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Earthing Assessments

January 2021

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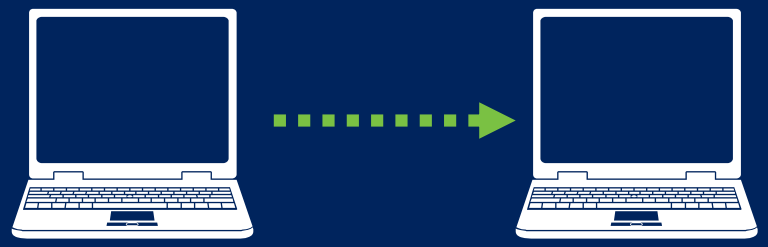
www.enwl.co.uk

Webinar format

40 minute presentation

20 minutes
questions & answers



Please submit written questions though the chat function or raise your hand

Agenda

Purpose of today

Overview	New process	Earthing Assessments & what is required	Next steps & any questions

Meet the Team

Garreth Freeman

Connections and Capital Manager

Chris Greenfield

Strategic Planning Engineer

Ami Mathieson

Incentive on Connections Engagement Manager

Mike Doward

Connections Charging Manager

Hannah Sharratt

Regulatory and Stakeholder Engagement Manager

Brian Hoy

Head of Market Regulation

Overview

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Overview

In 2018, we delivered Earthing policy briefings to all ICPs informing you of the changes:

- A Reminder of our obligations
- CP333 completely re-written and went live January 2019
- 3 methods of assessment introduced - design effort appropriate to situation
- Greater detail provided where required
- More information on site measurements

As part of the policy implementation and recognising this was a major change we agreed to undertake earthing assessments for a short period of time.


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Code of Practice 333

Issue 5

May 2020

Earthing Design for 11/6.6kV Distribution Substations and Equipment

Contents

1 Introduction
2 Scope
3 Definitions
4 Risk Assessments
5 Earthing Design Approach
6 Preferred Earthing Arrangements
7 Jointing and Connection of Earth Systems
8 Fault Clearance Time and Fault Levels
9 Installation Requirements
10 Soil Resistivity
11 Design Records
12 Ground Mounted Transformer Connections
13 Measurements
14 Guidance for ICPs and IDNOs
15 Documents Referenced
16 Keywords
Appendices A to E

Approved for issue by the Technical Policy Panel

As from July 2021, ICPs will be required to undertake these assessments

What's changed?

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Current Design Approval/Earthing Process

ICP

Electricity North West

Connection offer issued

Accepts connection offer.

Provide initial indication of assessment category

Earthing design submission

Approve submitted design

Reject submitted design and ask for more information

Energisation Request

Complete construction and submit Earthing measurement

Reject Earthing measurement Delay Energisation & request resubmission

Approve Earthing measurement

Energisation

Current Design Approval/Earthing Process

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Energisation

Tools to deliver

CoP333

1. CoP333 has now been refined and embedded following stakeholder feedback

2. Policy outlines process required to undertake earthing assessments for a site.

Network Asset Viewer (NAV)

1. A new Geographical Information System was released in May 2020 known as NAV

2. NAV is an intuitive system designed to reflect the current structure of our network and provide data access which is more easy to navigate through.

