault level without the need for expensive and time-consuming asset replacement. As this approach could maximise the use of existing assets and minimise the need for capital investment, Respond has the potential to realise significant cost savings to customers and improve the connection of generation to the network. There are four key elements to Respond:

- **Fault Level Assessment Tool:** This intelligent software has been deployed alongside the network management system (NMS) and uses data from it to predict the network's fault level in near real time. When it estimates the fault level increasing beyond a set threshold it will initiate one of three mitigation techniques:
- **Adaptive Protection:** This technique re-sequences the operation of circuit breakers (CBs) and is retro-fitted into existing substation equipment
- **Fault Current Limiting (FCL) service:** This will identify customers who operate equipment that contributes to fault current (eg large motors and generators) and are willing to help develop and ultimately enter into a managed commercial service backed by new technical interfaces with their equipment
- **I_S-limiters:** These devices are widely used across the world to limit fault current, but are not used on GB DNO networks due to compliance issues with GB regulations. Two devices have been installed, along with a further five I_S-sensing installations of monitoring-only equipment.

1.2 Progress to date

The project is on track and all of the SDRC have been delivered as planned. The project went live in May 2016 and consequently entered the two-year trials and analysis phase of the project to collect data and analyse the effectiveness of the installed techniques. The project team are currently collating the final installation costs and completing snagging problems.

The key project highlights during the reporting period are outlined below according to the four project workstreams.

1.2.1 Technical workstream

Fault Level Assessment Tool

The Fault Level Assessment Tool is now integrated into the NMS, calculating close to real time fault levels and taking the appropriate action following comparisons with plant ratings and enabling/disabling the techniques.

Adaptive Protection

The Adaptive Protection installations have been completed and sites are now operational. Since the trial period began three network faults have occurred to which the adaptive protection solution has responded correctly.

I_S-limiter and I_S-sensing units

The I_S-limiter and I_S-sensing units have been installed at seven substation sites by Electricity North West employees and commissioned by ABB. To date no network faults have occurred to cause any of the I_S-limiter or I_S-sensing sites to operate.

1.2.2 Trials & analysis workstream

Post-fault monitoring and analysis procedure

Every fault that occurs within the Respond network must be validated to ensure that the correct action has taken place. The Post Fault Analysis Methodology (published on the project [website](#)) details the process and data requirements to confirm: fault level, operation of each of the respective fault level mitigation techniques and Fault Level Assessment Tool action.

Three successful post-fault Adaptive Protection operations have occurred during the first six months of the trial. The data has been collected, monitored and analysed and the results published on the website.

Asset health study

An asset condition monitoring site selection and equipment rotation programme has been agreed with EA Technology. The equipment has been installed at a number of selected sites and will be rotated across the Respond sites during the trial period.

Fault level monitors

Outram fault level monitors have been installed at a total of nine Respond sites. These monitors have been installed for the purpose of network model validation of both the Electricity North West IPSA+ network model and the Schneider Fault Level Assessment Tool. The first set of results has been provided from three sites, with validation work ongoing by the project partners.

1.2.3 Customer workstream

FCL service

The project team has continued to engage with United Utilities on the FCL service and has identified one site with combined heat and power (CHP). A number of sites will be surveyed with the aim of identifying a second suitable site with a large motor. Other potential trial participants operating CHP plants have been identified and consulted directly. Some sites have been discounted but investigations continue to identify up to three existing or newly connected demand and/or generation customers, to supplement the trials expected to take place at the United Utilities sites.

FCL service contract

The FCL service standard contract has been completed and negotiations are ongoing with United Utilities about specific terms and clauses. Commercial and legal representatives of both Electricity North West and United Utilities are engaged in ongoing discussions to agree the final terms of the installation and management contract. The contract template is available on the project [website](#).

FCL service tested in the marketplace

Communications materials developed and endorsed by an engaged customer panel (ECP) to take the FCL service to market were used to 'pitch' the concept to four potential trial participants. The communications strategy and suite of materials were well received by these customers and confirmed to be effective in communicating the fault level problem, the objectives of the project generally and the FCL service specifically. These customers understood the pricing mechanism and the factors influencing the benefits that might be available to their respective organisations.

Reconvened engaged customer panel report published

A report has been published on the project [website](#) documenting the lessons learned from the second phase of ECP engagement, which influenced the development and refinement of

the strategy for taking the FCL service to market. The ECP also evaluated associated communication materials and guided the commercial templates.

1.2.4 Learning and dissemination

The Respond project team have been utilising a range of tools in this reporting period to disseminate and share knowledge about the project with stakeholders. These include the project’s second webinar in September 2016, an advertorial, an industry newsletter, internal updates and regular updates on the project website and via social media. The Respond project was presented at the Low Carbon Networks and Innovation (LCNI) conference on the 12 October 2016.

All successful delivery reward criteria (SDRC) due in the reporting period have been achieved, and those due in the next period are on track.

The ten SDRC due in the reporting period were successfully delivered. The most significant of these are shown in Figure 1.1 below, and all are discussed in Section 5.

Figure 1.1: Most significant SDRC delivered in this reporting period

SDRC (evidence)	Planned date	Completion date
Issue third project progress report in accordance with Ofgem’s June and December production cycle and publish on Respond website	June 2016	June 2016
Publicise Respond within Electricity North West in monthly team brief pack and/or Volt (intranet) and/or Newswire (quarterly employee magazine)	June 2016	June 2016
Publish equipment specifications and installation reports for the Adaptive Protection	Sept 2016	Sept 2016
Publish equipment specifications and installation reports for the I _s -limiter	Sept 2016	Sept 2016
Publish NMS interface and configuration specifications and commissioning reports	Sept 2016	Sept 2016
Second webinar held	Sept 2016	Sept 2016
Actively participate at four annual LCNI conferences. Second conference 2016	Sept 2016	11-13 Oct 2016
Publish report on validation of the Fault Level Assessment Tool	Nov 2016	Nov 2016

Project expenditure as at the end of Nov 2016 was £3,206,000 compared to a cost baseline of £3,753,000. The project completion costs have exceeded budget due to the project design and installation being more complex and time consuming than expected.

1.3 Risks

Risks identified in the Respond project bid are regularly reviewed by the delivery team; a significant proportion of them have been mitigated during the delivery phase and are therefore no longer active and closed. No new risks have been identified since the last report.

The principal risk continues to be the ability to secure an FCL service participant if they decide not to participate in the trial. The project team are working with United Utilities to agree final terms for managed agreements at identified sites. The team are also continuing to work closely with ADE and EnerG to publicise the project and attract participants, as well as re-exploring Electricity North West's existing customer data base, again to attract willing participants. The project team is also seeking to engage suitable newly connected customers who may be interested.

Risks are monitored on a continuous basis, including the potential risks that were documented in the full submission. The revised status of each of these risks is described in Appendix A.

2 PROJECT MANAGER'S REPORT

2.1 General

During this reporting period the Ofgem project manager visited Electricity North West to see the Fault Level Assessment Tool in action as well as visiting site to see the I_S-limiter installation at Bamber Bridge and Adaptive Protection installation at Blackbull.

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

- **Project monitoring and control:** Processes for the monitoring and control of the delivery of the Respond project are well established. These processes build on those developed during earlier LCN Fund projects to ensure that this project progresses in a controlled manner and that the outputs are of the highest quality.
- **Regular engagement with project partners:** The Electricity North West Respond project team has engaged and continues to hold regular meetings with the project partners. In particular with Parsons Brinkerhoff in validation of the Fault Level Assessment Tool and working closely with ADE and EnerG to publicise the project and attract participants. In the trials period the project steering group meeting frequency has been adjusted to reflect project development.
- **Engagement with Ofgem project team:** Monthly communication with the Ofgem project team has continued throughout the project.

