WPD INNOVATION
Transforming the electricity network

Take Charge

6 Monthly Report

April 2021 – September 2021

WESTERN POWER DISTRIBUTION
Serving the Midlands, South West and Wales

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1. Executive Summary

Take Charge is a project funded through Ofgem's Network Innovation Allowance (NIA). The project was registered in April 2020 and is expected to be completed in early 2022.

The project will design, develop, construct and install a Compact Connection Solution (CCS) to provide a fast and cost-effective solution to supply rapid Electric Vehicle (EV) charging facilities at Motorway Service Areas (MSAs). The design and build of the CCS will be led by Brush, a leading UK manufacturer of transformers and switchgear. Working closely alongside Brush we will focus on developing a solution with all the capabilities of a conventional substation but in a far more compact and low cost design. The CCS will be trialled at a site operated by Moto, the largest MSA operator in the UK. The CCS will be connected to existing 33 kV and 11 kV networks within the vicinity of the trial site and will provide supplies to existing and new EV charging infrastructure.

The demonstration of a new packaged substation on the live distribution network will provide the template for high capacity, low cost solutions to ensure rapid charging can be deployed efficiently to serve future numbers of EVs.

This report details project progress on Take Charge from April to September 2021.

1.1. Business Case

The development and roll-out of rapid EV charging is becoming increasingly important as EV manufacturers aim to minimise the time and disruption associated with customers charging their vehicles.

MSAs have been identified as a specific location where rapid EV charging would need to be deployed on a large scale to allow simultaneous charging by multiple customers when undertaking long journeys. MSAs are currently supplied either directly via the local Low Voltage (LV) networks or via a distribution substation connected to the 11 kV network. However, the deployment of rapid EV charging at MSAs is likely to require a power supply capacity of up to 20 MVA to ensure that customers can simultaneously charge their vehicles at peak times.

Providing this level of capacity using traditional solutions would require the installation of a new 33/11 kV substation with associated transformers, compound, switchroom, switchgear and auxiliary equipment. The delivery of this solution would be expensive, time consuming and often far too complex for the needs of the customer.

The Government's Road to Zero strategy sets the ambition that by 2050 almost every car and van will be zero emission and has since moved its planned date for ending the sale of petrol and diesel vehicles from 2040 to 2035. It is therefore highly likely that large scale rollout of rapid EV chargers at all major MSAs will be required to meet future demand from EV customers. In GB there are three main MSA site owners. The following list indicates the number of MSA sites attributed to each owner:

- Moto – 44 sites
- Welcome Break – 26 sites
- Roadchef – 21 sites

There is a total of 91 sites where the solution could be installed. The post-trial method cost of the solution has been estimated as:

- £470k - (A).

The base case is the scenario that a traditional primary substation is constructed to supply the rapid charging demand for each MSA site.

The average cost of a 33/11kV primary substation is:

- £960k - (B)

Therefore, the solution offers a saving of:

- £490k per site - (B – A) = (C)

We anticipate that 68 MSA sites (75% x 91) will require the packaged substation solution. The total saving across the GB roll-out is therefore £33.3m (68 x C).

1.2. Project Progress

This progress report covers progress during the period April to September 2021. This is the third six monthly progress report since Take Charge was successfully registered on the Smarter Networks Portal in April 2020.

During this reporting period progress has centred around:

1. 33kV cable route feasibility and tendering for the cable installation;
2. Carrying out required assessments and surveys, including topographical, geotechnical and tree surveys;
3. Preparation and submission of the pre-planning and planning applications to Exeter City Council;
4. Finalising the design of the CCS;
5. Review and procurement of ancillary equipment for the CCS; and
6. Work to progress the civil design and tender.

The work on design and tendering for the 33kV cable installation, as well as finalisation of the design of the CCS, procurement of ancillary equipment and work on the civil design is running to schedule.

However, a delay has been incurred on the build phase of the project due to the discovery of Tree Preservation Orders (TPOs) at the installation site requiring additional surveys to be carried out for the submission of the planning application.

At this stage it is not expected that the budget will need to be altered, however, there may be a need to further extend the timescales to account for the delay. This will continue to be monitored as the project moves into the build stage.

1.3. Project Delivery Structure

The Take Charge Project Review Group meets on a bi-annual basis (last meeting held on 29 July 2021). The role of the Project Review Group is to:

- Perform reviews at agreed stage boundaries;
- Ensure the project is aligned with organisational strategy;
- Assist with resolving strategic level issues and risks; and
- Assess project progress and report on project to senior management and higher authorities.

1.3.1. Project Resource

Table 1.1 provides an overview of the project resources for the project.

Table 1.1 Project resources

Project Partner	Name	Role
WPD	Yiango Mavrocostanti	Innovation Manager
	Paul Jewell	System Development Manager
	Stephen Hennell	Policy Engineer (Switchgear)
	Andy Reynolds	Policy Engineer (Transformers)
	Peter White	DSO Development Engineer
GHD	Neil Murdoch	Project Manager
	Daniel Hardman	Technical Lead
	David Thorn	Strategic Consultant
	Nicholas Edwards	Graduate Engineer
Brush	Andrew Watkins	Brush Lead
	Bill Carlyle	Senior Engineer
Moto	Paul Comer	Moto Lead
Ecotricity	Andrew Hibberd	Ecotricity Lead

1.4. Procurement

Table 1.2 provides a summary of the status of the procurement activities for the project.

Table 1.2 Procurement status

Provider	Services/Goods	Project Area	Status/Due Date
Brush	CCS Detailed Design	Design	Complete
Brush	CCS Build	Build	In progress – scheduled to be complete in November 2021
Brush	FAT	Testing	In progress – scheduled to be complete in November 2021
Brush	CCS Installation	Installation	In progress – scheduled to be begin in December 2021
Siemens	33kV switchgear	Installation	Procured and built – ready for installation in November 2021
GE	RTU	Installation	Build completed September 2021– ready for installation in November 2021
Various	AC/DC auxiliary equipment	Installation	Procured and built – ready for installation in November 2021
TBD	33/11kV cabling	Installation	Ready for award – scheduled to be begin in November 2021

1.5. Project risks

A proactive approach has been taken to effectively manage risk in the delivery of the Take Charge project. Processes have been put in place to review the applicability of existing risks; identify and record new risks that have arisen; and update the impact, likelihood and proximity of risks that have developed.