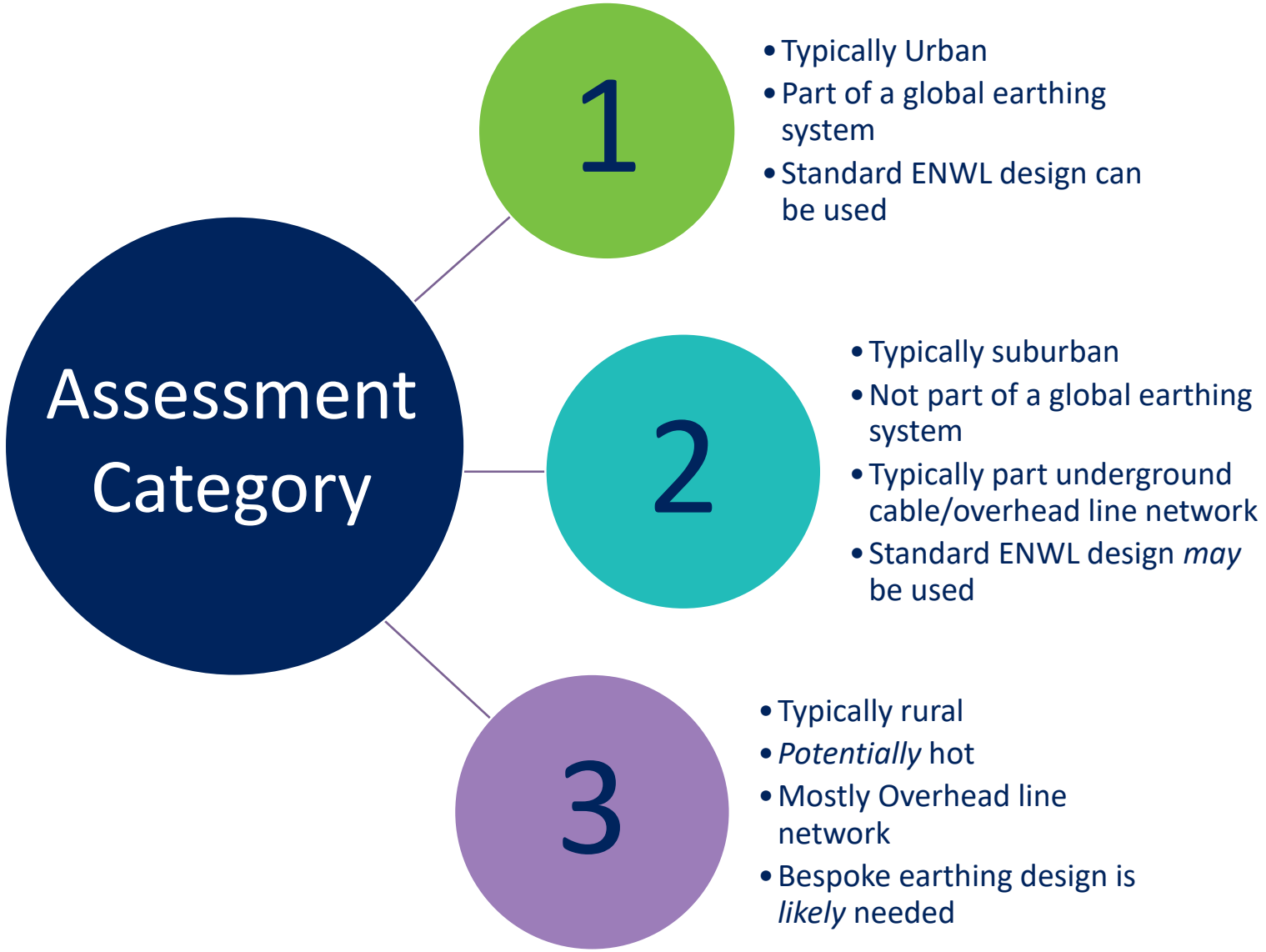
ENWL Spreadsheet

1. Easy to complete spreadsheet that will help you understand what Type assessment is required

2. Prepopulates and provides information on how to follow the process and where to get the relevant information

We will provide webinars leading up to July showing how to use these tools

Assessment of Earthing Category



CoP333 – Type 1 Assessment

- Tick box exercise
- Simple, quick – no detailed design
- Global Earthing System concept
- Final site measurement after installation
- Expected use – cities, towns

