

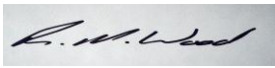


## Improved Statistical Ratings for Distribution Overhead Lines (Phase 2)


Quarterly Report; March 2016

Date: 9 March 2016

## Version History

Date	Version	Author(s)	Notes
09/03/16	1	Richard Wood	

## Final Approval

Approval Type	Date	Version	EA Technology Issue Authority
Final	09/03/16	1	

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## Summary

This first Quarterly report for the Improved Statistical Ratings for Distribution Overhead Lines (Phase 2) project at the Western Power Distribution (WPD) Stoke site provides an overview of the project since work commenced on actual data collection and initial validation on 4<sup>th</sup> January 2016.

The Overhead Line conductor test-rig has been formally operational since January 4<sup>th</sup> 2016, and whilst it has been in a stable operating condition, a small number of issues have arisen to date: these have been addressed swiftly by various EA Technology staff with support from Project Sponsor Sven Hoffmann at WPD, in order to maintain the operation of the rig.

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# 1. Project Activity List

The table below illustrates the current status of the activities aligned with Key Deliverables of this project which ensure continued, uninterrupted operation and timely completion:

Activity / Project Deliverable		Item Description	Status
1	Test-rig Running and Maintenance	Operation and Management Plan	Complete. However, this is a "live" working document: therefore, the appropriate reviews, amendments and additions are made as the project evolves.
		Decommission Plan	Started but incomplete.
2	Data Entry Checking and Validation	Data Collection and Validation Method Statement	Complete
3	Data Collection and Validation	Data Download Tool	In progress
4	Data Analysis	Data Analysis Method Statement	In Progress
		Data Analysis Tool; OHRAT & OHTEMP Functionality	In Progress
		Data Analysis Tool; C-T Curve Production Capability	In Progress
		Data Analysis Tool; Ability to incorporate LDC	In Progress
		Validation of CIGRE Methodology	In Progress
5	Year One	Year One Data Collection Completion	Not Started
		Year One Interim Report	Not Started
6	Year Two	Year Two Data Collection Completion	Not Started
		Year Two Interim Report	Not Started
		Update ACE104 and ENA ER P27	Not Started
		Decommission Test-rig	Not Started
7	Integrated Software Tool	Specification Developed	Not Started
		"Beta"/Test version of software released	Not Started
		Final Release of Software	Not Started
8	Project Conclusion	Final Project Report Complete	Not Started

## 1.1 Test-rig Running and Maintenance

A “live” Test-rig Operation and Management Plan (TOMP) has been developed by the EA Technology project team to ensure the successful operation and optimal evolution of the Overhead Line (OHL) rig at Western Power Distribution (WPD) Stoke. The current version of the TOMP comprises a list of all items that need consideration aligned with:

- Appropriate OHL rig spares, suppliers and delivery lead times.
- Performance feedback monitoring mechanism.
- External component performance support.
- Scheduled EA Technology review meetings.
- Appropriate level of approval.
- Appropriate resources to perform each task
- Appropriate Risk Assessments & Method Statements (RAMS).

Additional documents were produced during the development of the TOMP, and include:

- Outstanding Task List for the Test-rig.
- Reactive Maintenance Strategy.
- Maintenance Inspection Check-sheet.
- Calendar of Scheduled Events

The **Outstanding Task List for the Test-rig** provides a contemporary record of the ongoing project management status that enables prioritisation and forward planning of tasks. An extract of current incomplete tasks is shown in Appendix I<sup>1</sup>.

The **Reactive Maintenance Strategy** was formed to minimize down-time and enable efficient response and deployment of resources (Shown in Appendix II).

The **Maintenance Inspection Check-sheet** was composed to ensure that a suite of preventative maintenance activities were performed during site visits to improve rig performance and component service-life longevity (Shown in Appendix III).

The **Calendar of Scheduled Events** was produced, and is coupled with the electronic calendar of the Test-rig Manager, in order to ensure timely planning and execution of significant development or operational activities (Shown in Appendix IV).

EA Technology has made a significant number of scheduled and reactive visits to the Test-rig site since commencement of data collection in order to progress task completion and improve rig performance.

Remote monitoring systems, including web-cams, sensory threshold alarms and remote isolation apparatus, have been incorporated into the test-rig control system in order to attempt to prevent component failure and mitigate against unnecessary down-time.