A summary of the most significant risks is provided in Section 7.

1.6. Project learning and dissemination

The project learning is captured throughout the project lifecycle by monthly reporting and is available on the Take Charge project website.

In addition, up to the end of this reporting period the findings from the project have been captured through:

- WPD Innovation Showcase Event – 1 December 2020: Live presentation to a varied audience on the progress and findings to date on Take Charge;
- Energy Networks Innovation Conference (ENIC) 2020 – 8 December 2020: Live presentation to the industry on the progress and findings to date;
- CIRED 2021: Technical paper entitled "*Site selection and assessment of required system capacity for rapid EV charging at motorway service areas*", accepted and published as part of conference proceedings September 2021; and
- Preparation of material underway for the ENIC 2021 conference in December 2021.

2. Project Manager's Report

2.1. Project background

The development and roll-out of rapid EV charging is becoming increasingly important as EV manufacturers aim to minimise the time and disruption associated with customers charging their vehicles.

The project is working to develop, construct and install a compact packaged 33/11 kV substation with a capacity expected to be in the range of 10-20 MVA. Construction will be undertaken at an MSA based on applicability and the expected number of EV customers. The new packaged substation will be connected to existing 33kV and 11kV networks within the vicinity of the trial site and will provide supplies to existing and new EV charging infrastructure.

2.2. Project progress in the last six months

Work during the last six months has focussed primarily on:

1. Completion of the 33kV cable route feasibility, preparation of tender information for the new cable connection between Sowton Bulk Supply Point and Exeter Moto, evaluation of responses and work to appoint the contractor;
2. Carrying out the required assessments and surveys, including:
    - Ecological Impact Assessment;
    - Geotechnical survey;
    - Topographic survey; and
    - Tree survey.
3. Development of the design and preparation of material for the pre-planning application and planning application submissions to Exeter City Council;
4. Finalising the design of the CCS;
5. Completion of final reviews and ordering of the ancillary equipment for the CCS such that all the components of the substation are in the build phase and on schedule with the neutral earthing resistor having been delivered ready for integration with the transformer; and
6. Work to progress the civil design and tender.

Progress on the above areas are described in sections 2.2.1 to 2.2.6, below.

Table 2.1 provides an overview of the work packages that were detailed within the PEA and the progress that has been made to date.

Table 2.1 Take Charge work packages

Ref	Work Package Description	Status
1	Kick-Off and Data Gathering	Completed
2	System Capacity Optimisation	Completed
3	Design of the Solution	Completed
4	Build of the Solution	In Progress
5	Site Installation	Not started
6	Complete Trials	Not started
7	Closedown Report	Not started

2.2.1. Surveys

The design for the new substation requires several surveys to be carried to ensure that we have all the necessary information to build a safe and reliable asset. During the review period the following assessments and surveys have been carried out as per our standard requirements:

Ecological Impact Assessment (EIA) – this assessment investigates the area surrounding the proposed substation to identify any mitigation that would be required to protect any notable species. The results of the survey found that there were no specific mitigation measures required.

An extract from the report prepared by GE Consulting Services showing site photographs taken as part of work on the EIA is presented in Figure 2-1.

Figure 2-1 Overview of Exeter MSA site and existing plants and trees

Topographical survey – this survey is required to accurately measure the site levels and establish the presence of any underground services that could be affected by the proposed installation.

The survey was completed in June 2021 and an excerpt from the output from the topographical survey carried out by Site Vision Surveys is presented in Figure 2-2.

