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Common Network Asset Indices Methodology

Information Gathering Plan

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Information Gathering Plan v2.0

Approved for issue: 31 August 2016

Contents

1 Introduction

Version 2 of the Information Gathering Plan (IGP) has been developed following discussion with Ofgem and the wider DNO community. It addresses a number of issues raised through these discussion and provides clarity where requested.

On 1 February 2016, Ofgem directed that in accordance with Standard Licence Condition 51 (SLC51) for the RIIO-ED1 period (1 April 2015 to 31 March 2023), the DNO Common Network Indices Methodology V4 (CNAIM, henceforth referred to as 'the Methodology') shall be adopted by the licensees for reporting the values of the Network Asset Workbook and measuring progress towards these values within the period.

Licence Condition 51 Part E requires each DNO to either write an IGP or seek derogation where the company believes that they are capable of delivering the requirements of the direction without changes to its methodology for collecting and collating asset-related data.

The Methodology includes a specified set of data inputs; however it is not mandatory for a DNO to record and maintain all such inputs and in the absence of data, the methodology allows for the use of default values. As such, we consider that our existing data is entirely adequate for the purposes of implementing the Methodology and compliant with the SLC51 requirement; however we also acknowledge that there are opportunities to extend our population of the Methodology over time to develop an enhanced view of asset risk which will be of value both within RIIO-ED1 and as an input to the RIIO-ED2 price control.

As a consequence, we are not applying for derogation from the requirement to produce an IGP and submit this document in satisfaction of the requirements of SLC51 Part E.

The plan details the following information which is required by the condition;

SLC51 Part E requirement	**IGP section**
How we define and gather the data required by the Common Network Asset Indies Methodology	See 2 - Principles of Data Collection
How the data is stored and managed	See 3 - Data Storage and Management
Frequency of routine condition Inspections	See 4 - Frequency of Inspections
How data is refreshed post and intervention for asset replacement or Refurbishment etc.	See 5 - Data Refresh
The scope of the data we collect	See Appendix 2 and 3
The maintenance of the Information Gathering Plan	See 7 - Maintenance of Information Gathering Plan

Governance of our asset health modelling and associated reporting in accordance with the requirements of SLC51 is contained in our policy document EPD151. This documents our Asset Indices Methodology and is consistent with the requirements of the Methodology. This IGP complements EPD151.

In developing the IGP the following should be noted that;

1. The Methodology was developed in such a manner that it is possible to return the required data without implementing every single factor described within it.
2. We see that there is value in revising our approach to reporting Asset Indices by carrying out enhancements to our existing methodology although we will not implement every factor as permitted by the methodology. Details of our implementation programme are included in this plan.
3. Where we already collect sufficient data to comply with the requirements of the methodology this will be used to inform the initial population of the Methodology.
4. We will only collect and utilise additional data where we believe this is cost effective and provides a demonstrable benefit.

2 Principles of Data Collection

In collecting data to inform the calculations in the Methodology, we have an existing, well established method of defining requirements and classifying answers against established reference points. These requirements are detailed in our CP151 Asset Decision Support Tool (ADST) document. The question sets used in the collection of asset condition data are established under governance arrangements detailed in our policy EPD050 Principles of Asset Data Management. Additionally annex 2A of the Well Justified Business Plan submitted to Ofgem in July 2013 details how we use our CBRM tools and provided data to these models. We will use the same principles for the Common Methodology. We have provided further explanation of these processes in the plan.

Appendix 1 details how we will implement the detailed data requirements of the Methodology, and the steps we will take to transition from our existing CBRM models.

Appendix 2 details the current match of asset condition questions to those we will use in the Methodology calculations.

Appendix 3 details changes which we will implement as part of the project to enhance our population of the Methodology by 30 December 2016 which relate to the calculation of the Probability of Failure of an asset (data category 3 in table 1). The Appendix also details where we will not make changes to our asset condition collection data (data category 6 in table 1).

Our approach to the implementation of data requirements to be used in our methodology is summarised as follows:

Data Category	Not collected	Collected	Readily available	Currently used
0	Calibration Table			
1		Y	Y	Y
2		Y	Y	N
3		Y	N	N
4	This data we will collect as an enhancement to our methodology			
5	This data we may collect as an enhancement to our methodology in the future.			
6	NA / N – no current intention to collect			

Table 1 Data Scale

For data categories 2 and 3 we will make changes to the searches and methods of providing the data to the modelling suite thus permitting the data to be available in good time to influence the restatement of the Network Asset Workbook, which we will submit by 30 December 2016.