1) Please determine whether your substation is type 1 GES applicable

	Criteria		Evidence/Information required	Resource
1	Is the substation using a standard ENWL or other approved earthing design without metal fences/enclosures & not including compact or MDS?	Yes	Substation earthing & as-laid diagram	ICP
2	Does the substation sit within a 1km urban area?	Yes	Satellite image of the surrounding 1km area	Grid Reference Finder
3	Is the substation more than 20m away from fuel filling stations?	Yes	Maps image of the surrounding 20m area	Google Maps
4	Is the substation more than 50m away from transmission towers?	Yes	Network image of the surrounding 50m area	Network Asset Viewer
5	Is the substation supplying rail traction supplies?	No	N/A	ICP
6	Is the fault current from all primary substations on the running routes less than 2kA?	Yes	Normal = Enter_kA, Abnormal_1 = Enter_kA, Abnormal_2 = Enter_kA, Abnormal_3 = Enter_kA	LC25 Data
7	Do the primary substations on the running routes have an EPR <430V and resistance <0.17Ω	Yes	Normal = Enter_EPR/Ohms, Abnormal_1 = Enter_EPR/Ohms, Abnormal_2 = Enter_EPR/Ohms, Abnormal_3 = Enter_EPR/Ohms	PoC Report
8	Do any of the available running routes have overhead line in?	Yes	Normal = U/G / OHL , Abnormal_1 = U/G / OHL, Abnormal_2 = U/G / OHL , Abnormal_3 = U/G / OHL	HV Ops Diagrams
9	Is the substation ground mounted?	Yes	Substation earthing & as laid diagram	ICP
10	Is the soil resistivity less than 300ohm metres?	Yes	Wenner Test/Online source data	Wenner Tester/BGS Data

List of criteria

Yes / No

Prepopulates based on your answer

We will provide a task list to help identify type of assessment

CoP333 – Type 2 Assessment

- For sites failing the GES criteria – Design effort minimised – assume 10Ω earth mat resistance for calculations
- Calculation methods available in ENA ER S34
- Desktop exercise where possible providing the EPR remains below the 380V safety factor
- Look up tables provided in CP333 – standard designs in lieu of bespoke studies
- An earth resistance of 10Ω or less must be achieved prior to energisation

Requirements for Type 2 Assessment:	
1	Use on line sources to obtain soil resistivity data – BGS
2	Determine the cable data utilising the NAV viewer for each running arrangement
3	Determine the fault current using the LC25 data and percentage ground return current for each running arrangement
4	Determine the available network contribution resistance
5	Calculate the touch potentials within the sub and determine if the substation EPR is hot/cold

3) Please summarise the findings from your calculations/earthing report into the table below

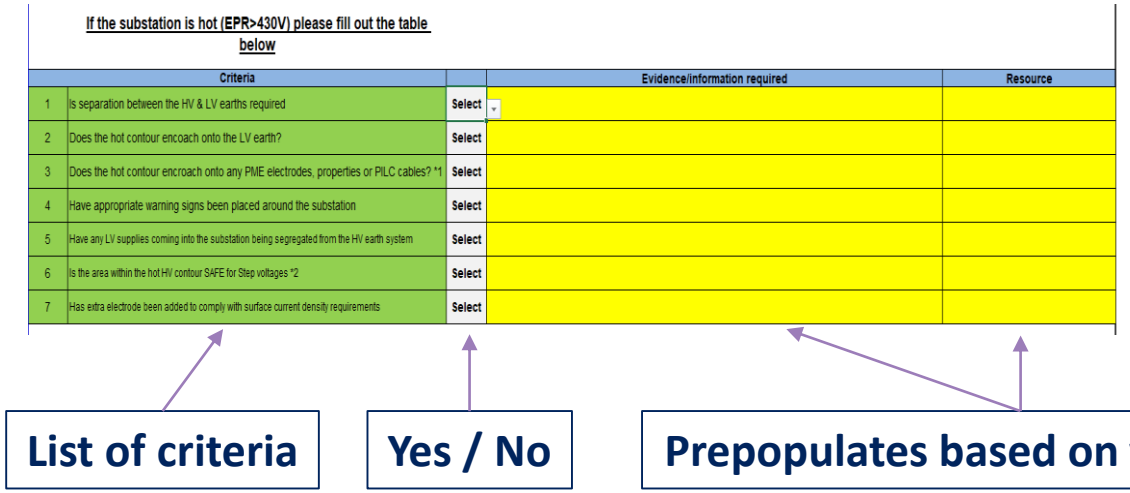
	Finding	Summary Table	Resource
1	Soil Resistivity	Resistivity = Enter_ΩM	Wenner Tester/BGS Data
2	Primary Resistance	Normal = Enter_Ω, Abnormal_1 = Enter_Ω, Abnormal_2 = Enter_Ω, Abnormal_3 = Enter_Ω	PoC Report
3	Primary Substation Fault Level Data	Normal = Enter_kA, Abnormal_1 = Enter_kA, Abnormal_2 = Enter_kA, Abnormal_3 = Enter_kA	LC25 Data
4	Calculated resistance value of the new substation (Rb) *1	Rb = Enter_Ω	ENA ER S34/Earthing Software
5	Calculated resistance value of the network contribution (Rnet) *2	Rnet_Normal = Enter_Ω, Rnet_Abnormal_1 = Enter_Ω, Rnet_Abnormal_2 = Enter_Ω, Rnet_Abnormal_3 = Enter_Ω	ENA ER S34/Earthing Software
6	Calculated resistance value of the wider network contribution (Rwnet) *3	Rwnet = Enter_Ω	ENA ER S34/Earthing Software
7	Calculated ground return current for each running arrangement	Normal = Enter_kA, Abnormal_1 = Enter_kA, Abnormal_2 = Enter_kA, Abnormal_3 = Enter_kA	ENA ER S34/Earthing Software
8	Touch Potential limit used	Limit = Enter_Limit	CoP333
9	Calculated EPR for each running arrangement to determine if the substation is SAFE *4	Normal = Enter_V, Abnormal_1 = Enter_V, Abnormal_2 = Enter_V, Abnormal_3 = Enter_V	ENA ER S34/Earthing Software
10	Calculated EPR to determine if the substation is Hot/Cold *5	EPR = Enter_V	ENA ER S34/Earthing Software

