WESTERN POWER DISTRIBUTION

INNOVATION

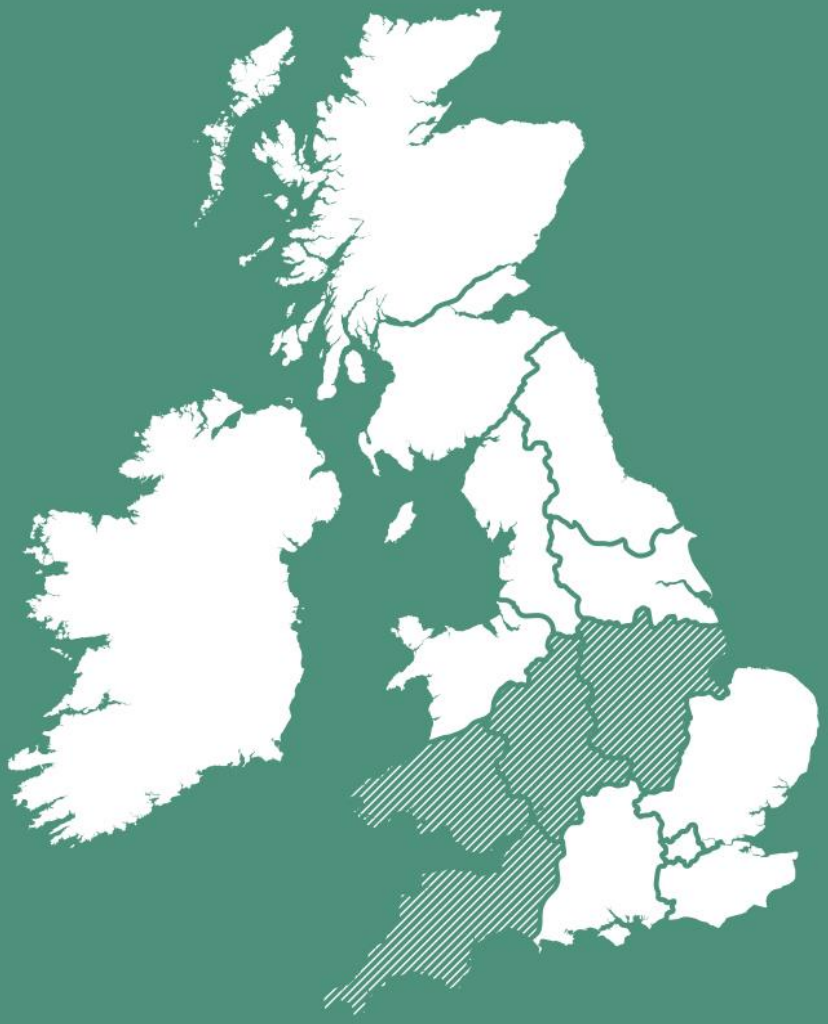
NEXT GENERATION NETWORKS

ENTIRE

WPD_NIA_017

NIA MAJOR PROJECT PROGRESS REPORT

REPORTING PERIOD: NOV 2017 – MARCH 2018



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	Name	Date
Prepared by:	Matt Watson	27/03/2018
Reviewed by:	Faithful Chanda	04/04/2018
Approved (WPD):	Roger Hey	10/05/2018

Revision History

Date	Issue	Status
27/03/2018	V0.1	Initial draft
04/04/2018	V0.2	Draft Following Review
10/05/2018	V1.0	Final

Contents

Glossary

Term	Definition
API	Application Programming Interface
ASC	Agreed Supply Capacity
BAU	Business as usual
BSP	Bulk Supply Point
CDM	Construction Design Management
CMZ	Constraint Management Zone
DNO	Distribution Network Operator
DSR	Demand Side Response
EoI	Expression of Interest
GB	Great Britain
GSP	Grid Supply Point
IPR	Intellectual Property Register
KOMP	Kiwi Operations Management Platform
LV	Low Voltage
NIA	Network Innovation Allowance
NG	National Grid
NPV	Net Present Value
PSD	Primary System Design
SCO	Second Circuit Outage
SGC	Smart Grid Consultancy
SO	System Operator
STOR	Short Term Operating Reserve
TO	Transmission Operator
WPD	Western Power Distribution

1 Executive Summary

Entire is funded through Ofgem's Network Innovation Allowance (NIA). Entire was registered in June 2016 and will be complete by April 2019.