Data associated with data category 4 has been identified as being potentially beneficial for inclusion within the methodology and we will seek to include in our data collection routines as soon as possible. We are planning to commence data collection by 1 April 2018.

Data associated with Category 5 is potentially either difficult to collect or the cost benefit is currently unclear. We will keep data in this category under review and as such we may decide to collect this data in future. We will decide by 31 March 2017 as to which data sets if any are cost beneficial to collect and implement data collection by 1 April 2018.

For both Category 4 and 5 data we will have collected the additional data no later than 2026 for assets with an eight year inspection frequency and 2030 for those with a 12 year inspection frequency. In order to minimise these time scales we will investigate the possibility of collecting some data in line with our Safety and Security inspection which will result in most Consequence of failure data being collect by 2021. Further details are provided in section 2.1 to 2.3 below

2.1 Summary of Data Collection Processes

Our condition data collection process takes place on a cycle of between eight and 12 years depending on the type of asset being inspected. Table 3 Section 4 details the timescales in which condition data is captured. A safety and security inspection takes in accordance with table 3 in section 4 of this document range in frequency between 32 and 144 months. Data collected in the safety and security inspection is not used in the assessment of Health Scores but is used in the calculation of Consequence of failure.

Data capture is driven by a works order which relates the asset type to the inspection regime for the asset type held in our Asset Registers. For each asset type a question set has been developed to permit the inspector to record the as seen condition of the asset against the question. The inspection is recorded on a hand held smart device which communicates directly with the Asset Registers. Data QA takes place as a routine exercise to ensure data quality is maintained at as high a level as possible. Once data is transferred to the asset register it is not possible to change the data unless a further inspection is undertaken. This can be scheduled manually within the system.

All data used for the calculation of PoF and CoF calculations are taken from the Asset Register database and the GIS system used to hold data associated with circuits. Further explanation is provided within this section of the IGP.

We do not propose to modify the data collection processes as applicable for data category 1. This data is already used in our current CBRM models and will be simply mapped across.

2.2 Data Associated with PoF calculation

We recognise that the more data that can be economically collected and used to inform the output of the model the greater the potential benefit to the customer and all stakeholders. However we also recognise the potential costs and risks of doing some of the work. An example of this is the factor associated with Ductor testing 132kV and EHV fittings on towers. This activity requires a system outage and working at height which introduces both system and operator risk. We need to carry out risk assessments as to the likely outcome of introducing this type of activity against the benefit it brings to the completeness of the modelling. These activities need to be carefully assessed hence our decision to delay any decision until after the current round of implementing the basic modelling requirements.

Currently we have not done any work to quantify the material benefit of the changes. We are planning to look at how we can use Cost Benefit Analysis to determine if there is a financial case to implement the collection of data. This will be part of the scope of the 2017 work package.

In addition we believe that Ofgem are now aware of the issues that collection of data relating to internal condition of an asset involves and that in some cases this can be in the order of up to 12 years. There is clearly significant additional potential cost to our business and therefore in the long term to our customers if inspection and maintenance frequencies need to be increased solely to drive this methodology. We do not believe that this additional cost is justified and hence the number of potential enhancements we will implement will be small.

In summary where we already collect high percentages of data to drive the PoF calculation we are unlikely to revise our data collection requirements as the material benefits will be small when compared to the cost of these changes. Equally where we feel an additional data set will increase the ability to state asset risk and there is a Cost Benefit to doing this we will implement data collection changes.

2.3 Data Associated with CoF calculation

Our current available data sets will allow us to distribute assets across the C1 – C4 classification of consequence, but we have recognised that there are a number of data sets which are simple to collect and will help to better describe the consequences than we are currently able to. We anticipate that by collecting the additional data this will better inform the distribution of assets across the bandings. As part of our data review to be carried out in 2017 we will identify these and the material benefits. We will include within the scope of our 2017 work activities a full review of the timescales associated with the collection of revised data requirements and where practicable we will look to minimise the collect of data period for Consequence of Failure data so as to be complete in the timescales associated with Safety and Security Inspections.

