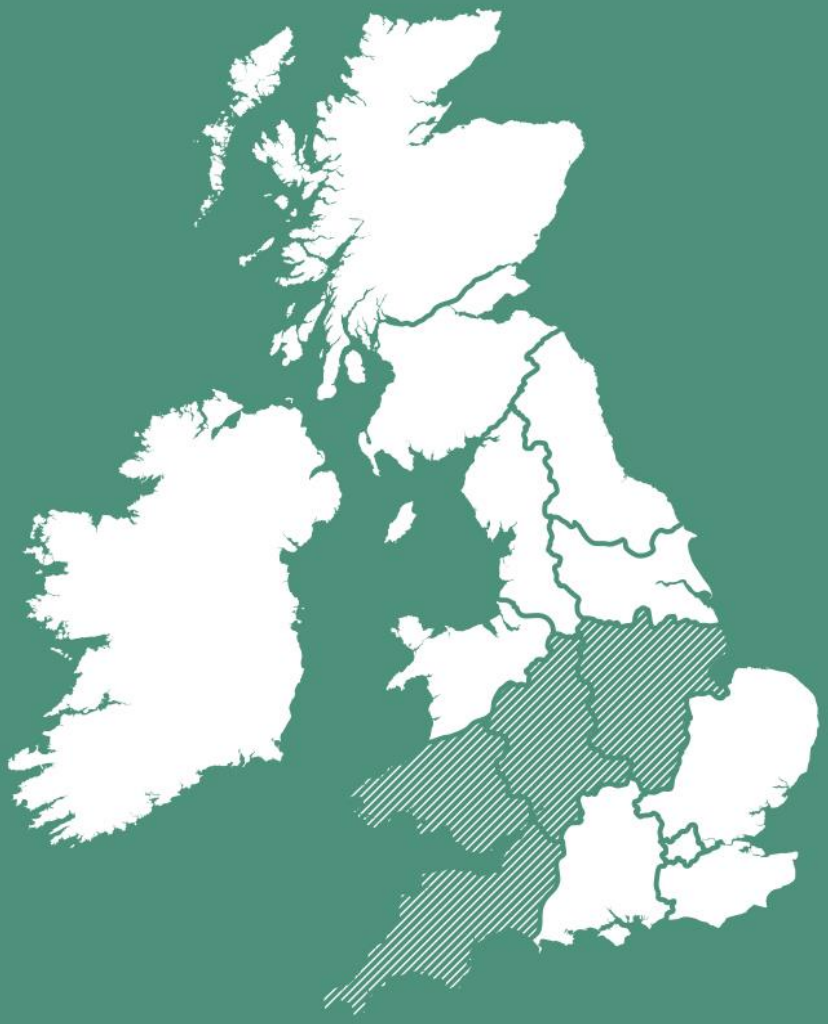
WESTERN POWER DISTRIBUTION

INNOVATION

NEXT GENERATION NETWORKS

Entire

WPD_NIA_017



NIA MAJOR PROJECT PROGRESS REPORT

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Contents

Glossary

Term	Definition
ASC	Agreed Supply Capacity
BAU	Business as usual
BSP	Bulk Supply Point
CDM	Construction Design Management
DNO	Distribution Network Operator
DSR	Demand Side Response
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 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 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, April 2017 to October 2017.

1.1 Business Case

By making DSR commercially viable for both the DNO and participants, Entire may allow for the utilisation 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 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 second progress report. It covers progress from April 2017 to the end of October 2017. Full details can be found in section 2.2.

The build phase of the project continued within the reporting period. This consisted primarily with the commencement of customer engagement. This has been broadly positive to date. In addition the technical dispatch platform has been progressed.

Following discussions with Ofgem, a project review was instigated. This was aimed at ensuring the project remained relevant amongst the wider industry work on DSO models. This review has now been completed with several major changes to the project. These have now been communicated to potential participants.

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.

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 January 2018

Table 1-1: Procurement Details

Procurement dates have been pushed back following the project review. This incorporates changes to the technical build requirements.

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 5 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;
- The annual Power responsive conference in June; and
- The Energyst DSR conference in September.