All activities to date have facilitated improvements in the quality of the test-rig management processes, documentation and performance.

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<sup>1</sup> Note: All completed task items are retained within the electronic version for completeness.

## 1.2 Data Entry Checking and Validation

A specific **Data Collection and Validation Method Statement** has been produced and is available to view separately to this quarterly report. Data analysis and validation is currently being carried out on manual basis.

Since commencement of this project phase, the data is being downloaded and processed daily. However it is the intention of the project team to introduce additional weekly and monthly tasks to the procedure as the overall operation of the rig becomes more reliable and consistent. Details of these additional tasks are stated within the **Data Collection and Validation Method Statement**.

A spreadsheet has been created to enable checking of daily data, and validates the “sanity” of the data collected each day. The raw data is imported into a “checkdata” file which prepares Graphs displaying a number of parameters. These parameters include:

- Behaviour of thermocouples
- Wind variation
- Power supply behaviour (graph of voltages to highlight any trips)
- Solar radiation
- Overall rig operation

## 1.3 Data Collection Download Tool

The EA Technology Software Team has commenced the initial development stage to automate the data checking for this particular aspect of the project during week commencing 7<sup>th</sup> March 2016. A further progress report regarding this development will be made in the next scheduled project Quarterly report.

A Data Analysis Method Statement is in the process of being written and will be populated during the forthcoming months as the data analysis process is developed.

## 2. Project Summary Activity Log

A number of issues have arisen during the initial “bedding in” period of the test-rig, and it is worth pointing out that all of the issues highlighted below have been attended to and rectified as a matter of urgency to ensure the test-rig has been maintained in an operational state.

At time of writing this report, the test-rig is in a stable, working condition and all required data is being recorded effectively.

Conductor thermocouples have been working well since the overhead line rig went live. One thermocouple had been suspected of malfunction and has been replaced as a precaution.

The power supplies have been generally working well, although one developed a fault that resulted in one of the four circuits producing invalid data for a few days. A minor modification carried out by EA Technology staff corrected the fault, and the opportunity was taken to similarly modify the other three power supplies as a precaution.

Unfortunately, the data logger has not been as reliable as expected, a situation worsened by it being delivered with very out-of-date firmware. The manufacturer has released several updates to fix a number of operational issues. It is now in a functional state and EA Technology personnel are routinely monitoring its performance.

The automatic daily data download procedure is working well, and as stated previously, data checking is not yet fully automated at this time. As the overall rig operation is settling, the project team has been updating the parameters that need to be monitored for reliable operation.

A back-up independent alarm system incorporating an Eltek Squirrel data logger has been installed, in addition to the primary automated alarm function hard-wired into the DT-85 Datataker logging system.

All ambient sensors (i.e.: temperature, wind, sunshine, rainfall) are noted as working well.

Modification of OHTEMP to incorporate new CIGRE equations is in progress (OHTEMP2).

EA Technology is currently developing a reporting table which will highlight areas of missing data throughout download periods. Actions taken will be reported during publication of subsequent quarterly reports.



A summary of the most significant issues attended to since data collection commencement was collated and is shown below:

Start Date	Issue Description	Date Resolved	Action and Consequence
23/12/15	Porta-cabin reached 30°C during pre-start and project rig running operation.	24/12/15, 21/01/16	Ventilation methods improved including installation of additional 16" cooling fan adjacent to injection transformers, thermostatic controllers for existing extractor fans and two new floor vents.
04/01/16	Formal start of Project Phase 2 and operation of the OHL rig	04/01/16	N/A
19/01/16	Integrity of certain thermocouples giving cause for concern	21/01/16	Thermocouple THUT1 behind PSU4 repositioned
19/01/16	Omni advised updating the logger's "firmware" to resolve potential reset instability.	10/02/2016	Complete. Changes in logger configuration and overall issues fixed. Logger operation stable
29/01/16	Minor mistakes in the Logger Channels file	29/01/16	Updated version; logger channel 12a is now consistent with the current CONFIG and checkdata programs.
01/02/2016	Squirrel Logger Installed	10/02/2016	Backup Trip Alarm and Relay installed to complement existing logger trip circuit.
02/02/16	Logger stopped at 07.14am	03/02/16	Manually restarted: 26hrs of data lost.
05/02/01	Logger stopped at 20.35pm	06/02/16	Manually restarted: 14hrs of data lost.
10/02/16	Logger firmware updated	10/02/16	Fix firmware bugs, improved operational stability.
14/02/16	Logger stopped at 15.20pm	14/02/16	Manually restarted: 43hrs of data lost. Configuration issues resulting from logger firmware update. Fixed.
16/02/16	Power supply unit (PSU) 3 had ceased automatic regulation, consequently, the output voltage and current were tracking the line input	24/02/16	A repair was carried out by modifying the micro-switch assembly of the maximum limit switch. Modification rectified fault and method was approved by the manufacturer.
19/02/16	Conductor 14A peaked at 80degC at 08.00. It was noted there was no wind and low sun	ongoing	Monitoring of this situation, but nothing to report since this temperature excursion.