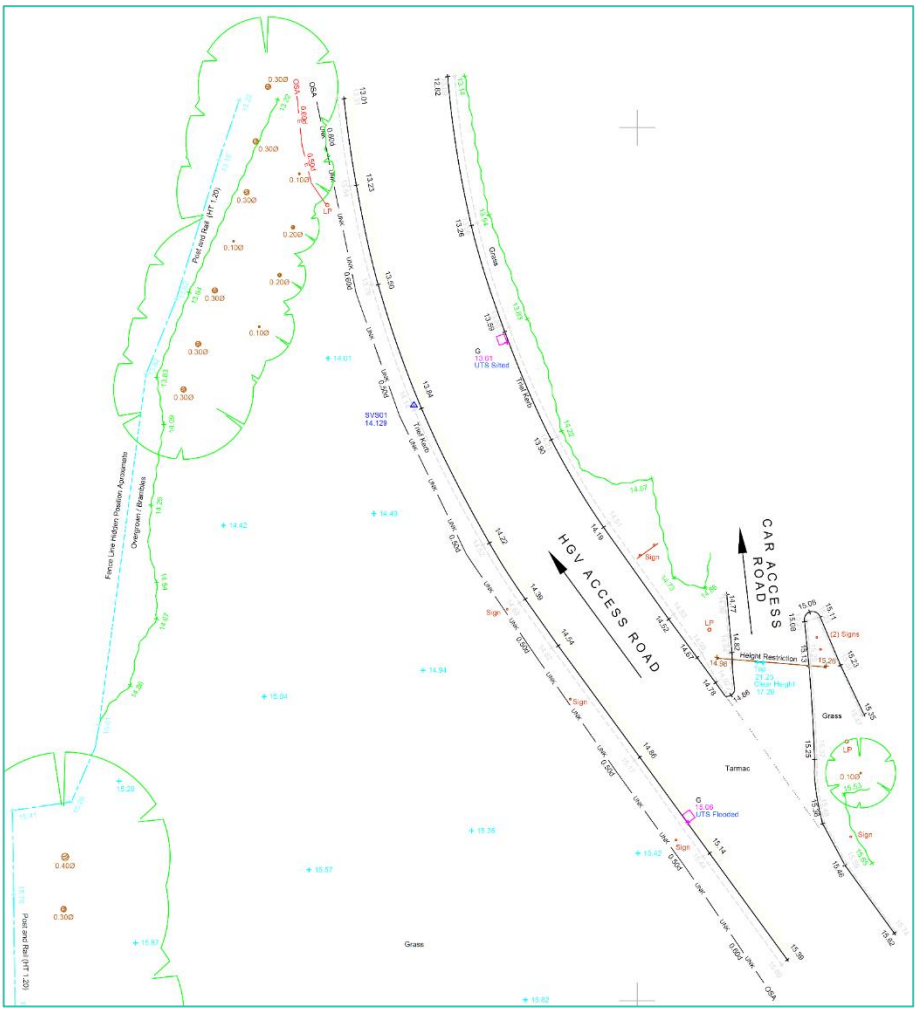

Figure 2-2 Output from topographical survey carried out by Site Vision Surveys

Geotechnical survey – an important aspect of the substation design is to establish the ground conditions that are on-site. Due to the weight of equipment, such as the transformer (over 30 tonnes), it is important to understand the bearing pressure of the ground where it will be located. Poor ground conditions could result in potential movement of the transformer sub-structure if mitigation measures were not undertaken. Unfortunately, the site conditions at Exeter were found to be poorer than expected as this is discussed further in Section 2.2.6.

An extract from the report prepared by Listers Geotechnical Consultants showing site photographs and ground samples taken as part of work on the ground investigation survey is presented in Figure 2-3.

View of adjacent fuel filling station (left) and site over view on completion of site work (right)

Arisings from TP01 and TP03

Figure 2-3 Photos from geotechnical investigation

Tree survey – typically a tree survey would not be required for a substation installation, however, during initial planning discussions with Exeter City Council it was discovered that a TPO was in place for all trees on the proposed site. An excerpt from the revised map from Exeter City Council Tree Preservation Order 384 is provided in Figure 2-4 showing the locations of the TPOs (G1, G2, G3 and G4).

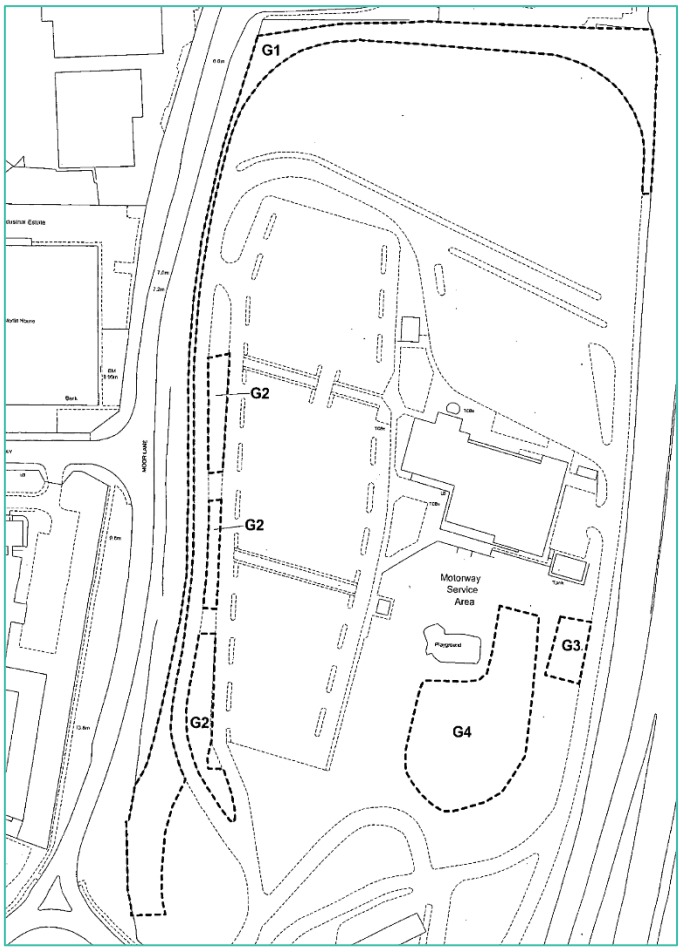

Figure 2-4 TPO received from Exeter City Council

The presence of the TPOs meant that we had to arrange a detailed tree survey to support the planning application of the new substation. This unforeseen survey resulted in delays to the planning application and required updates to the substation location to account for several TPOs identified around the Moto Exeter site.

The surveys listed above were all completed during this reporting period and have been used to finalise the design and support the submission of the planning application.

2.2.2. 33kV cable

During the review period, the 33kV cable route feasibility study has been completed. This identified that the preferred 33kV cable route (Option 2) overcomes challenges relating to traffic management for the route from Sowton Bulk Supply Point (BSP), the 33kV connection point, on to Moor Lane. Option 2 also adopts the approach to directional drill out of Sowton BSP and follow Osprey Road past our existing depot and back to Moor Lane, as shown in blue in Figure 2-5.

Tender information was prepared and released to contractors, which provided details of both options for consideration. The tender was shared with five contractors, who all confirmed that Option 2 is preferable route. Following evaluation of the tenders, the most cost effective and technically acceptable contractor has been selected and is currently being appointed.