We do not currently have any intention of collecting any data classified as being in Category 6.

It should be noted that the Methodology is made up of 25 discrete models. For the RIIO-ED1 period, we did not commit to Secondary Deliverables for the following categories of assets for the reasons below;

HI category	Reason
LV Circuit Breakers	We currently have small volumes of these asset and we don't believe it to be cost effective to collect data associated with them. We will keep this decision under review as the network develops through the application of Low Carbon Technologies.
EHV Non Pressurised cable	When submitting our Network Asset Workbook as part of the Well Justified Business plan in July 2013, we didn't include these assets in our submission and therefore don't propose to introduce these requirements in the restatement. It should be noted that we do have fault history and Sheath Rest data but not in an easily accessible format requiring changes to our IT systems to implement. Partial Discharge testing is not habitually carried out at present.
132 kV Non Pressurised cable	
Submarine cable	We have 3 km of submarine cable with 2.3km laid in a duct in the last 18 months. We don't consider data collection of this asset type to be cost effective.

132 kV Gas cable	We do not have any assets of this type connected to our network and hence have no reason to report a risk delta.

Table 2 Asset categories excluded from ENWL Secondary Deliverables

As a result, these asset categories are out of scope for our implementation of the Methodology. Developments in these areas will be kept under review in RIIO-ED1, particularly with regard to Non Pressurised Cables where we are undertaking a measurements programme which may enable us to implement these models in the future.

The low volumes of LV breakers and submarine cable at EHV means that we do not consider the implementation of these models to be cost effective and hence we will not implement these in RIIO-ED1 and probably beyond. For 132kV Gas cable we do not intend to install any of this redundant cable type in the future and hence we will not implement this model.

The Methodology requires four sets of data to produce a Probability of Failure value and a series of modifying values to assign a Consequence of Failure value. These are discussed in turn below.

2.4 Probability of Failure

For Probability of Failure, the following four calculations are required;

2.4.1 Base Data

An initial Health Score is created from data relating to the age, location, environment and duty of the asset. This data is held either as base data associated with the asset within our asset register or is available from data used to produce indicators such as Load Indices. As a consequence of implementing the methodology, we will ensure that;

- All assets have an age available to inform this calculation;
- The location of the asset is consistently stated within the modelling; and
- A rule set is available to ensure that appropriate duty values are assigned to the calculation.

As a consequence, a base Health Score will be calculated for all assets within the scope of the Methodology. We will implement this by 31 July 2016.

2.4.2 Observed data

This data is used to modify the base Health Score and is based on the data collected from site by observation of the asset condition. We have been carrying out this work since 2003 and have adopted the principle that data will be collected without the need for a circuit outage, in order to maintain security of supply to customers and provide cost-effective data. The data is collected via a hand held device with a pre-loaded asset condition survey question set. The inspector is asked to enter a condition state assessment on a scale of 1 to 4 where 1 is as new and 4 has serious condition deterioration. Data is subject to a quality control process to ensure it is of consistent quality. The data is stored in the asset register and retrieved by searches for use in the modelling.

As a result of the implementation of the Methodology, we have mapped our existing observed condition data points to the scales within the Methodology Observed Factor inputs.

Additionally, in some areas we have identified additional data already collected (but not used in our current modelling) where it will enhance the Methodology and requires only minor work to implement them in the system. These will be available by 30 December 2016.

We have also identified where we believe we can cost effectively collect additional observed data. We will do this by creating additional questions within our existing inspection scripts, aligned to the Methodology's data inputs. Appendix 4 shows where we will enhance our data collection sets (excluding those shown in Appendix 3 which relates to probability of failure condition sets).

2.4.3 Measured data

We have historically collected limited measured data as much of this requires outage and specialist inspection techniques. Until the implementation of the Methodology, measurements were limited and generally undertaken by non-intrusive techniques. Appendix 2 details where we have measured data sources and shows the link between the question and the relevant factor in the Methodology.

We do not intend to expand the areas of measured factors beyond those already collected due to cost and potential difficulties in aligning what may become two separate activities carried out by different skill sets and different times. Appendix 3 details changes we will make to the collection of measured data as well as details where we will not implement additional data gathering.

2.4.4 Reliability

The reliability factor is used to modify the Health Score based on data that we feel is important to the assessment of Probability of Failure but isn't covered elsewhere in the Methodology.