Start Date	Issue Description	Date Resolved	Action and Consequence
19/02/2016	Distributed thermocouples on 14A very variable e.g. 50 - 53 - 50 while TC15 reading 49	ongoing	Monitoring of this situation on regular basis
24/02/16	Successful modification of PSU 3 replicated in PSU 1, 2 and 4 following recent malfunction of PSU 3	24/02/16	Checked operation of motor to confirm symptoms were the same as PSU 3 and made mods on PSU 4. It was decided to perform mods on PSUs 1 and 2 also.
24/02/16	Logger formatted	24/02/16	Logger reloaded with saved configuration to try and alleviate unexplained stoppages
24/02/16	Logger formatted	24/02/16	Logger reloaded with saved configuration to try and alleviate unexplained stoppages
24/02/16	One of thermocouple trio on 14A (rig1, circuit 4, Ash) reading low (-3K).	24/02/16	Replaced Thermocouple 13 with spare and now operating without incident.

## Appendix I EA Technology Outstanding Task List for Test-rig

		<b>Outstanding Tasks at / for Test-site, Stoke</b>	Last updated: 29/02/16
Priority	EA Person Responsible	Problem/Action/Event/Comment	Comment or Est'd time (hrs)
	JDC	Investigate and repair/rectify: Squirrel logger tripped supply and welded contacts shut: equipment currently in a dysfunctional state. Possibly change circuit & hardware. Test-rig only has Datataker trip-function at present.	
	JDC/MPB/RA/NH	Integrate 'High Temperature Warning" notification into Datataker system to act as a pre-cursor alert to 'Over-temp Tripping Event'. ID of TC that will be used to trigger warning is still TBC.	
	RA	Identify/source UPS for PC & Modem and plan installation	Ongoing
	RA/NH	Identify/source remote isolation for logger and install during next visit	Ongoing
	NH/GPC/MPB	Calibration check of currents using clip-on ammeter and JDC's DVM	Ongoing at Capenhurst
	NH/GPC/MPB/PT	Devise new method/kit to check all TCs on Rig 1 CCT 4 (Ash) conductor are correctly identified. Activity to be performed during next visit.	
	PT/GPC	Amend component/circuit identification labelling on CU and PSUs so that consistent and appropriate: PT to review and advise.	
	NH	Replace TPS2 (FKA: IT2) TC during next site visit (TC48). Note RA replaced w/ new one BUT it needs to be verified that it is the correct one during the next visit (See MPB if necessary)	
	PT/NH	Floor vents: PT: <del>Verify floor structure (and roofing materials)</del> 29/02/16; arrange for vent-guards to be fabricated by FMS (painted yellow): EM request sent 29/02/16. NH: remove vent-covers; enlarge all floor holes; position vent-guards fab'd by FMS.	
	RA	Set up email (text) alert for 'Rig-tripped' alarm; recipients to be PT & RW (plus RA & MPB if they so desire)	
	NH	Source 6(qty) spare long brown TC's for OHL: Discuss w/ MPB	
	PT	Schedule visit to Lucideon (ST4 7LQ): Re. Instron test alternatives	
	PT/NH	Confirm thermostats for extract fans are appropriately wired: Test both w/ hot air gun during next visit.	
	RA/PT	Details for iPhone App Webcam viewing	Ongoing