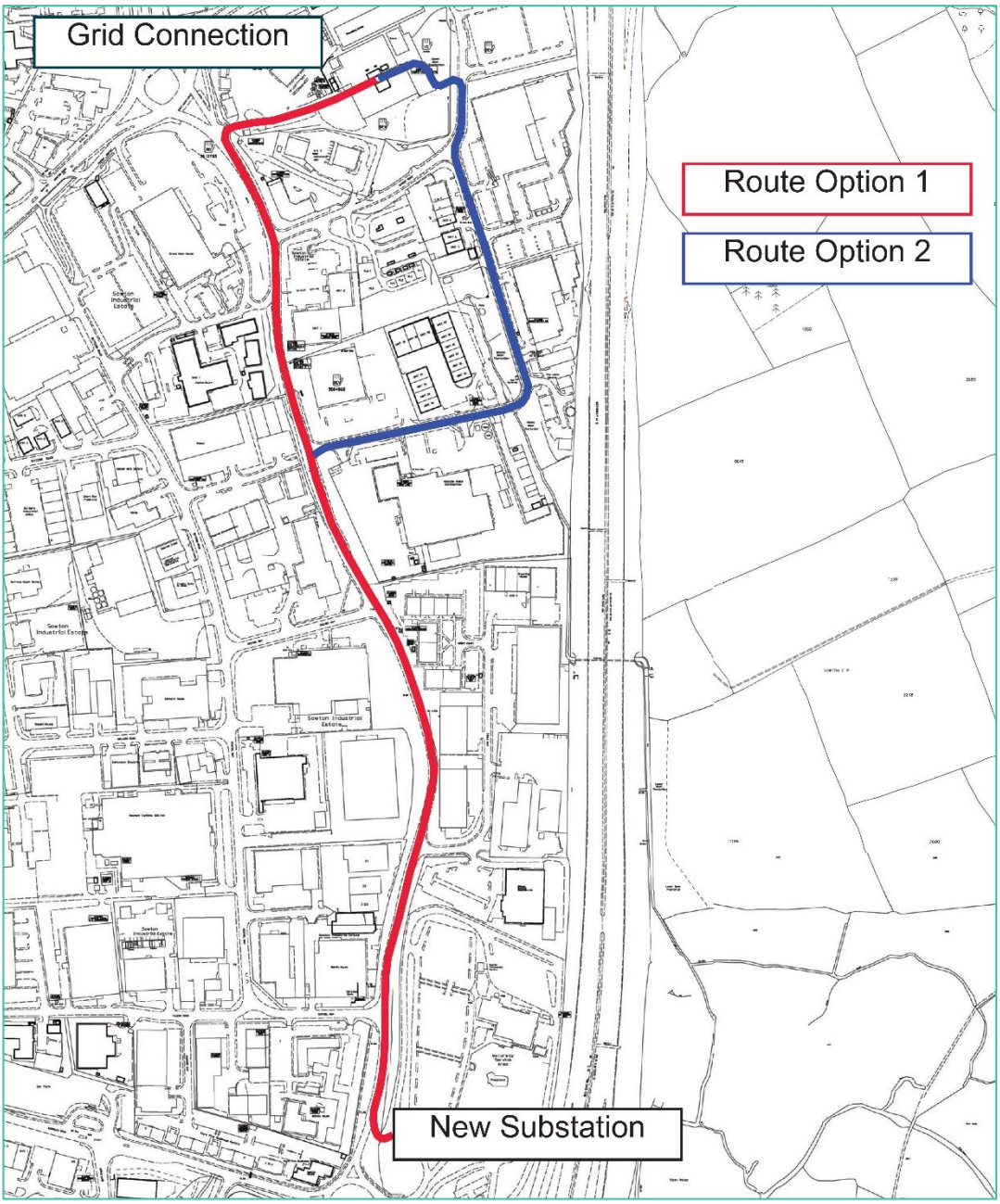

Figure 2-5 33kV cable routes

The appointed cable contractors have proposed the use of a vacuum excavator (see Figure 2-6) to remove soil and material from around trees protected by TPOs. The use of this technique helps to protect tree roots and prevents the need to remove or disturb trees.

Figure 2-6 Illustration of vacuum excavation method

2.2.3. Planning application

The requirement for submitting a planning application for new substations is dependent upon the size of the installation. Typically, any substation which is located on a new site which is over 27m³ will require planning permission and most substations connected at 33 kV will exceed this limit. The size of the substation at Exeter is far in excess of this requirement and therefore a planning application had to be drafted during this reporting period. As discussed previously, the submission of the planning was dependent upon several surveys and also contains information relating to the layout of the substation as shown in Figure 2-7 and Figure 2-8.