We have used this principle in our CBRM system for assessing asset health since 2008 and as such is well established for HV to 132kV switchgear and EHV and 132kV Tapchangers. For the implementation of the Methodology, we intend to expand the use of reliability to other asset groups by 30 December 2016.

Appendix 5 details the definition of reliability factors we use and shows where we will expand the use of this factor into other areas, which haven't had a specific reliability score but have factors within their CBRM models which act as a proxy for this factor.

2.5 Consequence of Failure

For the Consequence of Failure calculation, every asset in an asset class is initially assigned a reference value in accordance with the Methodology. In order to modify this value for each asset, the Methodology describes the data required to implement modifiers to the reference value and hence move the Consequence of Failure value from the reference to an alternative value specific to that asset. This value may be higher or lower than the reference value depending upon the manner in which the data acts upon the reference value.

The principles of CoF calculation in our models are essentially the same as those required by the Methodology; however there are sufficient differences to require us to re-implement this aspect of the calculation of the CoF value. The requirements related to the implementation of CoF in the Methodology have been identified and documented in Appendix 4 which includes our timescale to implement. We anticipate that the changes we will implement to our current processes will be complete in time to be included in the calculation of the re-submitted NAW on 30 December 2016.

3 Data Storage and Management

We have adopted the principle of storing data in appropriate corporate systems and consider the data to be in three main areas:

- Point Assets – Transformers; Switchgear; poles towers etc.
- Linear Assets – Cables; Conductors etc
- Operational Data – Customer Numbers; Loading etc.

The systems and the data held within them have an established governance process to oversee issues such as data quality and consistency. The principles governing data are documented in our policy document EPD050 which has recently been re-issued to reflect our adoption of a Master Data Management (MDM) model for data governance. In addition, the governance ensures that all internal stakeholders have an input to any proposed changes.

Data used in the calculations for the Methodology are held in one or other of the systems above. A principle of the governance in place is that data is mastered in one system although it may be used in all of the systems above via data referencing. In this manner data is kept consistent across systems.

For any given asset, a master record exists in one of the systems, to which the relevant inspection and maintenance regime is assigned and work orders created to generate the inspection and maintenance activity. The work orders are assigned to the appropriate inspection team and the inspector selects the asset to be inspected from the work list once on site. The inspector uses a handheld device to record the inspected values against a standard script. On completion of the inspection, the data is locked and electronically uploaded to the asset register and held against the individual asset record.

Within the asset register, the inspection is assigned a type code and records the time and date of the inspection. When populating the Methodology, we use a series of searches to pull the relevant data into the model and hence use a consistent data set.

It should be noted that all three systems are treated as real or near real time systems and for asset data little historical data exists in them. For these reasons it is virtually impossible to regress the systems such that older data can be recovered or statistics of data completeness at a point in the past created. We will consider the need to retain baseline copies of data in the future and determine the issues surrounding this area, although that activity is outside the scope of the IGP.

We have identified a number of changes which we need to make to our data sets in order to either improve our asset reporting or implement the Methodology. These changes include;

- All assets will have a commissioned date held in the point or linear asset databases[1]. In some cases these may be estimated in accordance with a rule set;

[1] Our legacy CBRM models allowed for the calculation of a Health Index directly from condition data, ie without the need for an asset age to calculate the initial Health Score. The Methodology requires an age for the asset as the initial input to the Health Score calculation, before the application of the condition modifiers. The asset groups impacted and the percentage of assets with an age prior to this work are as follows:
LV UGB – 6%; Switchgear - 97%; Feeder Pillars – 5%; Transformers (PM and GM) – 98%; Towers – 71%; Wood Poles - 69%; Tower Conductor 100%; Tower Fittings 100%.

- New searches for data will be implemented as discussed in the previous section; and
- The as-left condition requirements post refurbishment will require a change to the data structure and searches.

The above changes are planned to be implemented by 30 December 2016. In addition, new data collection questions will be implemented to improve the data available to inform the model by March 2018 as noted previously.

It should be noted that these percentages refer to the data held in our Company databases although other sources of data are available to use and we are investigating how we can use these to populate our models.