	NJH/RA/DPC	TC13 and TC4 need swapping back (TC4 should be in S1 Ch2): TC13 needs to be 'spare' (See MPB to clarify):	
	All	Monitoring of site Web-Cams during staff visits	
	JDC/MPB	Consider remote resetting function for PSU variac. JDC to discuss w/ REO	
	JDC/MPB	Consider installation of isolator switch for each PSU o/p to Inj. Tx's following JDC discussions w/ REO	
	JDC/PT	Determine reparatory tasks to be performed by REO on the PSU Variac issue: JDC to discuss w/ REO	
	NH	Check position of TBOX12 TC (currently 10°C higher than TBOX2)	
	PT	Add 'TC Calibration check stage to decommissioning plan. (Cal'n check stage to be performed following removal from OHLs).	
	NH	Source additional Fantronix cooling fan and position on rig side that only has 2	
	NH	Source wide red floor tape and demarcate floor position of all PSUs in current locations away from cabin walls	
	NH	Identify and label the 3 TCs that are taped onto side of PSU 4 [They should be THUT1, Squirrel Ch1 and Squirrel Ch2]. Then, reposition Squirrel Ch2 up to same height as THUT2.	
	NH	Update electronic spares list showing items currently held at Stoke and forward to PT. <del>NH to update spares list during next visit.</del> (Organise appropriate identification and storage to be performed at a later date)	Ongoing
	RW	Investigate costs associated with reflective paint for external surfaces of porta-cabin (Nexus: Tempcoat)	Ongoing
	PT	Investigate costs for Air-con unit within cabin (6-10kW): Progressed 10/02/16. 7x EMs sent; 3 responses so far = £1716 to £2261 (+VAT).	Progressed
	PT	Establish spec's for existing extractor fans: EM sent to Concept Cabins 29/02/16	Progressed
	JDC/MPB	Review Datataker & Squirrel over-current/over-temp thresholds (Currently PSUs set at 80°C; THUTs set at 40°C).	
	Team	Review performance feedback loop (Frequency of meetings, sensory threshold alarms, trigger recipients, webcam review, etc.)	
		Visual check of Digirail modules in auxiliary pole cabinets: moisture ingress, etc. [Localised heating required if ambient temp. = <0°C?]. TBC by OMNI and rig monitoring	
		Confirm how close the PSUs are running to their limits during warmer seasons	

	PT	Estimate 'Time & motion' record for all maintenance inspection tasks in order to estimate resource costs following completion of TOMP	
	PT	Re-review and finalize Safety Documentation. (Currently appropriate to running operation, revisit when time permits)	
	PT	Complete outstanding tasks on Fire RA. (inc. send docs to local Fire Brigade). NOTE: These tasks do not render the RA dysfunctional. Progressed 4/27/02/16. Fire Safety Document presented to Blah for printing printed and ready for WPD	
	PT	Identify & source spares required for Stoke. Review team spares list. <del>PT set up workable document in job folder: all team to add to list appropriately.</del>	
	PT/RW	Source "Main Isolation Point" signage on Electricity meter cubicle and "E-Stop only for 32A radial circuits" signage (ARCO): PT/RW to discuss	
	PT	Confirm grass maintenance contractors and schedule w/ Hortech (email sent to Peter Tilley 10/02/16)	
	RW/PT	1 page PR document for WPD (A. Pickering to approve all pics)	
	RA/MPB/PT	Confirm requirement for ambient heating in Auxiliary Pole Cabinets	
	PT/RW	Opening ceremony for EATL/WPD/Suppliers/DNOs/STP members	
	GPC	<del>Integrate 24V auxiliary relay control circuit into E-Stop circuit: JDC to discuss w/ GPC; GPC to perform during next visit. (Is sounder now disabled? Is heat sensor now in place alongside the smoke sensor? [Note 290216: Squirrel &amp; Datalogger alarms now do this task]. Commission fire alarm circuit properly).</del>	Sounder is enabled. Heat sensor not required. Alarm trip functional (Tested by NJH 24/02/2016)
	RW/JDC/PT	<del>Consider which resources can perform PSU replacement</del>	JDC will attend to identify cause of problem; replacement will be performed under his supervision.