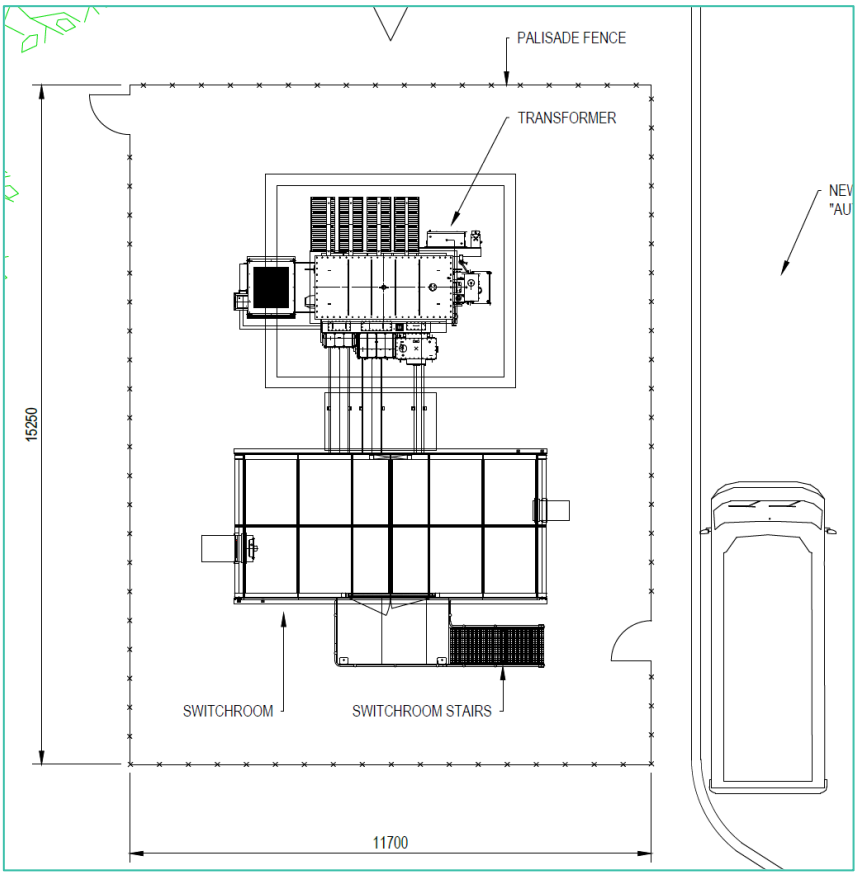

Figure 2-7 Pre-planning application substation plan

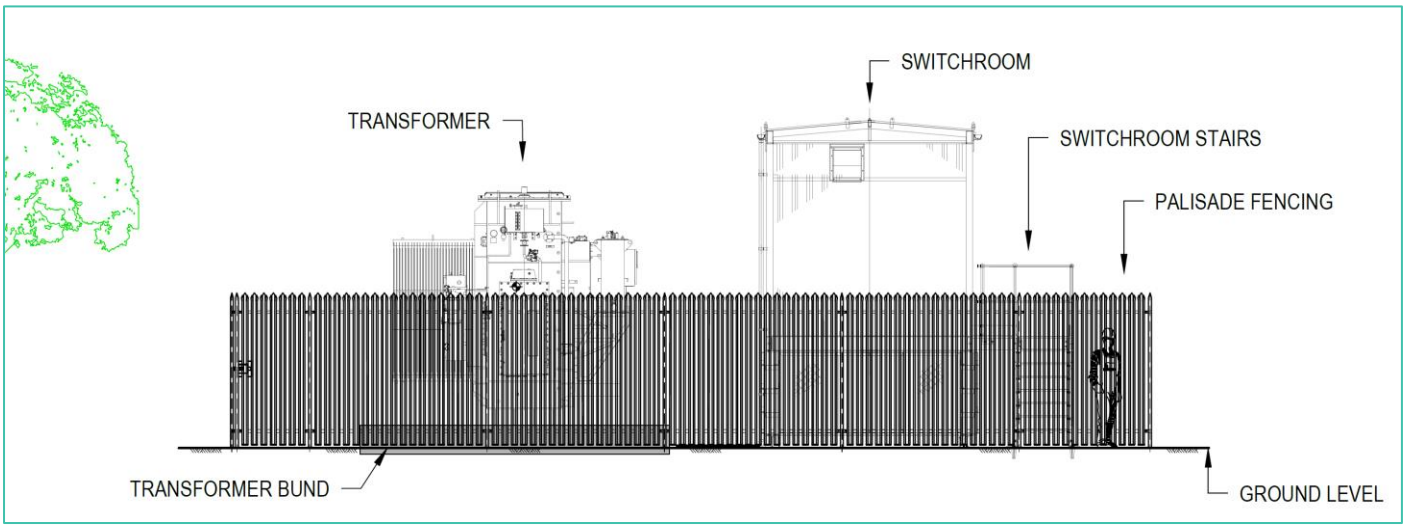

Figure 2-8 Pre-planning application substation elevation

2.2.4. Finalising the design of the CCS

During the reporting period the design of the CCS has been finalised. The design activities were mainly led by Brush who are responsible for the design and build of the transformer, 11 kV switchgear and container for the switchgear and ancillary equipment. We have arranged for various equipment to be provided to Brush as free issue to be integrated into the container, including the 33 kV switchgear, battery chargers and Remote Terminal Unit (RTU).

Brush have finalised the design of the 33/11 kV transformer during the reporting period, including use of a 'VACUTAP' on-load tap-changer and the unit is currently being built in their factory in Loughborough.

In addition, the container design to house the switchgear and ancillary equipment has been completed and construction of the container is nearing completion by Bradgate Containers. The electrical layout as part of the container design is provided in Figure 2-9 Containers.

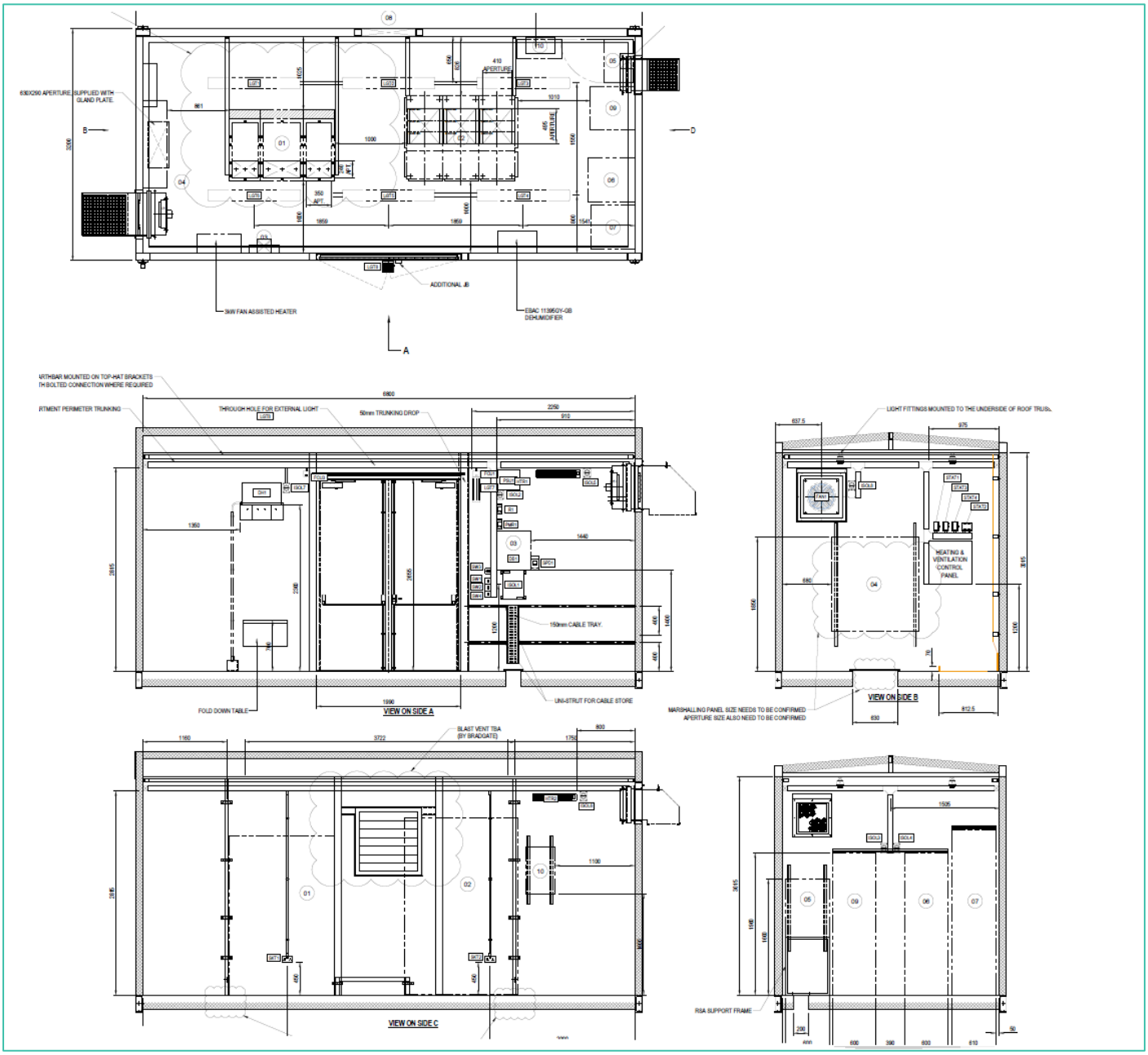

Figure 2-9 Layout of container designed by Bradgate Containers

2.2.5. Review and ordering of ancillary equipment

Work has also been progressing on the design of the other equipment associated with the CCS including:

- 33 kV switchgear – switchgear built completed by Siemens and ready for installation in container;
- DC batteries and chargers – design and build completed by PB Design;
- Telecoms - the IO schedule and RTU configuration have been developed during the review period. Furthermore, the GE iBox build has been completed ready for installation in the container;
- Transformer protection panel – the design of the combined protection and Automatic Voltage Control (AVC) panel has been completed during the review period, which was subsequently ordered, and manufacture has been completed by Acrastyle.

2.2.6. Work to progress the civil design and tender

Selected findings from the geotechnical survey are provided in Table 2.2 to Table 2.4, which were used to inform the civil design for the project. In summary, the ground at Exeter Moto is poor in terms of load bearing capacity. The standard option to resolve this would be piling, however, an alternative method of backfilling the ground with more suitable material is being proposed to provide advantages in terms of cost and time savings.

Table 2.2 Excerpt from Ground Investigation Report prepared by Listers Geotechnical Consultants - Ground Model Summary

GROUND MODEL SUMMARY

…

General Considerations

The Made Ground is considered an unsuitable founding stratum in its current state due to its variability and potential for unacceptable total and differential settlements under applied foundation loads. Given the depth of Made Ground present beneath the site, it is considered unlikely that traditional spread foundations will offer a practical solution for the proposed switch room and transformer base.

Consideration will therefore need to be given to an alternative solution, such as ground improvement techniques or piled foundations extending through the Made Ground into the naturally deposited Dawlish Sandstone Formation at depth. This is discussed further in the following Foundation Solution section.

Table 2.3 Excerpt from Ground Investigation Report prepared by Listers Geotechnical Consultants - Foundation Solutions

FOUNDATION SOLUTIONS

As previously noted, given the depth of Made Ground present beneath the site it is considered unlikely that traditional spread foundations will provide a practical solution for the proposed switch room and transformer base; and consideration therefore needs to be given to an alternative foundation solution.

Ground Improvement

Ground improvement techniques, such as using vibro-stone or vibro-concrete columns could be considered, with the columns being constructed onto the more competent Dawlish Sandstone Formation at depth. This option would eliminate concerns over trench instability issues and, as they utilise displacement processes, this would minimise waste soil.

The specialist advice of a ground improvement contractor would be necessary to determine the feasibility of successfully achieving the required column lengths and safe working loads if this foundation solution is pursued. The installation technique may need to be agreed with the regulating authority. Consideration will need to be given to the presence of asphalt and concrete cobbles that may make these methods problematic and the vibration/noise effects on surrounding infrastructure/places of work.

It should be appreciated however that only some 0.3m thickness of the Dawlish Sandstone Formation was recovered from the borehole. It is therefore considered likely that the ground improvement contractor will require supplementary investigation to determine the geotechnical engineering properties of the formation within a suitable depth range beneath the columns.

Pile Foundations

To provide a more assured solution, piles could be considered, embedded at depth into the Dawlish Sandstone Formation. Given the coarse-grained nature of the Made Ground and Dawlish Formation it is considered unlikely that skin friction will provide a significant contribution to the piles working load; and therefore the piles are likely to largely relying on end bearing capacity.

Similar to above, it is considered likely that the piling contractor will require supplementary investigation to determine the geotechnical engineering properties of the formation within the working range of the piles. A specialist piling contractor should be consulted as to the efficiency and suitability of piles installed using their particular systems in these ground conditions. However, based on the coarse-grained nature of the Made Ground and Dawlish Formation, and potential for groundwater inflows, it is considered a CFA type pile may be considered most appropriate on this site.

Table 2.4 Excerpt from Ground Investigation Report prepared by Listers Geotechnical Consultants - Ground Floor Slabs

GROUND FLOOR SLABS

Given the thickness of Made Ground present beneath the site, for the proposed switch room it is recommended that suspended floor slabs be adopted in conjunction with the main foundations.

Dependent on acceptable levels of total and differentia.1 settlement then ground bearing floor slabs could be considered, however it is recommended that geogrids, or similar soil reinforcement techniques be employed to provide a subgrade with a known CBR value. Discussions should be held with a soil reinforcement company (such as Tensar) who would design a sub-grade to a specified CBR value that would be likely to limit differential settlement.

2.2.7. Future activities

Project activity is ongoing to complete the build of the equipment and assembly of the CCS. The Factory Acceptance Tests (FATs) are scheduled before the end of the year for the transformer and container.

The Local Authority review period for the Planning Application is scheduled such that on site installation is unlikely to be possible before January 2022. This represents a delay resulting from finding TPOs, which necessitated a tree survey to be carried out, and delay to the submission of the Planning Application.

Work will also proceed with Brush finalising the manual and testing documentation for the CCS. These documents will be crucial to ensure that the CCS is ready for connection to the live network and will inform our own policy documentation.

2.2.8. COVID-19 Impact

The COVID-19 pandemic has not had a significant impact on the Take Charge project at the current stage. However, the situation is being monitored and the possible future risks with the build and installation stages have been identified and rated.

Table 2.5 presents a summary of the possible impact to the project and the mitigation action plans to reduce these risks.