CoP333 – Type 3 Assessment

Same process as before:

- Full bespoke design study and earthing report will be required
- On site soil resistivity tests will be needed
- Measured resistance values must line up with those in the earthing report
- Unavoidable to ensure safety

Requirements for Type 3 Assessment:	
1	On site measurements for soil resistivity
2	Determine the cable data utilising the NAV viewer for each running arrangement
3	Determine the fault current using the LC25 data and percentage ground return current for each running arrangement
4	Determine the available network contribution resistance
5	Calculate the touch potentials within the sub and determine if the substation EPR is hot/cold



Design Approval - PoC Report amendments

Please see the running arrangements and associated Primary information that you will need to take into consideration

Network Configuration for Earthing Studies	Primary Substation	Primary EPR (v) & Resistance (ohms)		Feeder Name/No		Normally Open Point (NOP) position
System Normal:	Frederick Rd	<430v	0.1ohm	John Lester Ct	F1217	
System Abnormal 1:	Pendleton	<430v	0.1ohm	Whitebeam Ct	F2351	Salford Shopping Precinct No1
System Abnormal 2:						
System Abnormal 3:						
System Abnormal 4:						
System Abnormal 5:						

Process – Study Guidance - What we need from you

Carry out an assessment to determine if your site is type 1, type 2 or type 3

Review the outcome from the assessment

Summarise the outcomes into our ICP Earthing Summary spreadsheet. An alternative generic outcome table may be acceptable once altered to suit our needs

You will need to gather any required evidence/information and submit these separately

Send in your earthing assessment/report, the completed summary spreadsheet & any required evidence along with your design approval to CIC cic@enwl.co.uk

Process – Construction guidance – What to submit

Install your earthing and carry out a Fall of Potential test

You must achieve a value of 10ohms or less for type 1 or type 2 assessment or for a type 3 assessment the value must be in line with that in your report