2.2 Technology workstream

The key activities undertaken by the technology workstream during the reporting period are summarised below:

Adaptive Protection

The five Adaptive Protection sites have been waiting for multi-phase faults to occur on the network they supply. To date there have been three successful operations at Atherton Town Centre, two of which has been analysed and posted on the Respond website.

The Adaptive Protection design was adjusted to provide fault current information at the sites selected in order to validate the operation of the Respond technology. This resulted in the use of two sets of three-phase interposing current transformers (CT) being fitted into the T11 and T12 11/6.6kV over-current protection systems. The revised design allows more accurate monitoring and recording during the project but a business as usual Adaptive Protection solution could be made simpler. This caused the design and installation process to be more complex than originally planned and there are some outstanding snagging issues that will incur future expenditure.

Pre-installation works using CT analysing equipment found that extra terminations in the secondary wiring of the over-current CT system using standard 5P20 CTs caused an unacceptable increase in output burden when combined with the interposing CTs. This resulted in increased design cost and on site works to mitigate against this effect.

The use of existing numeric relays on the Respond sites was ruled out due to the combined nature of the over-current and earth-fault legacy blocking systems found on most numeric relays. The straightforward way of achieving sequenced protection for Respond at numeric relay sites would have been to open circuit the blocking inputs from downstream relays to the 11/6.6kV bus-section relay. This would have resulted in the 11/6.6kV bus section circuit breaker (CB) tripping for earth faults as well as over-current faults. In Electricity North West the 11/6.6kV system is resistively earthed to reduce earth fault currents (majority of HV faults are earth fault in nature) and therefore the maximum fault level is controlled to around 20% of the break fault capacity of the 11/6.6kV CBs. There is therefore no requirement to implement Adaptive Protection for pure earth faults in Electricity North West. However this is a method that other GB DNOs could use as they have direct earthing of their primary transformers and therefore much higher earth-fault levels.

I_S-limiters and I_S-sensing units

The two I_S-limiters have been waiting for a multi-phase fault to occur on the networks they supply, however no such faults have occurred to date.

The five I_S-sensing units are also waiting to detect multi-phase faults on the networks they monitor. To date no such faults have occurred on the I_S-sensing networks. The I_S-sensing sites are passive in that no actual fault level mitigation is carried out. These devices are designed to sense if a fault occurs rather than switch. If a fault occurs, and the fault conditions are met, an alarm will be sent to the NMS.

Fault Level Assessment Tool

The project team are working closely with the network management system replacement programme to ensure that the programme has minimal impact on the Respond trials.

In this reporting period, the technology workstream undertook the following activities:

- Published the equipment specifications and installation reports for the Adaptive Protection
- Published the equipment specifications and installation reports for the I_S-limiters
- Published the NMS interface and configuration specifications and commissioning reports
- Published two reports on the operation of Adaptive Protection at Atherton Town Centre primary substation on 29 July 2016 and 28 August 2016.

In the next reporting period, the technology workstream will undertake the following activities:

- Attend and fix any on-site issues as they arise.

2.3 Trials & analysis workstream

Fault level monitoring

Outram fault level monitors (FLM) have been installed at nine sites and are being rotated around all Respond locations as faults occur. The fault level monitors have been installed to validate the Electricity North West IPSA+ master network to identify any difference between the simulated and monitored results. Both the FLM and IPSA+ results will be used to validate the Respond electrical network model and simulated fault levels.

FLM results and comparisons with IPSA+

Two reports from Outram Research Limited (ORL) have been produced showing fault level results for seven Respond locations. The first of these two reports was required as part of the TNEI work to carry out validation of the Electricity North West IPSA+ electrical network model and compare fault levels with IPSA+.

The TNEI report will be completed before the next six-monthly report, however the updated fault level results for Broadheath, Denton West, Irlam and Wigan are shown below in figure 2.1.

Figure 2.2 shows the results for the second set of sites: Longridge, Atherton Town Centre and Hareholme. Fault level comparisons for these sites have been carried out internally to provide additional results and as such increase the overall sample set.

The aim of the TNEI reports is to assess the level of confidence in the Electricity North West distribution network model in IPSA for fault level studies and to provide a practical understanding of how close the simulated fault levels using network models are to the 'actual' values at the selected locations. The 'actual' fault levels are in fact the measured and predicted values by fault level monitor (FLM) device manufactured by ORL and installed at the selected locations. This device utilises information generated from voltage and current disturbances occurring naturally on the network ie they are not artificially generated by imposing disturbances upon the network.

Figure 2.1: TNEI results

Substation	Outram FLM				IPSA+				Difference %	
	10ms Peak Upstream (kA)	10ms Peak Downstream (kA)	Combined 10ms Peak (kA)	90ms RMS upstream (kA)	10ms Peak Upstream (kA)	10ms Peak Downstream (kA)	Combined 10ms Peak (kA)	90ms RMS upstream (kA)	10ms peak (%)	90ms RMS (%)
Wigan BSP	16.83	1.6	18.43	7.51	22.72	1.42	24.11	8.27	-30.82%	-10.12%
Irlam primary	29.4	4.27	33.67	11.63	32.03	2.7	34.71	11.83	-3.09%	-1.72%
Denton West	34.84	3.47	38.31	14.08	37.17	2.35	39.51	13.65	-3.13%	3.05%
Broadheath	29.56	3.22	32.78	10.16	30.4	2.16	32.55	11.14	0.70%	-9.65%

The results in figure 2.1 show a high level of confidence in modelling the Electricity North West network in the Broadheath, Denton West and Irlam areas in IPSA.

The comparison of the simulated and measured upstream fault level results for Wigan suggests that the 400/275 kV topology of the wider National Grid transmission network feeding the Wigan grid in the network model may not be consistent with the actual operating scheme during the period of measurements.