Table 2.5 Summary of COVID-19 impact

Risk	Risk Rating	Mitigation Action Plan	Progress
The Covid-19 pandemic causes delays to the installation of the equipment on the 33 kV & 11 kV network (i.e. difficult to plan outages)	Major	Early engagement to understand the restrictions on site staff and continual monitoring of the situation	No updates on progress – installation delayed due to delay in submission of planning application. This risk will continue to be monitored.
Covid-19 delays the testing of new Brush equipment	Moderate	Early engagement with Brush to understand if there are social distancing working arrangements that can be implemented.	No updates on progress – testing scheduled towards end of 2021. This risk will continue to be monitored.
The Covid-19 pandemic causes delays to site visits	Minor	Regular engagement with Moto and local site teams. Continually monitor government, WPD and Moto guidelines. Conduct as much investigation using desktop techniques.	This risk will continue to be monitored, along with the requirement for site visits during installation.

3. Progress against budget

Table 3.1 summarises the details of the progress that has been made with respect to the project budget.

Table 3.1 Project finances

Budget Item No.	Budget Item	Budget (£k)	Expected Spend to Date (£k)	Actual Spend to date (£k)	Variance to Expected (£k)	Variance to Expected (%)
1	Project Management and Design	355.0	203.4	169.3	-34.1	-16.8%
2	Internal Project Review and Controls	65.0	0.7	0.7	0	0.0%
3	Free-issue equipment and installation	350.0	123.8	13.3	-110.5	-89.3%
4	CCS	600.0	444.0	117.5	-326.5	-73.5%
5	Telecoms	10.0	4.2	5.7	1.5	35.7%
-	Totals	1,380.0	776.1	306.5	-469.6	-60.5%

Comments around variance

The delay in signing the design and build contract continues to have an impact on the spend incurred on the project. Further delays due to finding TPOs, the requirement for a tree survey and delayed submission of the planning application are resulting in further delays to the build phase. As such, whilst most of the designs and arrangements have been made, the costs of the equipment have not yet been fully incurred as this will only take place upon delivery.

At this stage it is not expected that the budget will need to be altered, however, there may be a need to further extend the timescales to account for the delay. This will continue to be monitored as the project moves into the build stage.

4. Progress towards success criteria

Table 4.1 presents the progress towards the success criteria documented in the Take Charge Project Registration and PEA document.

Table 4.1 Progress towards success criteria

Criterion No.	Success Criterion	Progress
1	Analysis of information and data to inform the design of the new solution	Completed – all data gathered from internal sources, Moto, Ecotricity and Brush.
2	Selection of a suitable trial site for the installation	Completed – Exeter MSA selected as the trial site for the installation. The Site Selection report details the methodology and other shortlisted sites.
3	Development of a design for the new package solution	Completed – July 2021.
4	Installation and integration of the new package solution at the trial site	In progress – surveys completed and installation and integration of the CCS due to begin in December 2021
5	Monitor and analyse information and data during the trial phase	Not started – monitoring and analysis of data will begin after Item 4
6	Dissemination of key results, findings and learning to internal and external stakeholders	In progress – Two presentations held and a full paper presented at CIRED 2021 conference.

5. Learning outcomes

The following sections list some of the key learning outcomes that resulted from activities during this reporting period:

5.1. Learning summary

5.1.1. Design

The design phase has seen several key points captured through discussions and dialogue between internal WPD policy engineers and Brush. The learning points listed below are valuable to ensure the CCS is fit for purpose:

- WPD's standard policy for neutral earthing requires a reactor. However, as the CCS is designed to be low maintenance and compact, a resistor is a more suitable option for this application. The NER for the project is based on the standard EE specification. However, as the CCS is designed as a package substation it might be possible to reduce the size of the NER by refining the design. This would help reduce the footprint of the next iteration of the CCS;
- The route feasibility study revealed all the important services along the route of the 33 kV cable. It was discovered that there is a 1.35m diameter storm drain across the front of the entrance Sowton BSP. This along with congested services meant that we pursued a more risk adverse approach by using directional drill techniques at the other side of the substation to avoid any potential conflicts;
- The cable contractors engaged for the project have proposed the use of a vacuum excavator to remove soil and material from around trees protected by TPOs. The use of this technique helps to protect tree roots and prevents the need to remove or disturb trees; and
- The ground at Exeter Moto was found to be poor in terms of load bearing capacity. The standard option to resolve this would be piling, however, an alternative method involves backfilling the ground with alternative material which can be more cost effective and faster.

5.1.2. Planning and delivery

The planning and delivery of the project has generated various key learning points. These points would be applicable to any project that is looking to establish new infrastructure and have been shared within our teams:

- As part of the planning process we decided to engage early on with the local council. Following initial discussions with Exeter City Council we discovered that all trees around the Motorway Service Area are covered by TPOs. The trees are not a species of particular interest; however, it was apparent that the council wants to retain as much green space as possible. In future for such sites, we would look to carry out a search of TPOs before starting with the design; and
- The timescales originally proposed for the project did account for the time required to negotiate and liaise with the local council and other stakeholders. For future installations or projects, actual timescales for Take Charge can be used as a basis to develop a project programme.

6. Intellectual property rights

There is no current IPR to date. However, this situation is being monitored and will be updated throughout the design stage as required.

7. Risk management

7.1. General

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.

7.2. Current risks

Table 7.1 details the 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 project risks (by rating)

Risk	Risk Rating	Mitigation Action Plan	Progress
Location of CCS at Exeter MSA requires more civil works than originally planned	Major	Carry out a detailed geotechnical survey to establish the site conditions	Survey carried out and initial results indicate poor soil conditions
Project timescales need to be extended	Major	Monitor and ensure actions are delivered within the original timescales. Where possible, accelerate actions to free more time on other tasks. Coordinate with stakeholders to check potential impact on delays	Delays due to TPOs and associated tree survey has had an impact on the timescales
Difficulty obtaining permissions for installation of new equipment	Major	Identify routes and areas of land that may require permission and focus on public land and highways for the installation of equipment.	Pre-planning notification was not responded to by Exeter council.

Risk	Risk Rating	Mitigation Action Plan	Progress
		Engage with planning authority early.	
Planning permission for the CCS takes longer than statutory timescales	Major	Prepare planning permission application as soon as possible. Plan that the time to gain approval takes 4 weeks longer than normal	Provisional layout ready and briefing document prepared
Unable to agree land rights or lease for the new substation at Exeter MSA	Major	Engage with Moto and Ecotricity to determine the optimum way of obtaining permission to site the CCS	Discussions held with WPD property department. Follow-up meeting to be arranged. Probability reduced as Moto have informed WPD that they have freehold at Exeter.