4 Frequency of Inspection

4.1 Inspection Frequencies for Asset Condition

Our policy documents EPD301 (Plant) and CP421 (Overhead Lines) details the frequency of routine inspections for condition data capture. For the vast majority of our assets we carry out this activity once every eight years, extending to 12 years in the case of LV UGB assets. As a result of the introduction of the Methodology, we will also introduce a requirement that following a refurbishment intervention on an asset which has a Secondary Deliverable declared then an 'as left' inspection will be carried out post completion of the work. This requirement will be introduced by 30 November 2016, thus permitting the reporting of the 2015-16 programme to be completed by 30 December 2016.

The following table details inspection frequencies of the assets covered in the methodology:

Assets	**Safety and Security Inspection**	**Condition Inspection**
LV, HV and EHV OHL Supports (3 models)	Every 32 months (2 years and 8 months)	Every 96 months (8 years)
LV UGB (1 model)	Every 144 months (12 years)	Every 144 months (12 years)
LV Switchgear and other (1 model)	Every 96 months (8 years) Note Street pillars are inspected every 24 months (two years)	Every 96 months (8 years)
Switchgear, Distribution (1 model)	Every 96 months (8 years)	Every 96 months (8 years)
Switchgear, HV Primary, EHV, 132kV (3 models)	Every 24 months (2 years)	Every 96 months (8 years)
Transformers, Distribution (1 model)	Every 96 months (8 years)	Every 96 months (8 years)
Transformers, EHV and 132kV (2 models)	Every 24 months (2 years)	Every 96 months (8 years)
Towers, Conductors and fittings EHV and 132kV (6 models)	Every 32 months (2 years and 8 months)	Every 96 months (8 years)
Cables, Oil. Gas, non pressurised and submarine (7 models)	Every 32 months (2 years and 8 months)	Every 96 months (8 years)

Table 3 Inspection frequency by asset type

For all asset categories within the Methodology we believe that we currently hold sufficient data to be able to restate the Network Asset Workbook to deliver an "Equally Stretching" risk

delta for the RIIO-ED1 period. As discussed through the IGP we will seek to gather additional data where cost effective to enhance our submissions.

4.2 Inspection Frequencies for Asset Criticality Data

In Section 2 sub sections 2.1 – 2.3 and Section 3 above we have already discussed the requirements for further data capture and recording. Our Condition Data Capture processes results in a rolling programme of updating the condition data which is then used in the determination of asset risk as required in the methodology, In addition to this, we have also identified the need to potentially capture additional data associated with the criticality of the assets.

Criticality data can come from three prime sources;

- Safety & Security (S&S) inspections (eg surrounding land use)
- Condition Data Capture (CDC) assessments (eg viability of preventative measures); or
- Through desktop system studies & assessments not requiring a site visit (eg connected customers, loadings, proximity to watercourses)

Where any additional site-sourced criticality data is identified as being required, this will be incorporated into a modified S&S or CDC inspection script as necessary by March 2018 and issued for subsequent data collection. Assuming that these will be incorporated into the CDC data set gives the following target dates for full data capture;

Assets	**Additional Criticality Data Collection Target date based on April 2018 Implementation of Question Sets**
LV, HV and EHV OHL Supports (3 models)	December 2020
LV UGB (1 model)	April 2030
LV Switchgear and other (1 model)	April 2026
Switchgear, Distribution (1 model)	April 2026
Switchgear, HV Primary, EHV, 132kV (3 models)	April 2020
Transformers, Distribution (1 model)	April 2026
Transformers, EHV and 132 kV (2 models)	April 2020
Towers, Conductors and fittings EHV and 132kV (6 models)	December 2020 Note a full inspection is planned for the period 2018-19 which will fully populate these models.
Cables, Oil. Gas, non pressurised and submarine (7 models)	December 2020

Table 4 Criticality Additional Data Collection Completion by Asset Type

5 Data refresh

We will implement the Methodology through modification to our existing Condition Based Risk Management (CBRM) software tool by adding the Methodology modules into the same IT environment, thus creating the Asset Decision Support Tool (ADST). The CBRM models and Methodology modules will utilise the same data and have the same data mapping structures. As a consequence, we are currently re-mapping our CBRM data feeds to match those required by the Methodology. CP151 details the steps required to refresh data within the ADST.