Figure 2.2: Additional fault level results

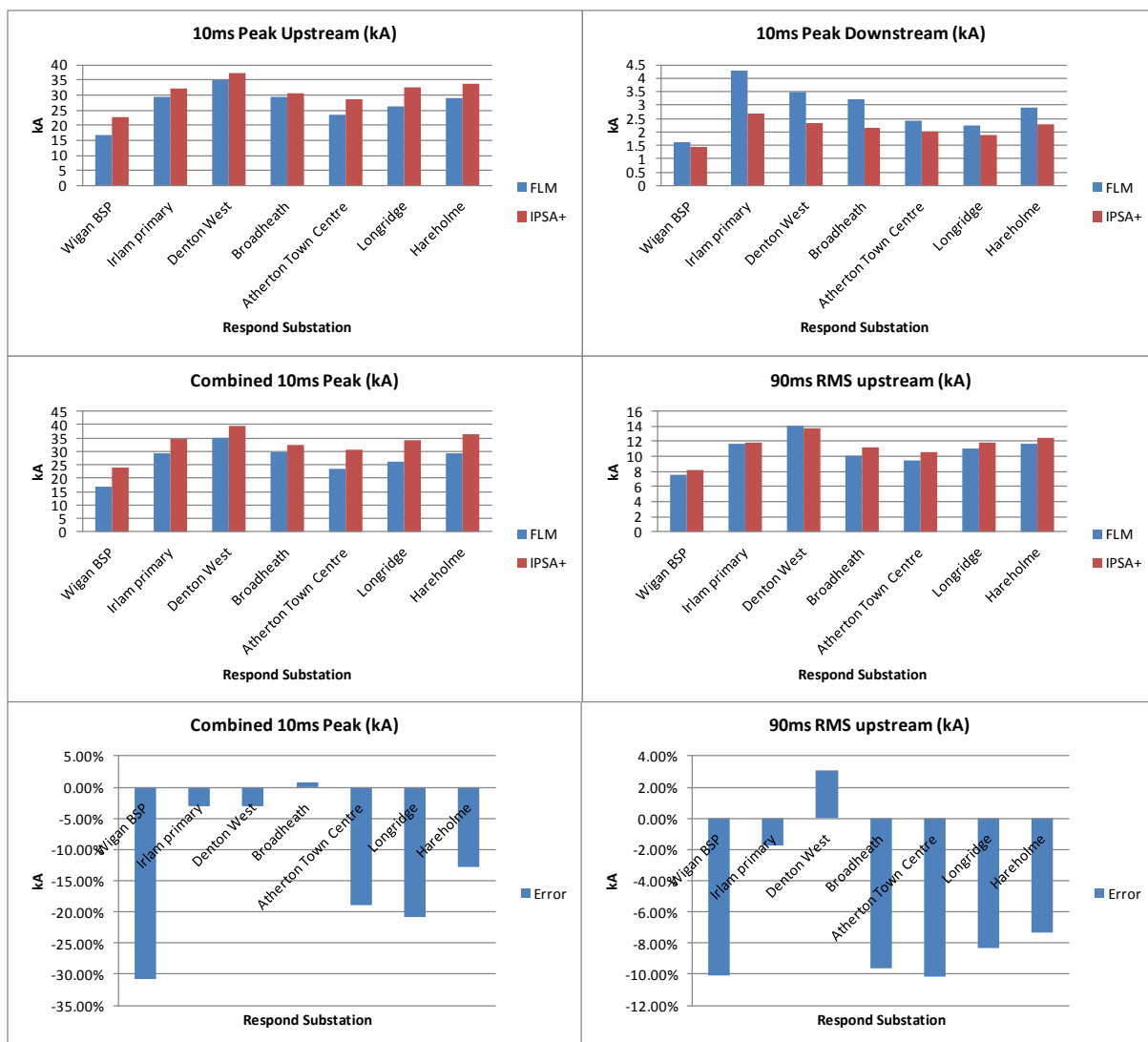
Substation	Outram FLM				IPSA+				Difference %	
	10ms Peak Upstream (kA)	10ms Peak Downstream (kA)	Combined 10ms Peak (kA)	90ms RMS upstream (kA)	10ms Peak Upstream (kA)	10ms Peak Downstream (kA)	Combined 10ms Peak (kA)	90ms RMS upstream (kA)	10ms peak (%)	90ms RMS (%)
Atherton Town Centre	23.35	2.416	25.77	9.531	28.615	2.02	30.635	10.499	-18.88%	-10.16%
Longridge	26.2	2.241	28.44	10.98	32.484	1.892	34.376	11.898	-20.87%	-8.36%
Hareholme	29.2	2.926	32.13	11.61	33.925	2.306	36.231	12.458	-12.76%	-7.30%

The results in figure 2.2 show a good level of confidence for the symmetrical RMS fault levels for all three sites. However, the 10ms peak values for Atherton Town Centre and Hareholme are less comparable.

Figure 2.3 below shows the Outram fault level monitor predicted and the IPSA+ calculated fault levels:

- 10ms peak make – upstream contribution
- 10ms peak make – downstream contribution
- 10ms peak make – combined
- 90ms symmetrical break – combined
- 10ms peak make combined – % error
- 90ms sym break combined – % error

Figure 2.3: Fault level comparisons



Post Fault Analysis Validation Methodology report

The Monitoring and Analysis Procedures for Trials, SDRC 9.3.1, was published on 27 May 2016.

The overall objective of the post-fault analysis is to establish the satisfactory action of the fault mitigation techniques. This requires examination of information on where the fault occurred, what happened as a consequence, when it happened and what the conditions were when the event occurred.

In particular the post-fault analysis is required to:

- Establish the sequence and timing of events

- Check if the actions took place as planned and expected for the particular fault level mitigation technique
- Quantify current flows throughout the event
- Establish that the correct actions were taken as a consequence of the flow of fault currents, including FLAT decisions and the enabling of the fault mitigation techniques before the fault
- Interpretation of fault data is required to give an insight into the system conditions to establish if the correct action was taken. Understanding of the sequence of events is critical in discovering if there are any problems with the protection performance.

Further details can be found in the Respond Post Fault Analysis Methodology which is published on the Respond [website](#).

Respond faults

Since going live there have been three 11kV faults in the trial area, all at Atherton Town Centre 33/11kV primary substation, where the Adaptive Protection fault level mitigation technique was installed.

Respond fault Ref	Substation Name	Feeder Name	Date	Web Link
001	Atherton Town Centre	Collier Brook 11kv cct	29/07/2016	Atherton Town Centre fault report No.1
002	Atherton Town Centre	Thomas St/Holland St	28/08/2016	Atherton Town Centre fault report No.2
003	Atherton Town Centre	York St SW stn	16/09/2016	

Analysis of the first two Respond fault which occurred on 29 July 2016 and 28 August has been completed by WPS Parsons Brinkerhoff.

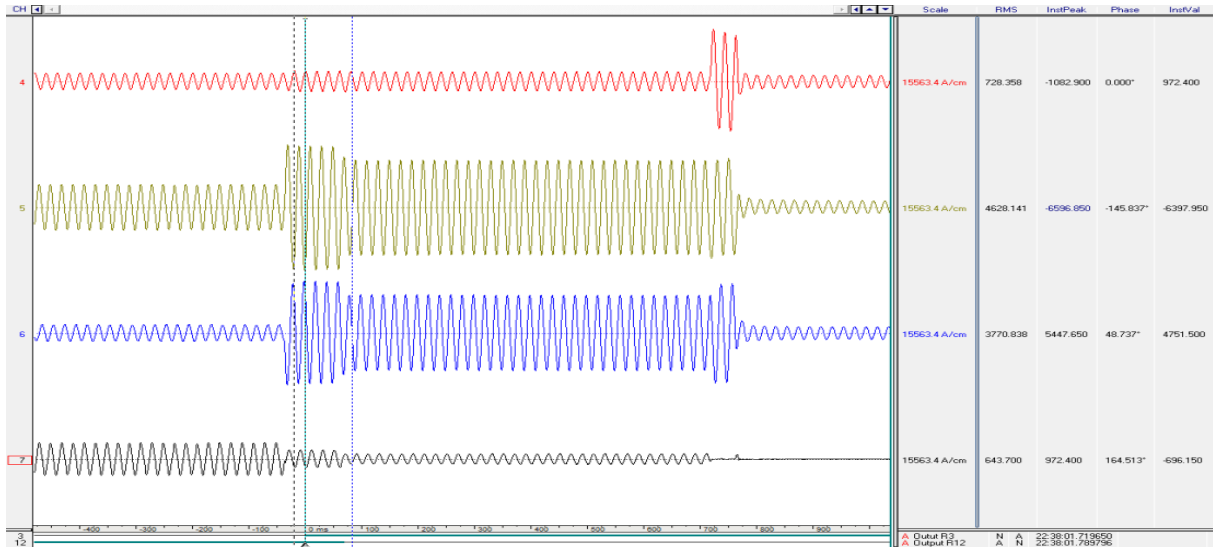
In summary, the disturbance records show that prior to the phase to phase to earth fault which the Adaptive Protection responded to, there was a yellow phase to earth fault present. The magnitude of the earth fault current was 1161.3 A with a corresponding yellow phase fault current of 1644.5 A (inclusive of load current).