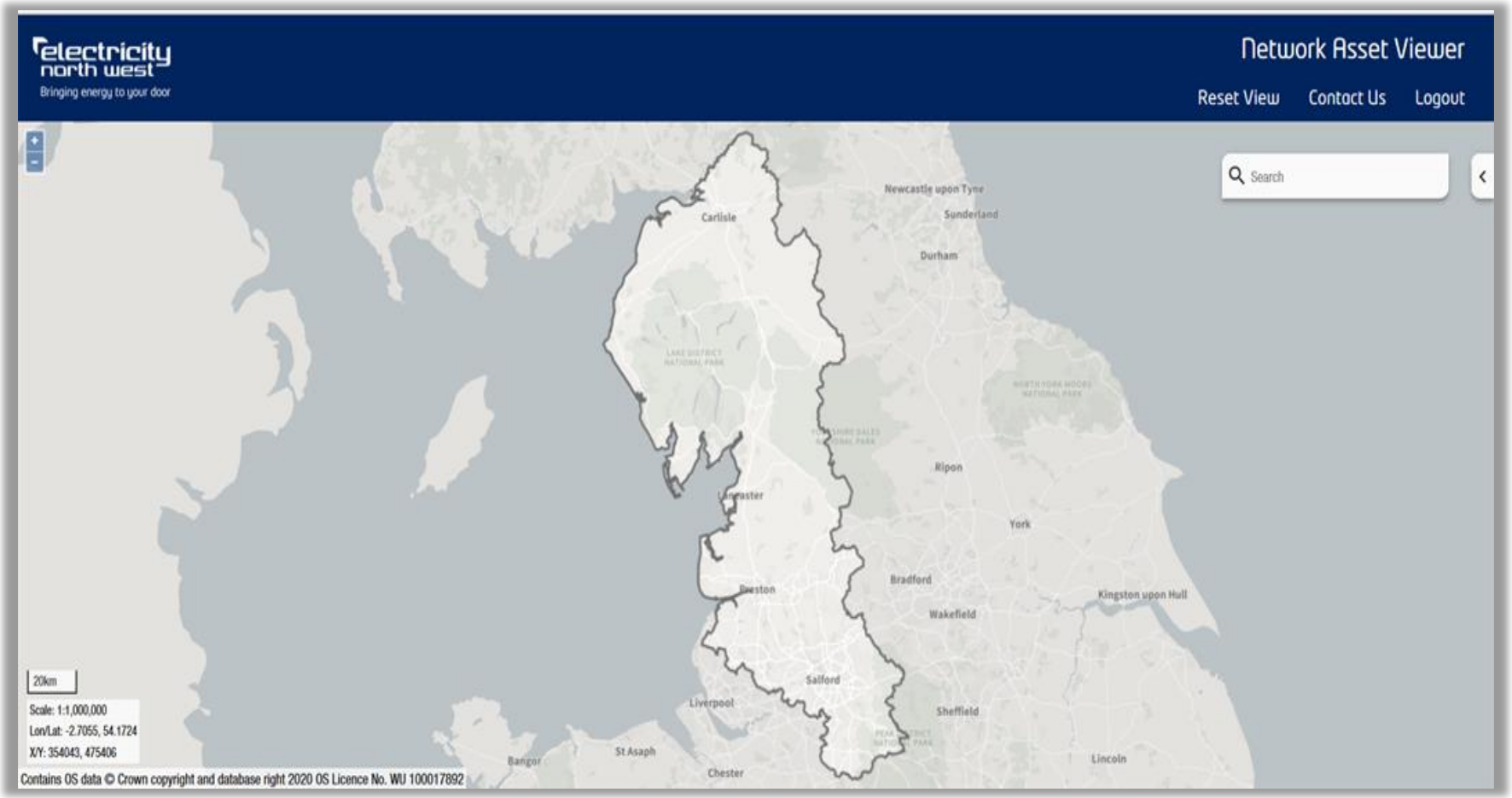
Send the results back to CIC cic@enwl.co.uk