We installed models allowing us to use the Methodology in August 2016, thus allowing us to run a draft restatement of the NAW for October 2016. The principles of data refresh are shown below;

1. All searches to extract data from the company databases are run and placed in a pre-specified folder location.
2. The ADST database refresh is enabled; this permits the ADST to import data from the searches to the ADST copy database.
3. The ADST database is checked for completeness of data and individual models are built and named in accordance with our naming practices for these models.
4. Models are run and copies taken to preserve the “as built” models.
5. Models are made available to the business to support either internal or external reporting of progress against the secondary deliverables.

It should be noted:

1. Where an asset is new then the condition set is reset to a predefined status hence an as new result will be returned.
2. Where an asset has been refurbished and that work results in a change to the SDI, the data set is modified so as to show the as left condition.
3. Only the last inspection result is returned in the searches and hence the latest condition data is always returned.
4. Records are kept for the period of a price control period and its close out to permit audit to take place.
5. These requirements are already incorporated into business as usual practice and hence no changes to processes are required.

6 Scope of data collection

Appendices 1 and 2 detail the scope of the data we collect to populate the Methodology or will collect as we enhance our current abilities and methodologies.

6.1 Generic project plans

The following diagrams provide a summary of the plans to implement and enhance our asset reporting in accordance with SLC51.

6.1.1 Common Network Asset Indices Methodology implementation plan

The generic plan below provides the basic timeline for implementation of the Methodology in line with the requirements of the Direction issued in February 2016 and subsequent enhancements detailed in this plan.

Note that the periods shown in the following plans are set to calendar years **ending 31 December** for each of the plan and **not** financial years (FY)**.** This applies to all charts in sections 6.1.1 to 6.1.5 inclusive, unless otherwise stated.

		End Date			
Asset Class	**Description**	**1. By 31 March 2016**	**By 29th July 2016**	**2. By 30 September 2016**	**3. By 31 December 2016**
General Implementation of CNAIM Methodology	Contract and Approve CNAIM models				
	Specify mapping of Condition points data to CNAIM				
	Delivery of Models to Electricity North West				
	Integration of data and models to Asset systems				
	Final Acceptance testing				
	Initial restatement of NAW				
	Refine NAW processes				
	Final restatement of NAW				

The forward plans for individual asset types vary depending on the maturity and completeness of the current data sets. As noted in section 2, we have identified a scale of data collection and usage. We have classed the subsequent pattern of requirements into four categories for the purposes of forward planning as noted below. Plans for each of these categories are presented subsequently.

Asset Type	Characteristic
A	Have largely complete data sets currently utilised in legacy models. Little or no additional data identified. (>85% data requirements complete).
B	Substantially complete data sets exist, but may require additional extraction routines and potentially a small amount of additional data (between 65% and 85% of data requirements complete).
C	Partially complete data sets with activity planned across categories 2-5 of the data scale (between 20% and 65% of data requirements complete).
D	Data sets with significant additional work identified, including the proposed collection of new data streams. (<20% data requirements complete).

Table 4 Asset type categorisation

6.1.2 Asset Types A

Asset types where little enhancement to the modelling or data have been identified as being required have been classed as type A in our plan. We anticipate that we will deliver these models in the timescales shown.

		Period														
Asset Class	**Description**	**2016 Q4**	**2017 Q1**	**2017 Q2**	**2017 Q3**	**2017 Q4**	**2018 Q1&2**	**2018 Q3&4**	**2019**	**2020**	**2021**	**2022**	**2023**	**2034**	**2025**	**2026**
LV UGB; LV OHL Supports; HV OHL Supports; HV GM Transformers; EHV OHL Supports; EHV OHL Towers; EHV UG Gas Cables; EHV UG Oil Cables; 132 kV OHL Towers; 132 kV UG Cable Oil.	Identify changes to data requirements for CNAIM Implementation															
	Changes to data searches for Cat 1 to 3															
	Use new data to inform final NAW															
	Routine Data collection requirements															
	Full Compliance with Revised data requirements															

6.1.3 Asset Types B

Asset types where some enhancement to the modelling or data has been identified have been classed as type B in our plan. We anticipate that we will deliver these models in the timescales shown.