Entire aims to develop and test a comprehensive Demand Side Response (DSR) aggregation capability to manage generators and customer loads. Previous trials have shown that manually controlled DSR can provide a valuable tool to network management. Entire is seeking to develop our understanding of DSR both in terms of more advanced systems but also the operational framework that would allow Distribution Network Operators (DNOs) to participate more widely in DSR schemes operates by other parties. The project will also investigate the regulatory and policies requirements to operate and manage DSR as well as the skills required to develop the commercial DSR markets.

This report details progress of the project, focusing on the last reporting period, November 2017 to March 2018.

1.1 Business Case

By making DSR commercially viable for both the DNO and participants, Entire may allow for the utilization of DSR for the management of network constraints and the extension of non-network solutions.

DSR has multiple use cases and can help defer reinforcement, manage constraints during network build out as well as offering optionality for the DNO.

These benefits are only possible if DNOs can offer products that are commercially attractive to participants and that facilitate revenue stacking.

An example of the possible value to customers is shown for one of the constraints investigated in the project.

In Constraint Management Zone (CMZ) 1, the provision of a new Super-Grid transformer is being deferred. Based on previous similar installations the base cost for such and installation is approximately £12 million.

Taking a simple example of deferring the associated costs by one year reduces the total NPV to £11.41 million due to the discounting effect.
Running DSR for a year for this scheme was estimated to cost approximately £0.21 million.
As such:

Saving = Base cost-method costs
= 12 – (11.41 +0.21) = £0.38 million.

The cost of each year of deferral will depend on the loading of the network and the associated profile, however, DSR can provide significant savings for the deferral of high cost reinforcement.

Over the course of innovation trials, all DNOs have expressed a great deal of interest in DSR and most have carried out their own limited scope trials. The project seeks to accelerate the transition to BaU for all DNOs and address many of the issues that arise from the lack of overlap with their existing core competencies.

DSR services are highly scalable once the central systems and skills have been developed. Much of the attraction of DSR over engineering solutions is that it offers excellent economies of scale.

1.2 Project Progress

This is the third progress report. It covers progress from November 2017 to the end of March 2018. Full details can be found in section 2.2.

The project review was concluded with the changes successfully communicated to participants and wider stakeholders.

The build phase of the project continued within the reporting period. This focussed on two main areas, customer recruitment and technical build. The customer recruitment progressed with the successful Expression of Interest phase. Following this engagement 12 of the 14 zones were taken forward. Full sign up is underway, with contracts being signed and interfaces being built.

On the technical build, there has been significant work both internally and with Kiwi Power to finalise the processes and systems required to operate the services. These are slightly delayed, although they won't affect the overall project timescales.

The testing phase is now overlapping with the build phase to mitigate the extension. As such the functionality delivered by the systems is being tested as it becomes available.

1.3 Project Delivery Structure

1.3.1 Project Review Group

The Entire Project Review Group meets on a bi-annual basis. The role of the Project Review Group is to:

- Ensure the project is aligned with organisational strategy;
- Ensure the project makes good use of assets;
- Assist with resolving strategic level issues and risks;

- Approve or reject changes to the project with a high impact on timelines and budget;
- Assess project progress and report on project to senior management and higher authorities;
- Provide advice and guidance on business issues facing the project;
- Use influence and authority to assist the project in achieving its outcomes;
- Review and approve final project deliverables; and
- Perform reviews at agreed stage boundaries.

1.3.2 Project Resource

The WPD project manager Matt Watson, is supported by Smart Grid Consultancy (SGC). SGC has provided the commercial lead, Gary Swandells and the commercial officer, Gareth Dauley.