Please allow 10 days for our review

Delays in approval of earthing can delay energisation

Network Asset Viewer (NAV) overview

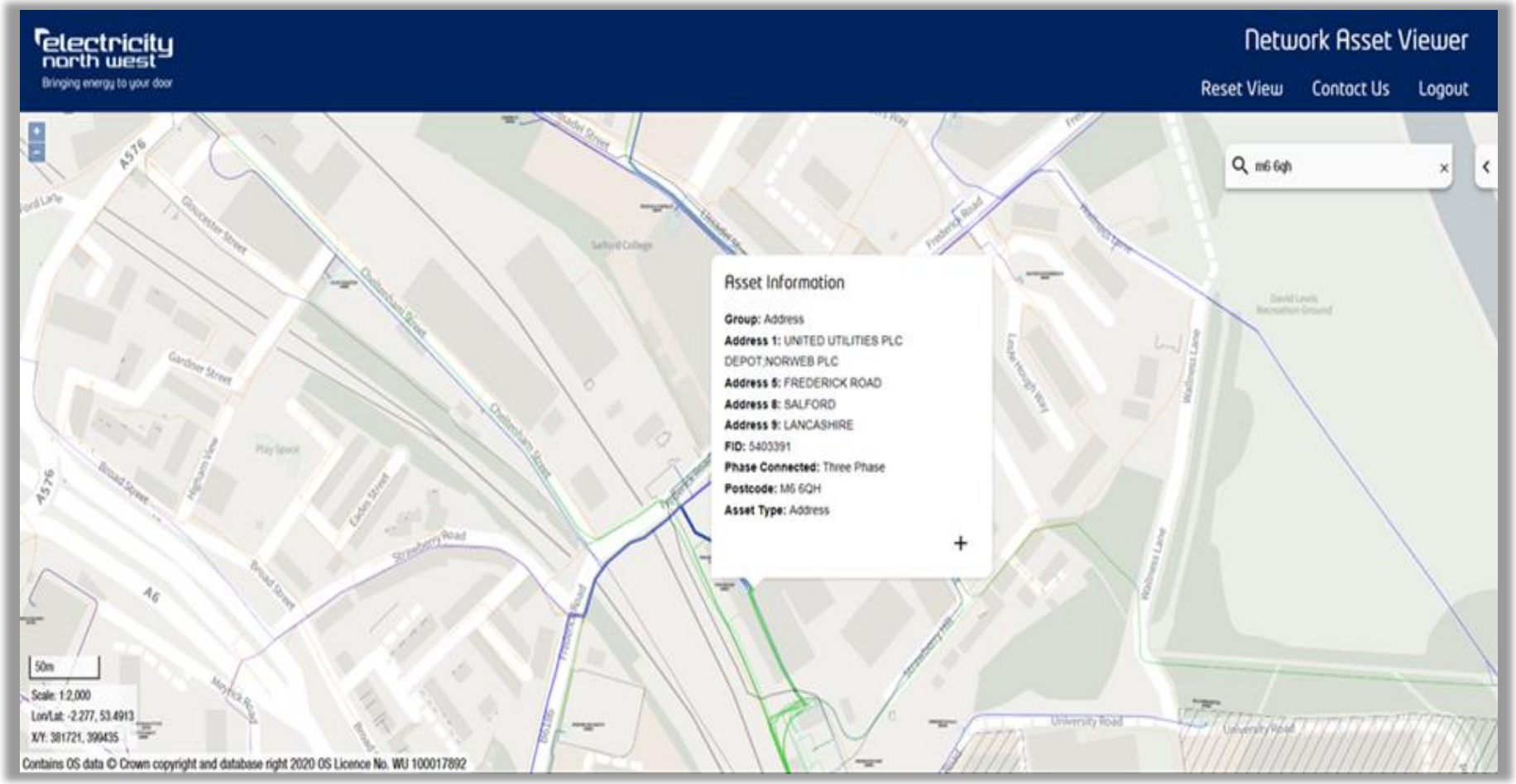
Network Asset Viewer



https://www.enwl.co.uk/get-connected/network-information/network-asset-viewer/register-for-nav-access/