		Period														
Asset Class	**Description**	**2016 Q4**	**2017 Q1**	**2017 Q2**	**2017 Q3**	**2017 Q4**	**2018 Q1&2**	**2018 Q3&4**	**2019**	**2020**	**2021**	**2022**	**2023**	**2034**	**2025**	**2026**
LV Switchgear and Other	Identify changes to data requirements for CNAIM Implementation	■														
	Changes to data searches for Cat 1 to 3		■													
	Changes to data collection for Cat 4			■	■	■										
	Implement Data Collection Changes for Cat 4						■									
	Routine Data collection requirements	■	■	■	■	■	■									
	Collect Revised Data requirements							■	■	■	■	■	■	■	■	■
	Full Compliance with Revised data requirements															■

6.1.4 Asset Types C

Asset types where much extended enhancement to the modelling or data has been identified have been classed as type C in our plan. We anticipate that we will deliver these models in the timescales shown.

		Period														
Asset Class	**Description**	**2016 Q4**	**2017 Q1**	**2017 Q2**	**2017 Q3**	**2017 Q4**	**2018 Q1&2**	**2018 Q3&4**	**2019**	**2020**	**2021**	**2022**	**2023**	**2034**	**2025**	**2026**
HV Switchgear (GM) Primary; HV Switchgear (GM) Distribution; EHV Switchgear (GM); 132 kV Switchgear EHV Transformer; 132 kV Transformer.	Identify changes to data requirements for CNAIM Implementation	■														
	Changes to data searches for Cat 1 to 3		■													
	Changes to data collection for Cat 4			■	■	■										
	Implement Data Collection Changes for Cat 4						■									
	Determine Cat 5 data Implementation			■												
	Changes to data collection for Cat 5				■	■										
	Implement Data Collection Changes for Cat 5						■									
	Routine Data collection requirements	■	■	■	■	■	■									
	Collect Revised Data requirements							■	■	■	■	■	■	■	■	■
	Full Compliance with Revised data requirements															■

6.1.5 Asset Types D

Asset types where extended enhancement to the modelling or data has been identified have been classed as type D in our plan. We anticipate that we will deliver these models in the timescales shown.

		Period														
Asset Class	**Description**	**2016 Q4**	**2017 Q1**	**2017 Q2**	**2017 Q3**	**2017 Q4**	**2018 Q1&2**	**2018 Q3&4**	**2019**	**2020**	**2021**	**2022**	**2023**	**2034**	**2025**	**2026**
EHV OHL Fittings; EHV OHL Conductors (Tower Lines); 132 kV Fittings; 132 kV OHL Conductors (Tower Lines).	Identify changes to data requirements for CNAIM Implementation	■														
	Changes to data searches for Cat 1 to 3		■													
	Determine Cat 5 data Implementation			■												
	Changes to data collection for Cat 5				■	■										
	Implement Data Collection Changes for Cat 5						■									
	Routine Data collection requirements	■	■	■	■	■	■									
	Collect Revised Data requirements							■	■	■	■	■	■	■	■	■
	Full Compliance with Revised data requirements															■

7 Maintenance of the Information Gathering Plan

It is the responsibility of the Head of Asset Management to ensure that the IGP is reviewed and updated throughout RIIO-ED1. The Plan is currently held as a standalone document and treated as an Irregular Submission on our NetDAR return.

The plan will be reviewed and if required revised as follows:

1. On receipt of a direction from Ofgem to amend the plan in accordance with SLC 51 Part E Para 51.15
2. By the last day of each calendar month a review of progress against the plan will take place, commencing the last working day of May 2016 for a period of 12 calendar months.
3. By 30 August 2016 the plan will be reviewed and amended if required in light of the outcome of;
    a. Our implementation of the Methodology including the associated CNAIM modules and CBRM model changes
    b. Any changes proposed by the DNOs in accordance Appendix 2 paragraph 7 of the Ofgem Directive issued 1 February 2016 entitled "*Notice of Our Decision to approve the Common Network Asset Indices Methodology and to direct a timescale for rebasing of the Network Asset Secondary Deliverables."*
4. By 1 February 2017 an updated version will be prepared and issued to Ofgem.
5. Six monthly from the 1st February 2017 for a maximum of 3 revisions the plan will be reviewed and updated if appropriate and a revised version issued to Ofgem where changes are made to the document
6. Post direction to change the methodology in accordance with SLC51 Part I, the document will be reviewed and reissued within 12 weeks of the direction to change the methodology.
7. Any other ad-hoc review required by Ofgem, management or auditors.