1.4 Procurement

The following table details the current status of procurement for this project.

Table 1-1: Procurement Details

Provider	Services/goods	Area of project applicable to	Anticipated Delivery Dates
Smart Grid Consultancy	Project Support	Whole Project	Full duration of Project
Kiwi Power	Control system	Whole Project	System to be delivered by April 2018

The delivery of the Kiwi Power control system was delayed due to the changing scope caused by the project review. This has been managed by the project team.

1.5 Project Risks

A proactive role in ensuring effective risk management for Entire is taken. This ensures that processes have been put in place to review whether risks still exist, whether new risks have arisen, whether the likelihood and impact of risks have changed, reporting of significant changes that will affect risk priorities and deliver assurance of the effectiveness of control.

Contained within Section 7.1 of this report are the current top risks associated with successfully delivering Entire as captured in our Risk Register. Section 7.2 provides an update on the most prominent risks identified at the project bid phase.

1.6 Project Learning and Dissemination

Project lessons learned and what worked well are captured throughout the project lifecycle. These are captured through a series of on-going reviews with stakeholders and project team members, and will be shared in lessons learned workshops at the end of the project. These are reported in Section five of this report.

Details of the project as well as the recruitment requirements have been shared at the following events:

- WPD's Balancing Act conference in May 2017;
- The annual Power responsive conference in June;
- The Energyst DSR conference in September;
- Four Entire Webinars (in October and November)

2 Project Manager's Report

2.1 Project Background

DNOs have been running limited scope trials in order to assess the potential of DSR as an enhancement to existing network operations. These have to date not addressed the issue of customer participation in multiple DSR schemes and the need for a service provider that can aggregate and optimise capacity to meet the requirements of multiple schemes (System Operator (SO), Transmission Operator (TO), DNO & Supplier) and maximise value to asset owners. If this is not addressed it is unlikely that DNOs will be in a position to recruit participants for the exclusive purpose of constraint management due to higher, or more frequent, income stream from non-DNO sources. Prior DSR trials have so far been limited in their scope with only small sample groups being engaged to offer limited functionality specifically for distribution constraint management. As the name **'Entire'** suggests, we will now extend the previously limited scope to fully develop and test the skills, relationships and systems necessary for a DNO to provide a comprehensive, commercially effective DSR capability. We will be doing this in areas within the WPD network that may need significant capital upgrades but where the certainty of immediate need is absent. The project will also demonstrate how DSR can be used to defer capital investment which can sometimes take up to ten years.

In order to achieve this, the **'Entire'** project scope includes:

- Recruit team / place contracts with partners;
- Develop connection policies / DSR contracts / technology and systems to facilitate services;
- Comprehensive knowledge of all legacy embedded generation and its impact on network and updating of asset records;
- Stakeholder engagement and interaction including recruitment of DSR programme participants;
- Interaction with external DSR programmes to optimise commercial attractiveness of DNO DSR. Establishing direct relationships with the largest demand customers to understand their usage, flexibility and possible changes. This will be combined with advice around Agreed Supply Capacity(ASC) and DSR to reduce their costs and introduce new revenue opportunities;
- Identifying the skills gaps and organisational structure issues that are required to be addressed to operate a commercial DSR programme and ongoing migration to DSO;
- Measuring direct impact of Low Voltage (LV) connected DSR on 33kV & 132kV infrastructure and establishing financial 'use case';
- Determination of data required for customer recruitment. This will include an assessment of the benefits (and any confidentiality barriers) from market availability of this data;
- Assessment of varying DSR offerings for constraint management; and
- Assess results and report.

The three year project is split into five phases: Design, Build, Test, Trial and Report.
The Trial section will run for one year.