Network Asset Viewer

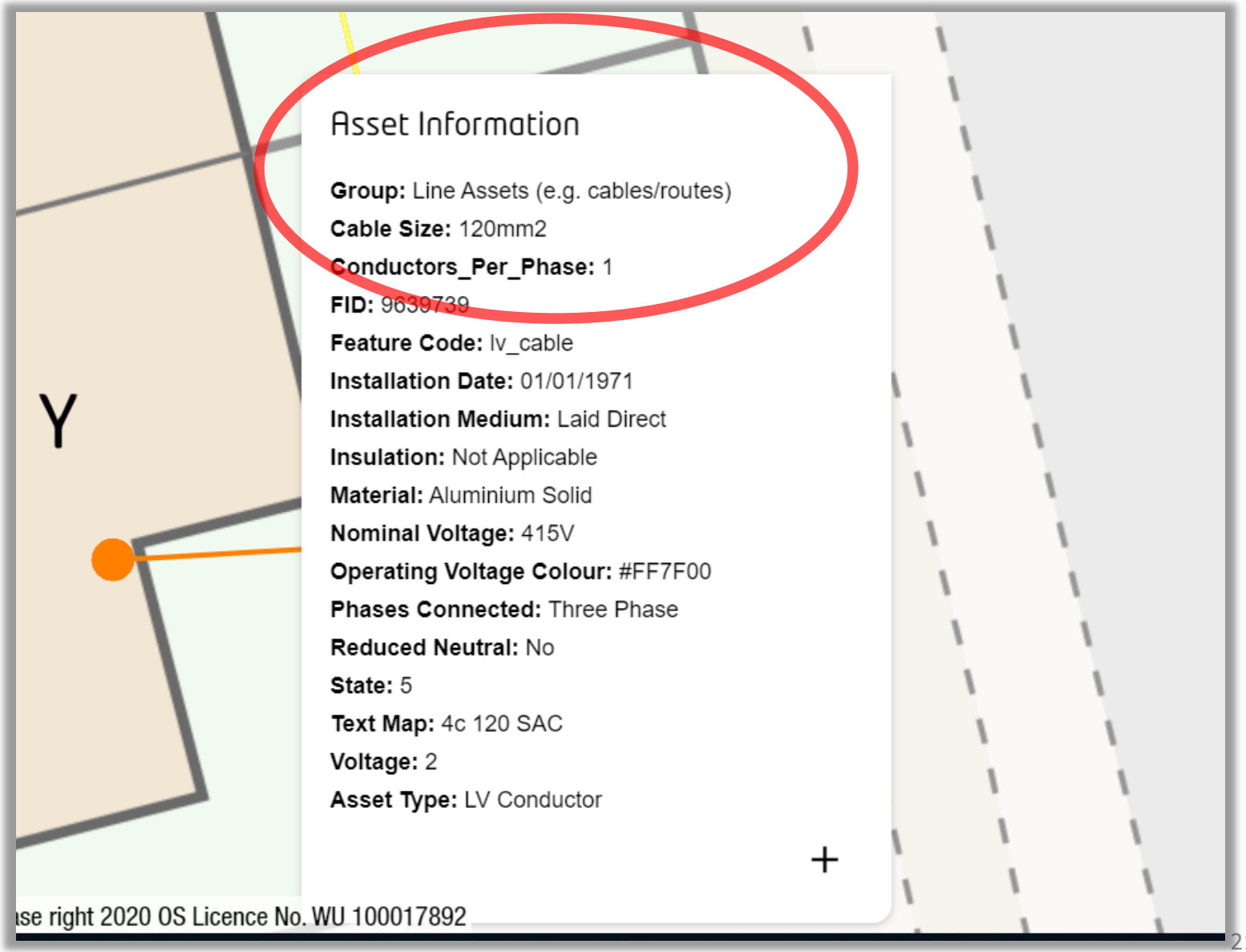
Search ENWL assets and find the information you need