## Appendix II Reactive Maintenance Strategy

Reactive Maintenance Strategy					Last updated:		8/01/2016			
Class of emergency				Actions available		Resources available				
	Emergency	Questionable	Non-emergency			Resource		Contact Details (7am-10pm)		
1	Threat to safety and health of people	Vandalism?	Power outage	A	Do nothing except record details of communication	1	EATL	Project Manager	Richard Wood	0151 347 2387 07854 401802
2	Threat to rig safety and/or functionality	Foreign objects within compound...		B	Remotely interrogate webcams	2		Test-rig Manager	Peter Thompson	0151 347 2402 077183 40551
		...close to or touching test-rig components	...remote from test-rig components							
3	Threat to WPD operations	OHL conductor falling/fallen down	Other?	C	Confirm receipt of 'Rig-tripped' text alert	3		Data Manager	Ramiz Ahmed	0151 347 2333 07891 236893
4	Trespassers within compound	OHL pole crossarm falling/ fallen down		D	Contact WPD reception, security or Electricity Supplier	4		Electrical Engineering Guidance	John Crabtree	0151 347 2337 (O) 07841 492595 (W) 07704 572786 (P) 01244 328961 (H)
5		Fencing/gate failure		E	Liaise with resource informatively	5		Test-rig design (Primary contact)	Mark Bertinat	0151 347 2391 07817 909797
				F	Contact emergency services informatively at an appropriate point in time	6		Test-rig design (Secondary contact- ONLY during normal working hours)	Alan Ward	0151 347 2349 (ONLY during normal working hours)
				G	Isolate power to rig remotely	7		OHL Design	Richard Wood	0151 347 2387 07854 401802
				H	Contact emergency services immediately	8	Health & Safety Advisor	Greg Watson	0151 347 2256	

Note: We currently foresee that the only cause for

immediate attendance to the Test-site outside of normal working hours would be if the Emergency Services and/or WPD were to insist that we do so.

I	Liaise with and deploy resource at an appropriate time
J	Liaise with and deploy resource immediately

9		Technical Engineers	Ralph Eyre-Walker	0151 347 2375 07894 392833
10	WPD	Test-rig design	Sven Hoffmann	
11		OHL Team	Shane Degg	07989 700472
12		Network Connection Team		
13		Stoke Depot Security	Nigel Morris	01782 403706
14	Electrical Contractor	AJ Electrics (Local to Test-site)	Chris Huxley	01782 205814 07718 027814
15	Data loggers	OMNI (0845 9000 601)	Andy Philpott	07595 120791
16			Steve Duncan	07908 753933
17	PSUs	REO	Steve Hughes	01588 673411
18	ITs	Birmingham Transformers	Mark Waidson	0121 764 5600
19	Npower	Commercial Premises Supplies	Ed Davies	0800 912 7723
20	Grounds Maintenance	Hortech Grounds Maintenance	John Shufflebotham	01782 416653 07866 704854
21			Peter Tilley	01782 416653 07896 832637
22	Porta-cabin	Concept Cabins	Darren Trinder	07733 763864

## Appendix III Maintenance Inspection Check-sheet

Task List D		Maintenance Inspection Check-sheet			Version update: 26/01/15	Maintenance Inspection completion date:		
<p><b>Description:</b></p> <p>The Maintenance Inspection Check-sheet is a guide for the routine maintenance tasks associated with the OHL Test-rig. A new document should be printed prior to visiting site and completed during each inspection. The completed documents should be returned to the Test-rig Manager and stored at EA Technology's head-office, Capenhurst.</p>								
Module	Component		Action	Frequency	HR	Equipment required	Initials	Comments
1	Test-rig control & monitoring equipment (Indoor)	A	Weld cables	Visual assessment <sup>2</sup> and comparative sweep across the four supplies w/ FLIR	Each visit <sup>3</sup>	TE	FLIR/iPhone FLIR	
				Torque check of terminated lugs (44Nm) and bolted terminations	During quarterly scheduled inspection ONLY when Test-rig is isolated	TE	Calibrated torque wrench, adaptors. Work Instruction including specified torque	
	B	Injection Transformers	Visual assessment as 1A	Each visit	TE	FLIR/iPhone FLIR		

<sup>2</sup> 'Visual assessment' refers to the observational process of assessing the mechanical condition of each component associated with the stated item, where practicable and safe to do so, by employing an appropriate level of manual handling, tooling, interference and/or component movement in order to assess the actual condition of component materials, assemblies, fixings, and/or wirings without causing unnecessary or irreversible disturbance that could render the components vulnerable to failure or dysfunctional operation. All noteworthy observations, reparatory works, pro-active maintenance actions or considerations must be recorded and communicated to the appropriate responsible person in a timely manner for means of traceability and in order that any subsequent actions can be planned accordingly.