- Design
  - Project design and governance
  - Supplier engagement
  - Network Analysis
- Build
  - Regulatory approvals to enable operational phase to include services to 3rd parties
  - Remote asset interface, central dispatch
  - Metering and data collection
  - Back Office Systems (performance / financial)
  - Customer contact and communication
  - Policy development
  - Field engineer 'App' development
  - Staff Training
  - Upgrades to WPD stand-by assets for DSR
- Test
  - Test control systems
  - Test Interfaces
  - End to end testing
- Trial
  - Customer payments for DNO constraint actions (*£390K)*
  - Trial administration
  - Knowledge Management
  - Enhanced customer data records
- Report
  - Stakeholder interviews
  - Closedown reports
  - Public dissemination

These are highlighted in the following Gantt chart;

Table 2-1: Gantt chart

Phase	06-16	07-16	08-16	09-16	10-16	11-16	12-16	01-17	02-17	03-17	04-17	05-17	06-17	07-17	08-17	09-17	10-17	11-17
Design																		
Build																		
Test																		
Operate																		
Review and Report																		

Phase	12-17	01-18	02-18	03-18	04-18	05-18	06-18	07-18	08-18	09-18	10-18	11-18	12-18	01-19	02-19	03-19	04-19
Design																	
Build																	
Test																	
Operate																	
Review and Report																	

2.2 Project Progress

This reporting period has covered the closure of the project review as well as the continuation of the project build phase and the initiation of the test phase. These are detailed below.

2.2.1 Project review

Background to the review

The Project underwent a major review following discussions with Ofgem.

Ofgem highlighted that they did not see models in which the DNO operates as a commercial operator as in the long term interests of customers. As such related elements of the project were removed to ensure the trial delivered relevant and valuable learning. The project design was also updated to accommodate the trial learning to date.
The changes included:

- Removal of stacked service offering. WPD will only offer the CMZ products and will not offer access to alternative services;
- Removal of managed service: WPD will no longer look to assess asset health and reliability;
- Splitting of five CMZ zones to 14 subzones to allow for more granular control of contracted assets;
- Expression of Interest stage: An EoI stage has been added to the process to allow WPD to quickly assess the available flexibility in the target areas;
- New Go-Live date: the trial will be starting in April as triad avoidance is no longer required;
- The trial will be shortened to a single year of operation to allow us to deliver the delivery of maximum learning at minimal costs.
- New interface options: an Application Programming Interface (API) alternative was developed alongside the outstation;
- New CMZ services. Following the detailed design of the project, WPD has seen significant value in the delivery of 2 additional CMZ products (Dynamic and Restore); and
- A consultation will be held on the value of DNO data to the DSR market.

Progress within this reporting period

Following the work conducted in the previous period WPD has:

- Communicated the changes to the project to all relevant stakeholders: this was done through face to face meetings, calls and a series of Webinars;
- Updated the customer contract: this removed the service stacking and managed service sections. Additional sections were added to cover the new services (Dynamic and Restore)

- Updated the design specification of the control system: this removed the requirements for interfacing with National Grid as well as some of the aggregated billing requirements. Additional features such as an API interface were added.

Next steps

- None. The Review has been concluded and implemented.

2.2.2 Build Phase

The build phase was also extended and now overlaps with the testing phase to accommodate the fine tuning of processes and the long than expected development needed for the control system.

Progress within this reporting period

Within the build phase; the following actions have been completed:

- EoI designed and marketed: this included webinars and a twitter campaign to raise awareness of the EoI and ensure that all potential participants could participate;
- EoI assessed and zones to take forward finalised: all response (121MW across 69 sites) were assessed for compliance. Significant follow up was required, however once all the information was collected 12 of the 14 zones had volume and were taken forward;
- Communication of EoI results to potential participants: the results of the EoI were communicated and the full sign up process started;
- Customer documentation and processes finalised: a full document library is now available, covering customer information, to contracting and testing.
- API defined: A simple API was developed to allow for easier interfacing with aggregators. This would remove the requirement for multiple outstations. Alongside the definition a self-test environment was created to allow for customers to test their APIs;
- Control system build: The customer portal was built. This incorporated availability declaration, acceptance receipt and reporting. Several more complex features are still in build;
- Outage planning processes finalised and trained: these processes have been updated to accommodate the latest control system design. Initial training has been delivered to the relevant team. Further training will be delivered once the build has been finalised.