The phase to phase to earth fault with 4635.3 A and 3779.5 A in the yellow and blue phases respectively and with a 645.3 A residual fault current, occurred 35.5 ms prior to being detected by the Adaptive Protection relay. For the purpose of the trials the Adaptive Protection operating value was set to 4.5kA. The 11kV bus section circuit breaker tripped 64.8 ms after the trip signal from the Adaptive Protection relay was sent. The total duration of the initial phase to phase to earth fault was 100.3 ms.

After the 11kV bus section circuit breaker tripped, the phase to phase to earth fault current reduced to 3520.8 A and 2784.3 A in the yellow and blue phases respectively and the residual fault current reduced to 391.4 A. These fault currents continued for a further 700.5 ms, developing into a three phase fault just before the feeder protection operated ie the fault was eventually cleared 765.3 ms after the Adaptive Protection detected the initial phase to phase to earth fault.

The residual current is seen to reduce from 645 A to 391 A (reduction of approximately 40%). This reduction in residual current reflects the dominant effect of the earthing resistors at Atherton Town Centre substation and the expected doubling of the earth resistance as the bus section is opened and the earthing resistors on each bus section are no longer in parallel.

Figure 2.4: Instantaneous Adaptive Protection Relay Recordings (IA=red, IB=yellow, IC=blue and IN(residual)=black)



Overall, the analysis has confirmed that the Adaptive Protection operated as expected and reduced the fault current to be interrupted by the feeder circuit breaker.

The reporting of each Respond fault is an SDRC for the trials and analysis workstream (SDRC 9.3.3 Publish on Respond website a summary of each fault event three months after each event). Full details for the first and second faults have been published. The report for the third fault will be published within three months of the event as per SDRC requirements.

Asset health study

The asset condition monitoring is on-going, using the site selection and equipment rotation programme previously agreed with EA Technology during the trial period.

In the next reporting period, the trials and analysis workstream will undertake the following activities:

- Publish on the Respond website a summary of each fault event three months after each event
- Publish a report on validation of the Fault Level Assessment Tool.

2.4 Customer engagement workstream

The key activities undertaken by the customer engagement workstream during the reporting period are summarised below:

FCL service

During this reporting period the project team has continued to engage with United Utilities on the FCL service. One site with CHP has been identified and a number of other sites will be surveyed with the aim of securing a second suitable site with a large motor. The outline of a technical solution has been provisionally agreed with regards to the FCL service, via the reduction in 90ms break fault level in-feed from a CHP scheme to the network. Other potential trial participants were identified from the customer survey. Those willing to engage have been consulted directly, details of which are outlined below.

FCL service contract

The FCL service standard contract has been drafted and negotiations are ongoing with United Utilities about specific terms and clauses. Commercial and legal representatives from Electricity North West and United Utilities are engaged in ongoing discussions to agree the

final terms of the installation and management agreement. The technical workstream is unable to proceed with agreeing technical specifications for enabling technologies until commercial differences are resolved. This learning is likely to influence refinements to the commercial templates for other trial customers and have implications when transitioning the templates to BAU, pending a successful trial.

FCL service tested in the marketplace

All potentially suitable survey respondents that had expressed an interest in participating in the FCL service trial have been contacted. This process involved identifying decision makers within the respective organisations and contacting these individuals directly. This strategy resulted in expressions of interest from four organisations and face-to-face meetings have since taken place with these customers.

The delivery team introduced the trial and the customer benefits to these customers using the communication materials that had been endorsed by an ECP during the previous reporting period. The 'pitch' was well received by the customers and confirmed to be effective in communicating the fault level problem, the objectives of the project generally and the FCL service specifically. This validates the strategy as providing a suitable introductory platform to take the FCL service to market. These customers responded positively to the commercial concept, understood the pricing mechanism and the factors influencing the benefits that might be available to their respective organisations. However, three of the four organisations were established to be unsuitable for trialling the FCL service for the reasons outlined below:

- Site with multi occupancy and maintenance agreements
- Back-up generation, not run in parallel with the distribution network
- CHP installations will not be completed within the project timescales
- One customer operates a suitable CHP; however, this is currently out of commission and pending replacement, subject to an internal review. This will not take place within project timescales. Channels of communication have been maintained, as the customer is keen to engage; there is a possibility that their existing CHP may be re-commissioned, offering the potential to test enabling technologies at this site within the trial period. The project team have therefore asked the customer to conduct an assessment of risks and cost, to establish the price point at which the organisation could theoretically be willing to consider a managed agreement.
- Engage with customers who have made a commercial agreement with the project to take part in the trials of the FCL service or those who are minded to agree commercial terms, if required.

One of the four organisations consulted is currently in the process of installing a 4MW CHP and appears keen to engage further about the benefits to their organisation of trialling the FCL service. The new generator has an anticipated commissioning date of August 2017 and the customer is currently in negotiations with the CHP developer/manufacturer and installation consultants concerning the management of the plant. While the organisation concerned believes they could potentially provide a fault level response, they are also in consultation with third party aggregators to understand the benefits of other commercial services available to them including Triad, STOR and frequency response.

Follow-up customer engagement

Previous experience has demonstrated the challenges of engaging I&C customers about new commercial concepts and this phase of consultation was no exception. Despite a carefully considered engagement strategy, attempts to re-engage survey respondents about trial participation were not as successful in generating interest as had been hoped. The project team therefore re-contacted all survey respondents, with sites in the North West that had expressed an interest, and had consented to their information being shared, for this purpose. This communication focussed on the financial benefits that could be available to their organisations. This strategy generated no further interest. The team has continued to

explore the company's existing customer database and identified decision makers in organisations operating existing HV connected CHP plants, meeting FCL service criteria, and has contacted these customers.

The team is working with the company's Energy Solutions colleagues, to attract newly connected customers and organisations that have a suitable connection pending completion, and could participate in the trial during the project timescales. A small number of new connections (primarily CHP plants) have been identified as possible candidates and work is continuing to engage these organisations.

The team is continuing to work closely with project partners ADE and EnerG to publicise the project to attract potential trial participants. They have publicised the trial in their respective newsletters, sent direct emails to their members/customers and highlighted the trial and benefits on their social media platforms. Partners have also consulted selected customers directly and have extended an offer of supporting their customers during provisional meetings with the project team, to assist in addressing concerns that these organisations may have.

Potential barriers identified

Direct customer engagement to date has identified that concerns about risk and resilience are the greatest barrier from organisations transitioning from an expression of interest, to entering discussions about a managed agreement. These range from concern about the impact on equipment and operations to breaches in service level agreements. These issues are documented in Sections 4 and 6 of this report and these findings corroborate learning from the survey and ECP feedback.

Other concerns are nervousness about the number of times the customer's equipment is likely to be constrained. There are currently no fault level issues on the Electricity North West networks; for the purpose of the trial, it is likely that the protection settings will have to be artificially lowered on the circuit breaker protecting a customer's equipment. This could allow the team to manage the time and number of tests conducted to evaluate the operation of enabling technologies, for the purpose of the trial. This approach appears to be more appealing to customers and may be influential in securing the requisite number of trial participants.

As the project team is still in the process of agreeing terms with United Utilities and seeking to identify other trial participants, it is not currently possible to evaluate industry confidence in the proposed technologies which will be deployed to facilitate the FCL service.

Reconvened engaged customer panel report published

A report has been published on the project website documenting the lessons learned from the second phase of ECP engagement, which influenced the development and refinement of the strategy for taking the FCL service to market. The ECP also evaluated associated communication materials and guided the commercial templates, all of which are published.

In the next reporting period, December to June 2017, the customer workstream will publish the full customer survey report on the Respond website.

2.5 Learning and dissemination workstream

The third Respond advertorial was published in Engineering and Technology magazine in July 2016.

The second webinar took place in September 2016 and was well attended by industry stakeholders.