<sup>3</sup> 'Each visit' refers to visits that are >2weeks apart or those directly following severe weather occurrences.



			Check tightness of bolted terminations	During quarterly scheduled inspection ONLY when Test-rig is isolated	TE	Calibrated torques wrench, socket set and spanners		
	C	PSUs (x5)	Visual assessment as 1A	Each visit	TE	FLIR/iPhone FLIR		
			6 monthly OEM Service inspection	Scheduled w/ REO	Any	REO require Min 2 week notice. (If fully disco'd: 4 units in 8 hours, w/ reconnection by EATL staff)		
	D	PSU control / measuring equipment	Visual assessment of cables, components and terminations Check only for signs of damage or overheating	Each visit	TE	FLIR/iPhone FLIR		
			PAT checks	Scheduled w/ FMS	FMS/ DC/ NJH	PAT Instrument		
	E	Porta-cabin thermo-couples	Visual assessment. Check in place and undamaged, and readings are similar	Each visit	TE			
	F	Data Logger, CEM units, PC / laptop	Visual assessment. Check in place and undamaged, w/ no disconnected wires.	Each visit	TE			
			PAT checks	Scheduled w/ FMS	FMS/ DC/ NJH	PAT Instrument		
	G	E-stop & Fire alarm circuit	Functional assessment and test of local operation and detectors	6 months	TE	?		

				Functional assessment and test of remote operation	6 months	TE	?		
		H	32A Radial circuits and consumer unit	Visual assessment of PSU isolators, sockets and extension cables (incl. mechanical switch operation)	Each visit. Switched operational checks ONLY when convenient	TE	FLIR/iPhone FLIR		
		I	Office furniture	Visual assessment of chair functionality and table legs	Each visit	TE			
2	Test-rig control & monitoring equipment (Outdoor)	A	OHL Thermo-couples	Visual assessment of self-amalgamating tape, and cable insulation material localised to ducted elbows at height and all glanded entry ports.	From ground level each visit.	TE	OHL_PGP <sup>4</sup> / Genie boom/ UAV		
					Review remotely using webcam.				
		B	2D Anemometer	Visual assessment of anemometer sensor head and overall cable insulation material, specifically at all glanded entry ports.	From ground level each visit.	TE	OHL_PGP / Genie boom/ UAV		
					Review remotely using webcam.				
		C	3D Anemometer	Visual assessment of anemometer sensor head and overall cable insulation material, specifically at all glanded entry ports.	From ground level each visit.	TE	OHL_PGP / Genie boom/ UAV		
					Review remotely using webcam.	Any			

<sup>4</sup> 'OHL\_PGP' is the OHL fibreglass poles with a GoPro Camera attached at the upper end

	D	Rain Tipping bucket	Visual assessment of functionality and overall cable insulation material, specifically at all glanded entry ports. Cleaning only if required.	Each visit.	TE			
	E	Solar meters	Visual assessment of sensor head and overall cable insulation material, specifically at all glanded entry ports.	Visual assessment and clean each visit.	TE			
	F	Ambient temp probes and radiation shields	Visual assessment of assembly and overall cable insulation material, specifically at all glanded entry ports.	From ground level each visit.	TE	OHL_PGP / Genie boom/ UAV		
				Review remotely using webcam.	Any			
	G	Auxiliary Cabinets	Check condition and functionality of cabinet, door, seals, mountings & panel keys, and identify any evidence of moisture ingress.	Only external inspection performed EVERY visit; detailed checks performed maximum fortnightly visit	TE			
	H	Ducting & trunking	Visual assessment of material, joints and all cable entry ports. Ensure duct seals are functional. Check that there is no pooled water present within, or evidence of rodent activity.	Only external inspection performed EVERY visit; detailed checks performed maximum fortnightly visit	TE			