The following actions are underway:

- Progression of Control system build: Several feature are still being built, these include dispatch and monitoring;
- PowerOn-Komp link: a link is being built to allow for the dispatch of assets from PowerOn. This will allow control engineers to maintain a single interface for the control of the network;

- Outstation build: the outstation is ready for use, however some site by site configuration work is still required.

Next steps

- Finish Control system build: delivery of non-essential features such as max and min runtime controls, and an enhanced user interface;
- Train control engineer processes: following the delivery of the PowerOn link, control engineers will be trained in the dispatch processes;
- Finish Outstation build: develop the interfaces for a least one ModApp connection;
- Close build phase.

2.2.3 Test Phase

The test phase now overlaps with the build phase

Progress within this reporting period

Within the build phase; the following actions have been completed:

- Testing of the customer portal for availability declaration and acceptance receipt: the availability and acceptance functions have been extensively tested to ensure usability
- The API self-test environment: the self-test environment has been tested and is ready for use.

Next steps

The remaining features to test include:

- Dispatch system testing: this will look to ensure that the dispatch signals can be sent reliably and they are visible in the API;
- Reporting system testing: this will ensure that the right reports with correct calculations are produced from the metering data;
- Test of Outage planning processes: this will involve running through the processes in real time to ensure a workable and efficient process is in place.
- Test of Control engineer processes: this will involve running through the processes in real time to ensure a workable and efficient process is in place.

3 Progress against Budget

As mentioned in the previous report a major review of the project was undertaken. As such the project budget has changed from the original report. Details of the changes can be found in the previous report.

Table 3-1: Budget

Spend Area	Budget (£k)	Budget (£k) Minus SGC contribution	Expected Spend to Date (£k)	Actual Spend to Date (£k)	Variance to expected (£k)	Variance to expected %
Design	85	85	85	141.158	56.158	66%[1]
Build	786	636	500	392.03	-107.97	-22%[2]
Test	50	40	20	10	10	-50%[3]
Trial	842	652	0	0	0	0%
Report	75	60	0	0	0	0%
TOTAL	1838	1473	585	543.188	-41.812	-7%

Comments around variance

1. The Design Phase took significant additional resourcing than expected. This is due to the additional work described in previous reports.
2. Spend is below the expected value as the delivery of the dispatch system has been delayed
3. Spend is below the expected value as the delivery of the dispatch system has been delayed

4 Progress towards Success Criteria

NETWORK: Identify, audit and update all generation connected to the 11kV network within the trial zone(s). This should enable the return of any unused export capacity to network planners. Identify all connected generation above 150kW and identify where these may affect dynamic network operation. We will also interact with other WPD initiatives to advise where increased telemetry may be required to monitor active locations in the network and update future forecasting models.

Progress - Initial investigations of target areas have been started. The ASC studies have been completed with limited success. Over 5MW of capacity has been returned however progress was limited by data quality and complex customer change processes. The generation audit has been designed and delivered following the go-live of the operational trial.

SYSTEMS: Identify, develop and demonstrate new policies, processes and systems that are required in order for WPD to operate standalone DSR services. (Monitor, control, meter and settle)

Progress - Technical systems are being delivered. Feedback on effectiveness will be collected. Customer journeys sign up processes have been designed. These will be tested and refined over the duration of the project.

OPERATIONAL: Identify new skills and roles that currently don't exist within the DNO organisational structure and either train existing staff to address gap or create appropriate job specifications for future recruitment.

Progress - Final roles to be designed following learning gathered from operation of the trial.

COMMERCIAL: Develop an economic business model for combined internal and external DSR service provision that demonstrates enhanced value to customers. This will integrate savings with additional opportunities that could generate new incremental revenues from third party DSR schemes and cost avoidance. Broadening the scope of what a DNO can do with DSR we would expect to achieve improved efficiencies for overall GB system operation.