The project team attends relevant industry events to present developments in the project; in particular, members of all workstreams attended and actively participated at the LCNI

conference in Manchester in October 2016. An overview of the project was available to all delegates on Electricity North West's stand via interactive platforms and the project team was on hand to provide more information. The technical workstream lead, supported by other workstream leads, presented Respond on 12 October. This was well received by delegates and generated widespread interest.

The fourth Respond industry newsletter was circulated in November 2016 to approximately 700 industry stakeholders, details of whom are held in an internal database, developed as a result of interest/engagement in previous LCN Fund projects.

Equipment specifications and installation reports for the Adaptive Protection and the Is-limiter were published on the Respond website in September 2016. Validation of the Fault Level Assessment Tool was also published in September 2016. Post fault analysis summary reports for Adaptive Protection at Atherton Town Centre were published in October and November 2016 and the reconvened engaged customer panel report was also published.

Social media forums exploited: To ensure that the key messages from Respond are disseminated as widely as possible, the project team is using a range of social media outlets to communicate Respond-related information, specifically:



<http://www.facebook.com/ElectricityNorthWest>



<https://twitter.com/ElectricityNW>



<http://www.linkedin.com/company/Electricity-North-West>



<http://www.youtube.com/ElectricityNorthWest>

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

- Publish customer survey report and information for customer evaluation of FCL service provision
- Publish fifth industry newsletter
- Hold knowledge sharing event
- Submit fifth six-monthly report to Ofgem.

3 CONSISTENCY WITH FULL SUBMISSION

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

4 RISK MANAGEMENT

The project risks identified in the project bid document have been migrated into the Respond delivery risk register, reviewed and updated.

Risks identified in the project bid are regularly reviewed by the delivery team and a significant proportion of them have been mitigated and are therefore no longer active or are a low level risk:

- There was a delay against plan in obtaining the signature of a number of partner contracts. All contracts have now been signed and are working well.

- There was a risk that project partners were not able to mobilise their resources in time because of other commitments leading to a delay in achieving potential milestones which could have project, reputational and financial repercussions. The project partners have achieved all milestones and deliverables for 'go live'.
- There was a risk that the Fault Level Assessment Tool delivery would be affected by the major project of replacing Electricity North West's NMS. To mitigate the risk the Respond team and the network management delivery team have been working closely and co-ordinating delivery plans. Through this co-ordination the team has been able to identify the Respond network and associated attributes which were prioritised within the data cleanse and network build programme in the NMS in order to meet the Respond delivery timescales.
- There was a risk that the new Fault Level Assessment Tool would not perform as expected during testing and commissioning, leading to a delay in the start of live trials. The Fault Level Assessment Tool passed the FAT and SAT testing and went live in May 2016.
- There was a risk that the six-month lead time for delivery of the I_s limiters may have led to a delay in the installation of this technology. Both I_s limiters were designed, installed and commissioned on schedule.
- There was a risk that appropriately skilled resource might not be available to perform the retrofit installation of technologies leading to a delay in the installation programme. Both Electricity North West employees and contractors worked effectively together to achieve all commissioning deadlines even when encountering a number of challenges during installation. This was helped by a number of these resources bringing experience from working on previous second tier projects. However there were a number of unforeseen problems which incurred a lot more time and cost to achieve the deadlines. These issues included hand digging around numerous abandoned cables that were found when installation took place, unexpected asbestos and network faults delaying completion and further works when the network was restored to normal.
- There was a risk that the data protection strategy would be complicated by accessing customer survey participants from outside the company's geographical licence area leading to legal and reputational issues. This was mitigated by close working with project partners to ensure adherence of strict compliance with data protection regulations and market research protocol, to ensure that the minimum required number of completed surveys was exceeded.
- There was a risk that customers with relevant demand or generation equipment would not engage in the customer survey leading to a lack of robust data for Hypothesis 5. Impact Research has had experience of this issue in a Second Tier project delivery environment and the survey contact list was designed to identify key decision makers within organisations.
- There was a risk that there would be a low level of surveys returned from the participants in the customer surveys. The Respond team worked with project partners, Impact Research, EnerG and the Association of Decentralised Energy (ADE) to ensure the minimum number of surveys was completed. Indeed, the minimum requirement of 75 surveys was exceeded to achieve a total return of 103 completed surveys.
- There is a risk that the project is unable to secure an FCL service participant if they decide not to participate in the trial. This remains a risk and the team is continuing to work closely with United Utilities to agree final terms. ADE and EnerG are actively publicising the project to attract alternative participants and the existing Electricity North West customer database is being re-explored to find willing participants.

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.

5 SUCCESSFUL DELIVERY REWARD CRITERIA (SDRC)

Ten SDRC were successfully delivered in this reporting period. These are shown in Figure 5.1 below.

Figure 5.1: Respond project SDRC delivered in the reporting period

SDRC (evidence)	Planned date	Completion date
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine)	June 2016	June 2016
Issue third project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	June 2016	June 2016
Publish third advertorial	July 2016	July 2016
Publish equipment specifications and installation reports for the Adaptive Protection	Sept 2016	Sept 2016
Publish equipment specifications and installation reports for the I _S -limiter	Sept 2016	Sept 2016
Publish NMS interface and configuration specifications and commissioning reports	Sept 2016	Sept 2016
Second webinar held	Sept 2016	Sept 2016
Actively participate at four annual LCNI conferences. Second conference 2016.	Sept 2016	Oct 2016
Publish report on validation of the Fault Level Assessment Tool	Nov 2016	Nov 2016
Publish fourth newsletter	Nov 2016	Oct 2016

The SDRC due in the next reporting period are shown below.

Figure 5.2: Respond SDRC due in the next reporting period

SDRC (Evidence)	Planned date	Status
Issue fourth project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Dec 2016	On schedule
Publish customer survey report and information for customer evaluation of FCL service provision on Respond website	May 2017	On schedule
Publish fifth newsletter	May 2017	On schedule
Second knowledge sharing event	May 2017	On schedule

To improve overall learning and dissemination of the Respond project some of these communication dates may be improved upon to coincide with other major Electricity North West learning and dissemination events to try and maximise the use of events. The current status of the evidence for all Respond SDRC is shown in Appendix B. Progress against the SDRC and the project plan will continue to be monitored, and if the current forecast for SDRC delivery changes, future project progress reports will be updated accordingly.

6 LEARNING OUTCOMES

A project website has been established as a repository for sharing project learning to interested stakeholders. A number of lessons were learnt and learning outcomes achieved during the reporting period. The key learning outcomes are summarised below:

Lesson 1: Anticipated difficulty in engaging large industrial and commercial customers, about participation in the FCL service trial, have been realised and these difficulties are exacerbated because of perceived risk.

- **Background:** Previous experience of projects involving this market sector, most notably C₂C, provided insight into the difficulties of initially engaging, building relationships and ultimately agreeing terms of trial participation with I&C customers. This learning identified the value of collaborating with trusted partner organisations that have access to third parties, who can help with introductions and identify the right person to talk to in commercial organisations. The Association for Decentralised Energy (formerly the Combined Heat and Power Association) and EnerG were appointed as project partners to help overcome this barrier and support customer engagement activities throughout the project. The project partners have assisted by publicising the FCL service, enabling the project team to initially recruit survey participants, to evaluate the appetite for the concept and the price point at which customers appear interested. However, despite partner support, it has proven to be extremely difficult to engage large demand and generation customers. It has been particularly difficult to re-engage the survey participants, who responded positively and expressed an interest in taking part in the trial. To date, the project team has been unsuccessful in transitioning any customer from an expression of interest, to entering formal discussions about the terms of a managed agreement to provide a fault level response.
- **Lesson learned:** The time of key decision makers in the target market is extremely valuable and this market sector is extremely risk averse. Financial benefits are the primary driver in encouraging suitable organisations to consider the provision of a fault current response; however, their assessment of reward versus risk appears to be one of the greatest barriers in transitioning these organisations from an indication of interest to meaningful commercial discussions. Feedback to date indicates that the key areas of concern are nervousness about risk to equipment; resilience of operations; overall security of supply; the number of occasions the customer's equipment is likely to be constrained; and the wider impact this could have on service level agreements with their own customers. It is hoped that continued collaboration with project partners will help to secure a small number of managed agreements with organisations that are prepared to trial enabling technologies and allow better understanding of the viability of this new commercial concept for the industry and customers alike.