Figure 7-1 provides a graphical summary of the project risk register to give an ongoing understanding of the project risks.

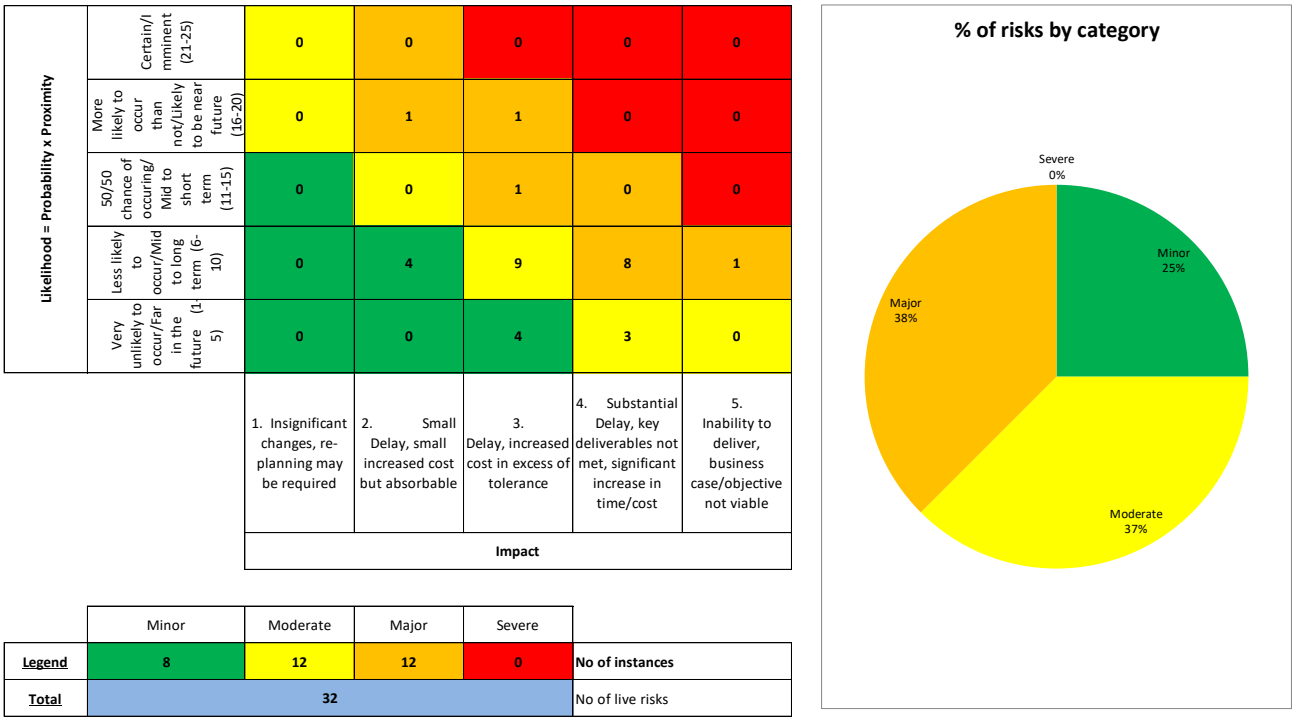

Figure 7-1 Graphical view of project risks

7.3. Update for risks previously identified

Descriptions of the most significant risks, identified in the previous six-monthly progress report are provided in Table 7.2 with updates on their current risk status.

Table 7.2 Top five risks from previous reporting period

Risk	Previous Risk Rating	Risk Rating	Mitigation Action Plan	Progress
Protection for the rapid charging connection solution does not meet WPD policy requirements	Major	Major	Review protection requirements with WPD policy engineer and build these into the functional specification	Design finalised - closed
Unable to agree land rights or lease for the new substation at Exeter MSA	Major	Major	Draft agreement in place	Progressing as planned
High visitor numbers at MSA trial site during works	Major	Moderate	Coordinate closely with Moto. Aim to start enabling works before the school summer holidays. Alternatively, delay install until Sept 2021.	Programme delayed due to delays resulting from TPOs, tree survey and planning application submission
Point of Connection (PoC) cannot be provided at chosen substation	Major	Major	Ensure there is enough space in the substation to install the equipment and coordinate with PSD and ED departments	Discussions complete with PSD and no apparent issues with the connection (Sowton BSP)
Package substation enclosure design does not comply with HSE regulations	Major	Major	Work with Brush to ensure that the design and layout of the enclosure complies with HSE requirements and WPD requirements	Discussed with Brush and WPD – further details provided by Bradgate Containers (manufacturer)

8. Consistency with project registration document

The project is being carried out according to the Project Registration and PEA document, and no inconsistencies or required changes have been identified relating to completed or future work on the project.

9. Accuracy assurance statement

This report has been prepared by the Take Charge Project Manager (Neil Murdoch), reviewed and approved by the Innovation Team Manager (Yiango Mavrocostanti).

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.

Glossary

Acronym	Definition
AC	Alternating Current
BSP	Bulk Supply Point
CCS	Compact Connection Solution
COVID	Coronavirus Disease 2019
CIRED	International Conference on Electricity Distribution
DC	Direct Current
DNO	Distribution Network Operator
EMU	Electronic Mapping Utilisation
ENIC	Energy Networks Innovation Conference
ENA	Energy Networks Association
EV	Electric Vehicle
FAT	Factory Acceptance Testing
GB	Great Britain
GHD	Gutteridge Haskins and Davey Ltd
HSE	Health and Safety Executive
IPR	Intellectual Property Rights
kV	Kilovolts
LV	Low Voltage
HV	High Voltage
MSA	Motorway Service Areas
MVA	Mega Volt-Amperes
NER	Neutral Earthing Resistor
NIA	Network Innovation Allowance
PoC	Point of Connection
PEA	Project Eligibility Assessment
RAID	Risks, Assumptions, Issues and Dependencies
RMU	Ring Main Unit
RTU	Remote Terminal Unit
TPO	Tree Preservation Order
VT	Voltage Transformer
WPD	Western Power Distribution

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