Progress – Improved commercial propositions have been developed as part of the review. WPD services have been designed to be cost effective for the WPD requirement as well as commercial effective against the Flexible STOR programme. This will be tested in the trial phase

MARKET: Agree a new set of conditions that allow and incentivise DNOs to design DSR services that not only address internal constraint issues but incentivise the efficient use of these new capabilities to support overall GB System operation requirements. This will enable the use of customer assets to participate in external DSR schemes, including SO balancing services.

Progress – Stackable services designed. Effectiveness and attractiveness to be tested in trial operation.

KNOWLEDGE: Document and share all key learning that is achieved in order that the results should be replicable across all UK Distribution Networks.

Progress - Learning is being documented. This will be shared with the wider industry later in the project.

5 Learning Outcomes

This period has focussed on the build of the project and the project review.

The main new learning in this reporting period is:

Commercial Products:

- The complexity and sophistication needed within the baselining methodology required for the addition and removal of sites
- The single unit price, whilst simple limits the establishment of a meritocracy and the ability to differentiate between customers

Customer proposition:

- Twitter can bring significant targeted exposure at limited costs
- Increased lockdown of EoI forms would allow for the simpler, quicker and more consistent evaluation of responses
- EoI responses were clustered at the deadline, limiting the amount of pre-processing that could be achieved
- Significant follow up to EoI responses was needed
- Significant follow up is required to push participation

WPD technical requirements:

- Any live calls need to be made through PowerOn to ensure Control engineers only need to interact with a single tool
- Services should be extended to cover seven days a week
- Simplicity is key to ensure the services are used operationally

Technical implementation:

- Combining generation turn up and demand turn down into a single positive and negative axis simplifies the combination of sites in zones.
- Final implementation deviated significantly from the original expectation, delaying the build.

6 Intellectual Property Rights

A complete list of all background IPR from all project partners has been compiled. The IP register is reviewed on a quarterly basis.

The key background IPR can be seen in Table 6-1.

Table 6-1: Key intellectual property

IPR	Comment	Background/Foreground	Owner	%
KOMP V2	Being licenced from Kiwi Power for project	Background	Kiwi Power	100%
Fruit	Being licenced from Kiwi Power for project	Background	Kiwi Power	100%
Client App	Being licenced from Kiwi Power for project	Background	Kiwi Power	100%

This IPR is being licenced from Kiwi Power as part of the technology tender.

The relevant foreground IPR identified in this reporting period is:

- Updated marketing documentation, processes and contracts.
- API definition

7 Risk Management

Our risk management objectives are to:

- Ensure that risk management is clearly and consistently integrated into the project management activities and evidenced through the project documentation;
- Comply with WPDs risk management processes and any governance requirements as specified by Ofgem; and
- Anticipate and respond to changing project requirements.

These objectives will be achieved by:

- ✓ Defining the roles, responsibilities and reporting lines within the Project Delivery Team for risk management;
- ✓ Including risk management issues when writing reports and considering decisions;
- ✓ Maintaining a risk register;
- ✓ Communicating risks and ensuring suitable training and supervision is provided;
- ✓ Preparing mitigation action plans;
- ✓ Preparing contingency action plans; and
- ✓ Monitoring and updating of risks and the risk controls.

7.1 Current Risks

The Entire risk register is a live document and is updated regularly. There are currently 14 live project related risks. Mitigation action plans are identified when raising a risk and the appropriate steps then taken to ensure risks do not become issues wherever possible. In**Error! Reference source not found.**, we give details of our top five current risks by category. For each of these risks, a mitigation action plan has been identified and the progress of these are tracked and reported.