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 (SO, 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 10 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 ASC (Agreed Supply Capacity) 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 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 3 year project is split into 5 phases: Design, Build, Test, Trial and Report.
The Trial section will run for 1 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
- 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;

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																	

Table 2-1: Gantt chart

2.2 Project Progress

This reporting period has covered the part of the build phase of the project as well as the project review. These are detailed below.

2.2.1 Build Phase

Progress within this reporting period

The project is part way through the build phase; the following actions have been completed:

- Flexible Power Website improved and updated;
- Call taking process finalised;
- CDM implications of Fruit installs finalised;
- Operations Processes finalised;
- Site identified for technology test;
- ASC investigation completed;
- Detailed Payment mechanism finished;
- Customer contract designed and finalised; and
- Generator audit process agreed.

The following actions are underway:

- Development of tendered systems to fulfil WPD spec. Kiwi Power will provide a cloud based solution (KOMP) alongside their Fruit device to control assets. The back office is integrated into KOMP. A client app will also be provided for declaring availability; and
- Roll out of generator app.

Next steps

- Implement actions of project review (see section 2.2.2);
- Continue customer recruitment;
- Install dispatch system; and
- Investigate impact of generator stability.

2.2.2 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 these elements of the project have been removed to ensure that the trial continues to deliver relevant and valuable learning.

WPD has also taken the opportunity to update the project design in conjunction with learning gathered as part of the project.

Actions

Following the review several key changes have been made to the project:

- Removal of stacked service. WPD will only offer the CMZ products and will not offer access to alternative services. WPD still sees the stacking of revenues as essential to the viability of DNO led DSR, and endeavours to deliver a product that the wider industry can stack;
- Removal of managed service: WPD will no longer run the managed service. As such WPD will not look to assess asset health and reliability;
- Splitting of 5 CMZ zones to 14 subzones: to allow for more granular control of contracted assets, WPD has subdivided the original 5 zones into 14 subzones. The same overall area is covered;
- EOI stage: An expression of interest stage has been added to the process to allow WPD to quickly assess the available flexibility in the target areas;
- New start 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. This will allow us to deliver maximum learning at minimal costs. As we do not expect large levels of response to be built for the service, operation over 1 year will allow us to reduce project costs and facilitate a faster transition to BaU;
- New interface options: can use an API as an alternative to the fruit;
- New CMZ services. Following the detailed design of the project, WPD has seen significant value in the delivery of 2 additional CMZ products; and
- A consultation will be held on the value of DNO data to the DSR market.

These changes have required the following actions to be undertaken:

- Updating of customer engagement processes and materials (including the website);
- Development of new payment mechanisms;
- Redesign of customer contract; and
- Updates to the Dispatch system.

Next steps

- Effective communication of changes to all stakeholders;
- Delivery of amended contract; and
- Delivery of amended dispatch system.

3 Progress against Budget

As mentioned in section 2.2.2 a major review of the project was undertaken. As such the project budget has changed.

Spend Area	Budget (£k)	Revised 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	85	139.595	54.595	64%[1]
Build	950	786	636	300	226.64	-73.36	-24%[2]
Test	50	50	40	0	0	0	0%
Trial	800	842	652	0	0	0	0%
Report	80	75	60	0	0	0	0%
TOTAL	**1965**	1838	1473	385	366.235	-18.765	-5%

Full logs of the changes can be found in the relevant change requests.

Table 3-1: Budget

Comments around variance

1. The Design Phase took significant additional resourcing than expected. This is due to the additional work described in section 2.
2. 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 capcity has been returned however progress was limited by data quality and complex customer change processes. The generation audit has been designed but was delayed by the project review.

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 required have been scoped and tendered for the project. 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:

- Limitations of commercial DNO operations

Customer proposition:

- Calling CMZ requirements by 15.00 rather than 17.00 allows for participation in frequency response;
- High customer interest in fully managed service. Desire for minimal interactions;
- Complexity of contracting required for participation in multiple services;
- General positive response to Flexible Power branding and propositions;
- Complexities of National Grid service participation and Standing Reserve Dispatch equipment installation;
- Poor data quality limited response to ASC letters; and
- ASC follow up generated better response, however this was limited by difficulties over finding correct decision makers as well as companies wishing to keep ASC capacity.