Lesson 2: Suitable organisations may be reluctant to engage because of conflicts with other commercial arrangements

- **Background:** Only seven of the 103 survey respondents had other commercial arrangements in place. However, it is believed that these arrangements are likely to present a barrier to these and other organisations from considering a FCL service and entering into dialogue about the trial. The project team is continuing to work with project partners, EnerG and the ADE who have a more direct relationship with their own customers and associate members, to understand the barriers of an FCL service

agreement for customers operating in the STOR, electricity storage, DSR and the capacity markets.

- Lessons learned:** Potential conflict with other commercial arrangements and industry players in the commercial services market has been identified as one of the primary areas of investigation for the customer workstream in the next reporting period. It is important to understand the viability of this type of managed agreement and its associated benefits for customers that are able to provide other lucrative commercial services in an expanding and competitive marketplace. While it appears that there are potential conflicts, equally there could be possible synergies which warrant further investigation.

7 BUSINESS CASE UPDATE

The project team are not aware of any developments that have taken place since the issue of the Respond (FLARE) project direction that affects the business case for the project.

8 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 Figure 8.1 below. The report includes expenditure up to and including 30 November 2016.

Actual spend to date is reported as below the planned expenditure to date (exc contingencies) yet for the total project an overspend (exc contingencies) is anticipated. This is due to a number of major contract payments being later than planned which currently mask an increase in actual costs during the installation

During the installation phase a variety of issues arose during detail design and site installation with each of the technologies that were unforeseen and unbudgeted. This has resulted in an increase in forecast costs across labour, equipment and contractors as shown for the total project.

As the installation phase has delivered its planned outputs these increased costs (£177,000 over the three cost categories) are reported as overspends in the affected cost categories rather than transferring the reporting of these costs as a contingency item.

Project spend to date is £3,206,000 compared to plan £3,753,000.

Forecast at completion is £4,718,000 against a plan of £5,024,000 including contingencies.

Figure 8.1: Summary of project expenditure

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date			Total Project		
	Actual	Plan	Variance	Forecast	Plan	Variance
Labour	916	895	(21)	1,408	1,305	(103)
Equipment	967	993	27	1,101	1,058	(43)
Contractors	697	762	65	1,172	1,140	(32)
IT	520	573	53	573	573	(0)
IPR Costs	0	0	0	0	0	0
Travel & Expenses	0	0	0	0	0	0
Payments to Users	7	44	37	61	61	0
Contingency	0	346	346	0	484	484
Decommissioning	0	0	0	54	54	0
Other	99	139	40	349	349	0
Total	3,206	3,753	547	4,718	5,024	306

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

Note: Respond is budgeted at £5.544 million including £519,460 of partner contributions. For reporting these partner contributions have been removed from both the relevant budget and actual financial statements, resulting in the restated project budget of £5.024 million.

9 BANK ACCOUNT

The Respond project bank statement is shown in Appendix E. The statement contains all receipts and payments associated with the project up to the end of November 2016.

10 INTELLECTUAL PROPERTY RIGHTS

Electricity North West is following the default IPR arrangements. No IPR have been generated or registered during the reporting period.

The IPR implications of forthcoming project deliverables are currently being considered, and will be reported in the next project progress report.

11 ACCURACY ASSURANCE STATEMENT

This document has been reviewed by a number of key business stakeholders. The project team and select members of the Respond project steering group, including the lead member of the bid development team, have reviewed the report to ensure its accuracy.

The financial information has been produced by the Respond project manager and the project's finance representative who review all financial postings to the project each month in order to ensure postings are correctly allocated to the appropriate project activity. The financial information has also been peer reviewed by the Electricity North West head of business performance.

The issue of the document has been approved by the innovation delivery manager.

APPENDIX A: STATUS OF RISKS FROM THE FULL SUBMISSION

Project Phase / Workstream	Description (Delivery Risk Category)	Probability Score	Impact Score	Mitigating Action/ Contingency Action	Revised Probability	Revised Impact Score	Status
Mobilisation	Closed on 31st May 2016 as project mobilisation delivered and project live. There is a risk that 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. (Other)	2	4	<ul style="list-style-type: none"> 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. <p><i>Contingency: Electricity North West will seek new partners should existing partners fail to mobilise.</i></p>	1	1	Closed
Technology	Closed on 31st May 2016 as project delivered and project live. There is a risk that installation of the new Fault Level Assessment Tool or configuration of the network management system will overrun leading to delayed start of live trials. (Installation)	3	5	<ul style="list-style-type: none"> Robust T&Cs for the Fault Level Assessment Tool provision will be agreed to ensure partner focus on achieving the FLARE project timescales. Resources and mobilisation plan will be defined to achieve the project milestones and will be developed in conjunction with the selected software partner. <p><i>Contingency: Regular progress meetings/reports to track progress against the plan. Electricity North West will commit additional operational resource should any delays occur to the installation, testing and commissioning programme.</i></p>	1	1	Closed
Technology	Closed on 31st May 2016 as project FLAT tool commissioned and project live. There is a risk that the new Fault Level Assessment Tool will not perform as expected during testing and commissioning, leading to delayed start of live trials. (Installation)	3	4	<ul style="list-style-type: none"> Guidance on the use of a fault level monitor to validate the Tool's calculations has been sought from WPD using their learning from FlexDGrid. Validation of the Fault Level Assessment Tool will occur prior to live trials and periodically, and at different points on the trial networks during the live trial period. <p><i>Contingency: n/a</i></p>	1	1	Closed
Technology	Closed on 31st May 2016 as project delivered and project live. There is a risk that the six month lead time for delivery of I _S -limiters may lead to a delay in the installation of this technology. (Procurement)	4	3	<ul style="list-style-type: none"> Project plan specifies that a purchase order will be raised to procure I_S-limiters at the beginning of March 2015. ABB will expedite the order. <p><i>Contingency: Flexibility is built into the installation programme so that installation of this technology can occur in spring 2016.</i></p>	1	1	Closed