Table 7-1: Top five current risks (by rating)

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
Development of Komp2 is delayed	Severe	Active management of contract. Milestone based payments	Ongoing
Development of Fruit is delayed	Major	Active management of contract. Milestone based payments	Ongoing
Cyber security risks from new systems	Major	Involvement of IR in tendering processes. extensive penetration testing	IR to arrange penetration testing with Kiwi Power
Insufficient volume is available in target area	Major	Significant customer engagement. Active	Ongoing

		management of potential targets	
Access to customers is limited by aggregators	Moderate	Active engagement with aggregators	Ongoing

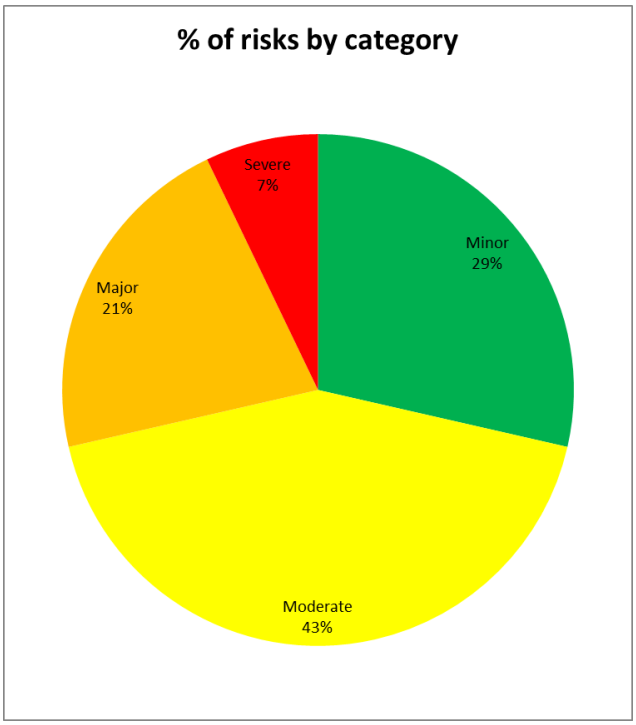
Error! Reference source not found. Table 7-2 provides a snapshot of the risk register, detailed graphically, to provide an on-going understanding of the projects' risks.

Table 7-2: Graphical view of Risk Register

Likelihood = Probability x Proximity						
	Certain/Imminent (21-25)	0	0	0	0	0
	More likely to occur than not/Likely to be near future (16-20)	0	0	1	1	0
	50/50 chance of occuring/ Mid to short term (11-15)	0	1	0	0	0
	Less likely to occur/Mid to long term (6-10)	0	2	4	1	1
	Very unlikely to occur/Far in the future (1-5)	0	0	2	1	0
		1. Insignificant changes, re-planning may be required	2. Small Delay, small increased cost but absorbable	3. Delay, increased cost in excess of tolerance	4. Substantial Delay, key deliverables not met, significant increase in time/cost	5. Inability to deliver, business case/objective not viable
		Impact				

Table 7-3 provides an overview of the risks by category, minor, moderate, major and severe. This information is used to understand the complete risk level of the project.

Table 7-3: Percentage of Risk by category



7.2 Update for risks previously identified

Descriptions of the most significant risks, identified in the previous six monthly progress report are provided in **Error! Reference source not found.** with updates on their current risk status.

Table 7-4: Risks identified in the previous progress report

Details of the Risk	Previous Risk Rating	Current Risk Rating	Mitigation Action Plan	Progress
Cyber security risks from new systems	Major	Major	Involvement of IR in tendering processes. extensive penetration testing	IR to arrange penetration testing with Kiwi Power
Insufficient volume is available in target area	Major	Major	Significant customer engagement. Active management of	Ongoing

			potential targets	
Development of Fruit is delayed	Moderate	Major	Active management of contract. Milestone based payments	Ongoing
Development of Komp2 is delayed	Moderate	Severe	Active management of contract. Milestone based payments	Ongoing
Access to customers is limited by aggregators	Moderate	Moderate	Active engagement with aggregators	Ongoing

8 Consistency with Project Registration Document

No additional change requests have been created during this reporting period.
In total there have been five throughout the duration of the project.

The registration documentation can be found here:
www.westernpowerinnovation.co.uk/Document-library/2016/Registration-Forms/Entire-Project-Registeration-Form.aspx

9 Accuracy Assurance Statement

This report has been prepared by the Entire Project Manager (Matt Watson), reviewed and approved by the Future Networks Manager (Roger Hey).

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