WPD technical requirements:

- Base CMZ design ineffective for class D networks under Second Circuit Outages. This would be better with an availability style service (led to design of Dynamic product); and
- Avoidance of network build increases Interruption and Incentive Scheme liabilities (led to design of Restore product).

Technical implementation:

- Large level of potential equipment that needs to be interfaced with; and
- Level of disaggregation required from Aggregators to ensure volume is in right areas.

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 is:

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

Table 6-1: Key intellectual property

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

The relevant foreground IPR identified in this reporting period is:

- Flexible Power marketing documentation;
- Flexible Power customer processes;
- Flexible Power customer contract; and
- CMZ product designs.

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 Table 7-1, 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.

Details of the Risk	Risk Rating	Mitigation Action Plan	Progress
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 management of potential targets	Ongoing
Development of Fruit is delayed	Moderate	Active management of contract. Milestone based payments	Ongoing
Development of Komp2 is delayed	Moderate	Active management of contract. Milestone based payments	Ongoing
Access to customers is limited by aggregators	Moderate	Active engagement with aggregators	Ongoing

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

Table 7-2 provides a snapshot of the risk register, detailed graphically, to provide an on-going understanding of the projects' risks.

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	0	0	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	6	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 7-2: Graphical view of Risk Register

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.

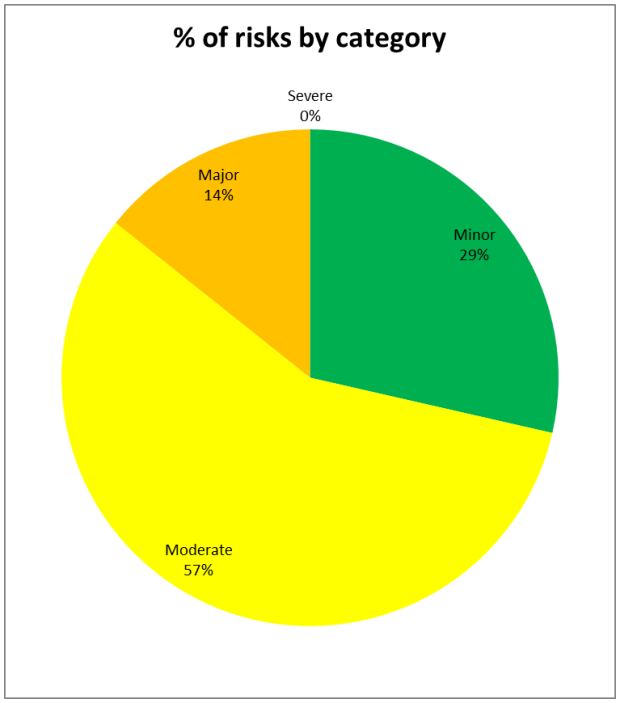

Table 7-3: Percentage of Risk by category

7.2 Update for risks previously identified

Descriptions of the most significant risks, identified in the previous six monthly progress report are provided in Table 7-4 with updates on their current risk status.

Details of the Risk	Previous Risk Rating	Previous Risk Rating	Mitigation Action Plan	Progress
Shift in PSD use case	Major	Moderate	Constant liaison with PSD	Further design work was conducted to finalise use case.
SRD is delayed due to replacement programme	Major	Closed	Accelerate contract signing and first tender entry	Risk Closed
Website development halted as WPD hosting contract is being moved	Major	Closed	Liaison with Main business website team	Risk Closed
NG not giving FP a aggregator contract	Major	Closed	Acceptance of base aggregator terms	Risk Closed
Cyber security risks from new systems	Major	Major	Involvement of IR in tendering processes. extensive penetration testing	New systems will be tested by WPD's Information Resources team.

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

8 Consistency with Project Registration Document

4 additional change requests have been logged in the reporting period.
CRF002 - adjusted the project benefits following the changes in geographical areas in CRF001.
CRF003 - de-scoped the use of WPD generation asset participation in the trial to reduce any potential conflicts of interest.
CRF004 - amended the wording of the project scope to reduce confusion over the project.
CRF005 - this change implemented the outcomes of the project review.

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.