Project Phase /Workstream	Description (Delivery Risk Category)	Probability Score	Impact Score	Mitigating Action/ Contingency Action	Revised Probability	Revised Impact Score	Status
Technology	Closed on 31 May 2016 as project delivered and project live. There is a risk that retrofit of Adaptive Protection (for distribution system and electrical machines) may be more complex than anticipated leading to a delay in the installation programme. (Installation)	3	3	<ul style="list-style-type: none"> The installation programme will be considered alongside known operational and maintenance activity peaks to allow for extra resource to be secured and deployed. Electricity North West has scoped Respond with the input from a generator manufacturer and a customer with motors. Protection requirements for generators are explored in ENER-G's test cell. The Project cost includes for external contractor retrofit of the Adaptive Protection for electrical machines. <p><i>Contingency: Alternative substations may be selected to ensure Respond trials are not delayed. Learning from every installation/ attempted installation will be published through knowledge dissemination activities.</i></p>	1	1	Closed
Technology	Closed on 31 May 2016 as project delivered and project live. There is a risk that appropriately skilled resource may not be available to perform the retrofit installation of technologies leading to a delay in the installation programme. (Installation)	3	4	<ul style="list-style-type: none"> Guidance on the specific skills requirements has been sought and FLARE's installation programme will be designed in consideration of known operational and maintenance activity peaks. <p><i>Contingency: Contractors may be brought in to cover business as usual activities to allow internal resource to cover installation requirements of this project.</i></p>	1	1	Closed
Technology	There is a risk that Respond technologies do not perform as anticipated leading to trial circuits exceeding their fault level limits. (Other)	3	5	<ul style="list-style-type: none"> Forerunner projects explored techniques with academic and technical colleagues. Fault level mitigation techniques will be installed at substations with no fault level constraints. Standard protection capability will not be exceeded. <p><i>Contingency: n/a</i></p>	2	5	Open
Customer	Closed on 31 May no issues accessing customers. There is a risk that the data protection strategy will be complicated by accessing customer survey participants from outside the company's area leading to legal and reputational issues. (Recruitment)	3	5	<ul style="list-style-type: none"> The CHPA/ ENER-G has members/ customers across the UK and will promote involvement in the survey. Impact Research will work with the CHPA/ ENER-G to design and undertake the customer survey work and ensure complete compliance with data privacy requirements. Impact Research and Electricity North West will undertake a pilot communication trial, with a range of stakeholders to ensure that they are able to effectively communicate and engage with the project's stakeholders. <p><i>Contingency: n/a</i></p>	1	1	Closed

Project Phase /Workstream	Description (Delivery Risk Category)	Probability Score	Impact Score	Mitigating Action/ Contingency Action	Revised Probability	Revised Impact Score	Status
Customer	There is a risk that customers with relevant demand or generation equipment do not engage in the customer survey leading to a lack of robust data for Hypothesis 5. (Recruitment)	3	4	<ul style="list-style-type: none"> Impact Research has experience of this issue in a Second Tier project delivery environment. The survey contact list will be designed to identify key decision makers within organisations. Incentive payments are being offered for participation. <p><i>Contingency: More customers are being approached and incentivised to participate.</i></p>	3	4	Open
Trials & Analysis	There is a risk that the selected networks do not experience a fault during the period of the trials leading to the techniques and devices being untested. (Other)	3	5	<ul style="list-style-type: none"> Up-to-date fault statistics will be used in the site selection phase to ensure that networks with higher than average faults are selected for Respond demonstration. <p><i>Contingency: In the absence of any faults, PB Power will test, via simulation, operation of the Fault Current Assessment Tool and three mitigation techniques.</i></p>	1	2	Open
Trials & Analysis	There is a risk that a FCL service participant decides they no longer wish to participate in the trial. (Recruitment)	2	3	<ul style="list-style-type: none"> The Respond team will work with the customer to understand why customer perception has changed and to capture learning from the trial. <p><i>Contingency: n/a</i></p>	2	2	Open
Technology	Closed on 31st May 2016 as project delivered and project live . There is a risk that the Respond project is delayed due to the replacements of Electricity North West's network management system taking priority. (Installation)	2	4	<ul style="list-style-type: none"> The project team will work closely with the network management team to ensure goals are aligned and the Respond network and attributes are prioritised for data cleanse, network build and attribute population <i>Contingency: Build the Respond network and attributes on an islanded server with an ICCP link to the NMS system for live data and topology changes</i> 	1	1	Closed
Customer	Closed on 31st May 2016 as project delivered and project live There is a risk that the customer survey participants will not complete the minimum number of surveys required for the project (Recruitment)	2	2	<ul style="list-style-type: none"> The Respond team will work with project partners, Impact Research, Ener-G and the Association of Decentralised Energy (ADE) to ensure the surveys are completed and aim to identify more participants. 251 who have shown an interest to participate have been identified <i>Contingency: Increase the financial incentive to existing participants and recruit more new participants</i> 	1	1	Closed

As the project progresses, the project team will gain a better view of the likelihood of these risks and will also identify more evidence-based ones.

APPENDIX B: SUMMARY OF PROJECT SDRC

SDRC (evidence)	Due date	Status
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine) by January 2015	Jan-15	Delivered
Publish first newsletter by May 2015	May-15	Delivered
Send customer engagement plan and data privacy statement to Ofgem by June 2015	Jun-15	Delivered
Issue first project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Jun-15	Delivered
Deliver live Respond website and social media forums by July 2015	Jul-15	Delivered
Publish first advertorial by July 2015	Jul-15	Delivered
Deliver engaged customer panel workshop by September 2015	Sep-15	Delivered
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine) by September 2015	Sep-15	Delivered
First webinar held by September 2015	Sep-15	Delivered
Deliver lessons learned from testing customer survey materials incorporated into survey and all survey materials published on the Respond website by October 2015	Oct-15	Delivered
Publish second newsletter by November 2015	Nov-15	Delivered
Actively participate at 2015 annual LCNI conference	Nov-15	Delivered
Issue second project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Dec-15	Delivered
Brief and train Electricity North West operational teams, including planning engineers, on fault level mitigation management protocols by April 2016	Apr-16	Delivered
Publish second advertorial by April 2016	Apr-16	Delivered
Publish monitoring and analysis procedures for trials on Respond website by May 2016	May-16	Delivered
Publicise commencement of live trials on Respond website by May 2016	May-16	Delivered
Publish third newsletter by May 2016	May-16	Delivered

SDRC (evidence)	Due date	Status
Hold first knowledge sharing event by May 2016	May-16	Delivered
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine) by June 2016	Jun-16	Delivered
Issue third project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Jun-16	Delivered
Publish third advertorial by July 2016	Jul-16	Delivered
Publish equipment specifications and installation reports for the Adaptive Protection and the I ₃ -limiter by September 2016	Sep-16	Delivered
Publish NMS interface and configuration specifications and commissioning reports by September 2016	Sep-16	Delivered
Second webinar held by September 2016	Sep-16	Delivered
Publish report on validation of the Fault Level Assessment Tool by November 2016	Nov-16	Delivered
Publish fourth newsletter by November 2016	Nov-16	Delivered
Actively participate at 2016 annual LCNI conference	Nov-16	Delivered
Issue fourth project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Dec-16	Delivered
Publish customer survey report and information for customer evaluation of FCL service provision on Respond website by May 2017	May-17	On track
Publish fifth newsletter by May 2017	May-17	On track
Hold second knowledge sharing event by May 2017	May-17	On track
Issue fifth project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Jun-17	On track
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine) by July 2017	Jul-17	On track
Publish fourth advertorial by July 2017	Jul-17	On track
Hold third webinar by September 2017	Sep-17	On track
Publish sixth newsletter by November 2017	Nov-17	On track
Actively participate at 2017 annual LCNI conference	Nov-17	On track

SDRC (evidence)	Due date	Status
Issue sixth project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Dec-17	On track
Publish equipment specifications and installation reports for the FCL service by April 2018	Apr-18	On track
Publish on Respond website a summary of each fault event three months after each event, with the expectation that a minimum of 18 faults will be reported on	May-18	On track
Purchase a Fault Current Limiting service from at least one Electricity North West demand customer and one Electricity North West generation customer	May-18	On track
Publish contract templates for FCL service with new and existing customers and commercial arrangements learning by May 2018	May-18	On track
Publish seventh and final newsletter by May 2018	May-18	On track
Publish updated fault level management, planning, design, protection settings and operation and maintenance policies by June 2018	Jun-18	On track
Issue seventh project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Jun-18	On track
Publish on Respond website the cost benefit analysis study report and the buy order of Respond/ FlexDGrid/ traditional reinforcement fault level mitigation solutions by July 2018	Jul-18	On track
Publish on Respond website the carbon impact assessment report by July 2018	Jul-18	On track
Publish asset health study on Respond website by July 2018	Jul-18	On track
Submit a DCUSA change proposal for amending application approach to Fault Level Cost Apportionment Factor in Common Connection Charging Methodology by August 2018	Aug-18	On track
Publish peer reviewed safety cases on the Respond project website by September 2018	Sep-18	On track
Hold third knowledge sharing event September 2018	Sep-18	On track
Hold fourth webinar	Oct -18	On track
Publicise Respond within Electricity North West in monthly team brief pack and/ or Volt (intranet) and/ or Newswire (quarterly employee magazine)	Oct-18	On track
Publish fifth advertorial by October 2018	Oct-18	On track
Issue Respond project closedown report to Ofgem and publish on Respond website by October 2018	Oct-18	On track