3	Porta-cabin	A	Fixtures, fittings, windows, door locks & cable entry ports	Confirm condition, functionality, seals and security. Identify any evidence of moisture ingress. Assess functionality/integrity of cable entry ports and vermin barriers. Assess vermin traps.	Only external inspection performed EVERY visit; detailed checks performed maximum fortnightly visit	TE			
		B	2-step platform	Visual assessment	3 months	TE	FMS		
		C	Entrance steps	Visual assessment	Each visit	TE			
		D	Fire extinguisher	Quarterly inspection	3 months	TE	FMS		
		E	General	Housekeeping	Each visit	All			
4	OHL	A	OHL conductors and fittings	Visual assessment	From ground level each visit.	TE	FLIR/iPhone FLIR OHL_PGP / Genie boom/ UAV		
					Review remotely using webcam.				
		B	Poles, cross-arms and stay-wires	Visual assessment	From ground level each visit.	TE	OHL_PGP / Genie boom/ UAV		
					Review remotely using webcam.				
5	Electricity supply	A	WPD cabling supply to Test-site	No control measures available					
		B	Contract w/ Electricity Supplier (Npower)	Assess actual usage against estimated. Current contract expires: 14/02/16	Review of most appropriate contract	Any		PT	

		C	Cut-out / meter cubicle	Check condition and functionality of cabinet, door, seals, mountings & panel key, and identify any evidence of moisture ingress.	Only external inspection performed EVERY visit; detailed checks performed maximum fortnightly visit	TE			
		D	Internal electrical installation	RCCD test	Quarterly ONLY when possible	TE			
				Annual Test & Inspection	Annual	AJ Electrics		PT	
		E	Earthing	Confirm condition and security of cable and terminations	Only external inspection performed EVERY visit; detailed checks performed maximum fortnightly visit	TE	Hand tools		
6	Fencing/ Gates	A	Fencing & gates	Visual assessment of fixings	Each visit	Any			
		B	Padlock / keys	Confirm functionality	Each visit	TE			
7	Test-site	A	Signage	Visual assessment of condition & fixings	Each visit	Any	Hand tools Cable-ties		
		B	Safety walkway	Visual assessment	Each visit	Any			
		C	Grass maintenance	Ensure maintenance contract works are performed to WPD expectations	Confirm w/ WPD	TE	Maintenance contract		
		D	General house-keeping	Collection & disposal of wind-blown debris/ refuse	Each visit	All			

## Appendix IV Calendar of Scheduled Project Events

Calendar of Scheduled Events 2016-18				Last updated:	28/01/16
Date	EA Person Responsible	Problem/Action/Event/Comment	Target Completion Date	Results	
04/01/2016	MPB	Test data gathering commenced			
25/01/2016	PT	Renewed Electricity Supply Contract w/Npower (Expires: 14/02/16)	01/02/16	Complete	
21/01/2016	NJH/RA/GDC	Visit to Stoke to continue w/commissioning tasks (Poss. perform 1 <sup>st</sup> Visual Inspection?)		Visit performed: outstanding tasks and first inspection partially complete	
10/02/2016	NJH/RA/GDC	Visit to Stoke to continue w/commissioning tasks (Completed 1 <sup>st</sup> Visual Inspection)			
1/05/2016	PT	Schedule 6mth maintenance inspection of PSUs w/ REO and EATL resources/visit	1/06/2016		
1/07/2016 (TBC)	PT/REO/TE	6mth maintenance inspection of PSUs by REO			
1/10/2016	PT	Schedule 6mth maintenance inspection of PSUs w/ REO and EATL resources/visit	1/11/2016		
1/01/2017 (TBC)	PT/REO/TE	6mth maintenance inspection of PSUs by REO			
1/05/2017	PT	Schedule 6mth maintenance inspection of PSUs w/ REO and EATL resources/visit	1/06/2016		

<b>Calendar of Scheduled Events 2016-18</b>			<b>Last updated:</b>	<b>28/01/16</b>
1/07/2017 (TBC)	PT/REO/TE	6mth maintenance inspection of PSUs by REO		
Nov 2016	PT	Prepare Site Decommission Method Statement	Dec 2016	
Jan 2017	PT	Confirm Electricity Supply Contract renewal w/ Npower (Expires: 14/02/17)	01/02/17	
Jan 2018		Stop gathering test data		
Mar 2018	PT	Decommission Test –rig and Site	June 2018	
July 2018	MPB	Produce Final Report		
July 2018		Site Lease Expires		

## Global Footprint

We provide products, services and support for customers in 90 countries, through our offices in Australia, China, Europe, Singapore, UAE and USA, together with more than 40 distribution partners.



## Our Expertise

We provide world-leading asset management solutions for power plant and networks.

Our customers include electricity generation, transmission and distribution companies, together with major power plant operators in the private and public sectors.

- Our products, services, management systems and knowledge enable customers to:
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- Assess the condition of assets
- Understand why assets fail
- Optimise network operations
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