- Address
- Cables
- Poles
- Substations
- Towers

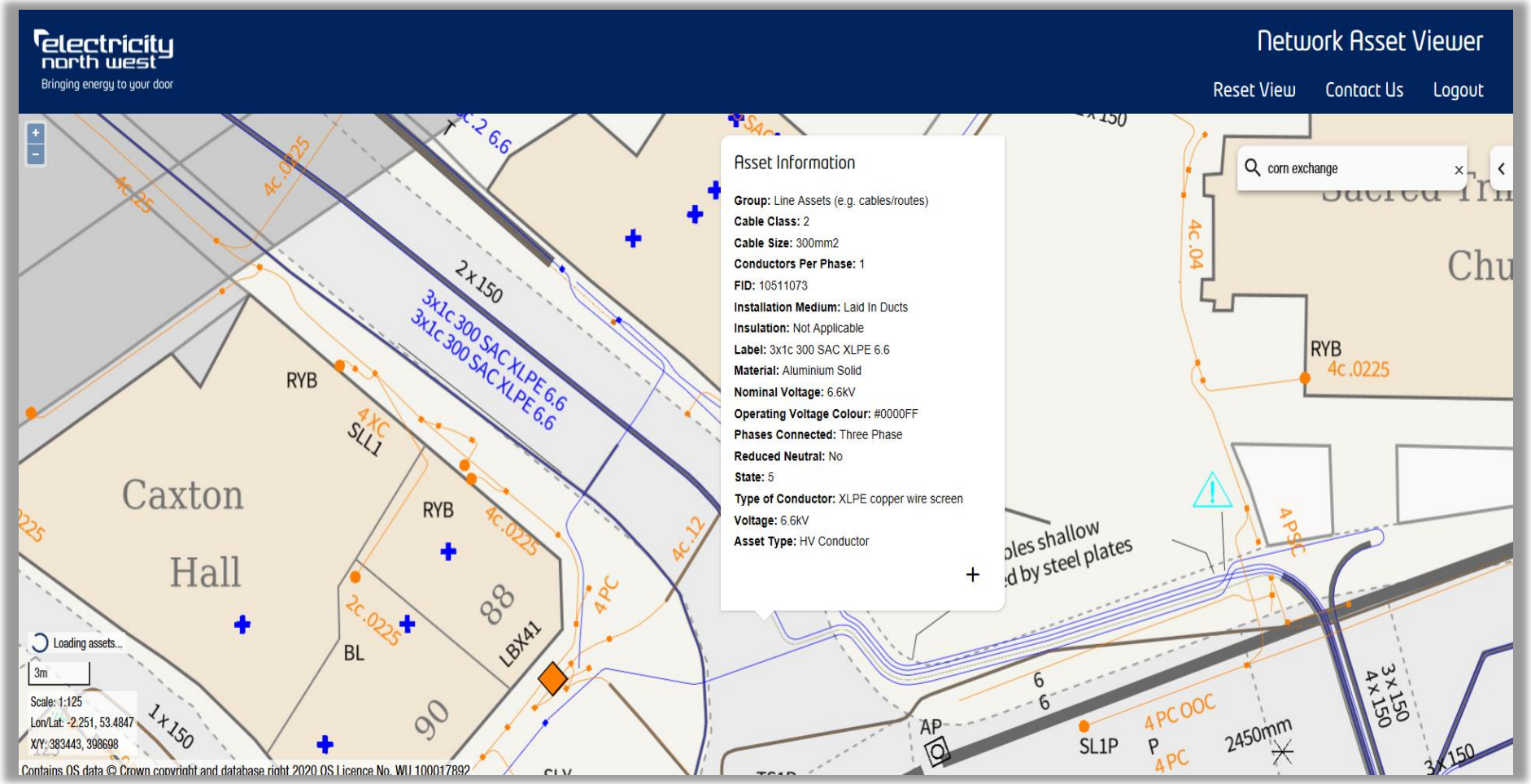
Asset Information

- You have the ability to navigate through the map by clicking on the left hand button on your mouse.
- Clicking on any of the assets you can obtain the asset information.
- Listed right is the information available for the highlighted asset.



Network Asset Viewer

Example – cable 6.6kV 300 XLPE



Next steps
& questions

Next steps

It is important to note that there is not much that has changed. We are here to support. Earthing studies have always been undertaken by ICPs and we have only undertaken the assessments as an interim measure

You will be required to submit your earthing assessments and designs from **5th July 2021**

We will provide online training sessions for your teams in the forthcoming months

If you require any further clarity or assistance, please email cic@enwl.co.uk

Any questions?

ICP Earthing - Keep informed

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	**youtube.com/ElectricityNorthWest**

Please contact us if you have any questions
Webinar slides will be circulated to all registered delegates

Thank you for your participation in today’s session