SDRC (evidence)	Due date	Status
Publish Electricity North West's approach to managing fault level reinforcement on Respond website by October 2018	Oct-18	On track
Actively participate at 2018 annual LCNI conference	Nov-18	On track
Issue eighth project progress report in accordance with Ofgem's June and December production cycle and publish on Respond website	Dec-18	On track

APPENDIX C: PROJECT DIRECTION BUDGET


£000's	
Excluding Partner Funding	
Ofgem Cost Category	
Labour	1,305
Project Management - Labour	866
Install/Commissioning - Labour	396
General Labour - Labour	43
Equipment	1,058
Materials - Equipment	4
General Equipment - Equipment	22
Monitoring Equipment - Equipment	163
IS Limiter - Equipment	685
Adaptive Protection - Equipment	184
Contractors	1,140
Project Management - Contractor	20
Install/Commissioning - Contractor	554
Research - Contractor	295
Customer Survey - Contractor	59
Customer Engagement - Contractor	169
Dissemination - Contractor	43
IT	573
IT Hardware - IT	0
IT Software - IT	564
IT Licences - IT	9
IPR Costs	0
IPR Costs	0
Travel & Expenses	0
Travel & Expenses	0
Payments to Users	61
Payments to Users	36
Fault Current Limiting Service	0
Customer Payments	26
Contingency	484
Contingency	484
Decommissioning	54
Decommissioning	54
Other	349
Rent - Other	60
Telecoms - Other	0
Dissemination - Other	289
Customer Survey - Other	0
Conference Reg. Fees - Other	0
Other	0
Total	5,024

APPENDIX D: DETAILED PROJECT EXPENDITURE

£'000s Excluding Partner Funding Ofgem Cost Category	Spend to date			Total Project			Comments
	Actual	Plan	Variance	Forecast	Plan	Variance	
Labour	916	895	(21)	1,408	1,305	(103)	
Project Management - Labour	404	462	58	866	866	0	
Install/Commissioning - Labour	492	391	(101)	499	396	(103)	Multiple design & instalation issues.
General Labour - Labour	21	43	22	43	43	(0)	
Equipment	967	993	27	1,101	1,058	(43)	
Materials - Equipment	3	1	(2)	4	4	(0)	
General Equipment - Equipment	7	9	2	22	22	(0)	
Monitoring Equipment - Equipment	152	163	11	163	163	0	
IS Limiter - Equipment	723	667	(57)	761	685	(76)	Part of equipment cost budgetted as contractor
Adaptive Protection - Equipment	81	154	72	150	184	34	Savings identified in settings design & application
Contractors	697	762	65	1,172	1,140	(32)	
Project Management - Contractor	7	20	13	14	20	6	Savings identified in Project Management
Install/Commissioning - Contractor	534	512	(22)	599	554	(45)	£131k £76k budget allocation & £45k instalation costs
Research - Contractor	0	35	35	295	295	0	
Customer Survey - Contractor	35	50	16	53	59	6	
Customer Engagement - Contractor	121	135	14	169	169	(0)	
Dissemination - Contractor	0	10	10	43	43	0	
IT	520	573	53	573	573	(0)	
IT Hardware - IT	0	0	0	0	0	0	
IT Software - IT	520	564	44	564	564	(0)	
IT Licences - IT	0	9	9	9	9	0	
IPR Costs	0	0	0	0	0	0	
IPR Costs	0	0	0	0	0	0	
Travel & Expenses	0	0	0	0	0	0	
Travel & Expenses	0	0	0	0	0	0	
Payments to Users	7	44	37	61	61	0	
Payments to Users	0	18	18	36	36	0	
Fault Current Limiting Service	0	0	0	0	0	0	
Customer Payments	7	26	19	25	26	0	
Contingency	0	346	346	0	484	484	
Contingency	0	346	346	0	484	484	
Decommissioning	0	0	0	54	54	0	
Decommissioning	0	0	0	54	54	0	
Other	99	139	40	349	349	0	
Rent - Other	26	24	(2)	60	60	(0)	
Telecoms - Other	0	0	(0)	0	0	(0)	
Dissemination - Other	73	115	42	289	289	0	
Customer Survey - Other	0	0	(0)	0	0	(0)	
Conference Reg. Fees - Other	0	0	0	0	0	0	
Other	0	0	0	0	0	0	
Total	3,206	3,753	547	4,718	5,024	306	

APPENDIX E: PROJECT BANK ACCOUNT

The bank statement below details all transactions relevant to the project. This includes all receipts and payments associated with the project since the previous report up to the May 2016 month end reporting period.

 Lloyds Bank		Yesterday's Statement			N397926	
Statements and Balances						
308012-11782760						
ELECTRICITY NWL NO.14 LCNF (FLARE) (GBP)						
Date	Type	Narrative	Value Date	Payments	Receipts	Balance
01JUN16		Opening Ledger Balance				3,849,792.51 Cr
09AUG16	CR	INTEREST (GROSS)			1,371.16	3,851,163.67 Cr
11AUG16	CR	REFUND DEBIT INT			3,533.37	3,854,697.04 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		359,942.15		3,494,754.89 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		515,232.01		2,979,522.88 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		249,779.86		2,729,743.02 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		296,324.15		2,433,418.87 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		34,119.11		2,399,299.76 Cr
06SEP16	DR	TO A/C TFR 02749020 300002		188,786.74		2,210,513.02 Cr
09SEP16	CR	INTEREST (GROSS)			773.39	2,211,286.41 Cr
10OCT16	CR	INTEREST (GROSS)			469.52	2,211,755.93 Cr
31OCT16	DR	TO A/C TFR 02749020 300002		43,264.71		2,168,491.22 Cr
09NOV16	CR	INTEREST (GROSS)			451.51	2,168,942.73 Cr
30NOV16	CR	FROM A/C TFR 02749020 300002			34,119.11	2,203,061.84 Cr
30NOV16	CR	FROM A/C TFR 02749020 300002			359,942.15	2,563,003.99 Cr
30NOV16	DR	TO A/C TFR 02749020 300002		80,578.87		2,482,425.12 Cr
30NOV16	DR	TO A/C TFR 02749020 300002		73,720.57		2,408,704.55 Cr
30NOV16	DR	TO A/C TFR 02749020 300002		259,942.15		2,148,762.40 Cr
30NOV16	DR	TO A/C TFR 02749020 300002		341,109.11		1,807,653.29 Cr
08DEC16	DR	TO A/C TFR 02749020 300002		76,904.66		1,730,748.63 Cr
08DEC16		Value of Credits (7)			400,660.21	
08DEC16		Value of Debits (12)		2,519,704.09		
08DEC16		Closing Ledger Balance				1,730,748.63 Cr
08DEC16		Closing Cleared Balance				1,730,748.63 Cr

*** End of Report ***

Note: Statement shows two payments (cost transfers) that were incorrect, and have been corrected by two receipts of an equal value.