It is anticipated that we will have implemented all the aspects of the IGP by 31 March 2018. Subject to successful completion, further versions of the IGP beyond that date will only be required if a direction to do so is issued or a change to the methodology is directed.

8 Documents referenced

The following documents are referenced in this plan;

Document Reference	Document Title
Ofgem documents	
Standard Licence Condition 51	Standard Licence Conditions for the RIIO-ED1 period
CNAIM	Common Network Asset Indices Methodology V4
RIG Annex A	Regulatory Instruction and Guidance RIIO-ED1 Annex A
Electricity North West Limited documents	
EPD050	Principles of Asset Data Management
EPD301	Inspection and Maintenance of electrical Plant and Substation Security
EPD151	Condition Based Risk Management
CP421	Maintenance and Refurbishment of Overhead Lines
CP151	Application of Common Network Asset Indices Methodology and Condition-Based Risk Management within the Asset Indices Methodology

9 Appendix 1 - Common Network Asset Indices Methodology compliance summary by Methodology table

Please note all tables referenced in the following five appendices relate to the Common Network Asset Indices Methodology V4 as published on the Ofgem website on 1 February 2016.

This appendix details a summary of the actions we will undertake to implement the Common Methodology. The table references are as follows:

CNAIM Table Number – This is a cross reference to the tables as detailed in the Common Network Asset Indices Methodology V4 as detailed in the List of Tables.

Description – This is the description of the table referenced by the Methodology Table number.

Active or Inactive – An active table is one which we will use in our initial implementation of the Methodology and is typically data we have used in the past to provide data in our submissions. An Inactive table is one which we have not used in the past and will be implemented or not as described in the plan to implement the methodology.

Status – This describes the actions we will take and have the following meanings:

1. **No Action** – An existing match already exists in our data and calibrations sets and requires no changes
2. **Align** – An existing table exists in our CBRM modelling but when the Methodology models are implemented will require a data alignment to take place to match the Methodology
3. **Planned** – Currently we do not use this data in our asset methodology and hence we are working to implement these requirements as part of our implementation of the Methodology
4. **Under Investigation** – These tables could be used to enhance our modelling of asset health but require further investigation to determine if it is cost effective to do so.
5. **WNU** – Will not use these tables in our RIIO-ED1 methodology as described in our Asset Indices Methodology in our Code of Practice 151.

Summary of data volumes required and being collected.

The table below summaries the data required by the methodology for each asset category and the data being provided and missing per asset in the modelling to be submitted by us.

Model Ref	Asset Category	Total Data points in the Methodology	Total Data Points In Modelling to be used by Electricity North West	Total Data Points "Populatable" at September 2016	Total Data Points "Not Populatable" at September 2016	Total Data Points Which will not be used at September 2016
CM1	LV OHL Support	26	26	20	6	0
CM2	LV UGB	22	22	19	3	0
CM3**	LV Switchgear and Other	43	43	27	14	2
CM4	HV OHL Support - Poles	33	33	29	4	0
CM5	HV Switchgear (GM) - Primary	41	41	33	8	0
CM6	HV Distribution Switchgear	52	52	42	10	0
CM7	HV Distribution Transformers	46	46	42	4	0
CM8	EHV Poles	32	32	29	3	0
CM9	EHV OHL Fittings	28	28	23	5	0
CM10	EHV OHL Conductor (Tower Lines)	25	25	22	3	0
CM11	EHV OHL Support - Towers	31	31	29	2	0
CM12	EHV UG Cable (Gas)	23	23	22	1	0
CM13*	EHV UG Cable (Non Pressurised)	19	0			19
CM14	EHV UG Cable (Oil)	25	25	24	1	0
CM15*	Submarine Cables	41	0			41
CM16	EHV Switchgear (GM)	59	59	52	7	0
CM17	EHV Transformers	83	83	76	7	0
CM18	132kV OHL Fittings	28	28	23	5	0
CM19	132kV OHL Conductor (Tower Lines)	25	25	22	3	0
CM20	132kV Tower	26	26	24	2	0

CM21***	132kV UG Cable (Gas)	25	0	0	0	25
CM22*	132kV UG Cable (Non Pressurised)	24	0			24
CM23	132kV UG Cable (Oil)	26	26	24	2	0
CM24	132kV Circuit Breakers	60	60	53	7	0
CM25	132kV Transformer	79	79	72	7	0
	Totals	922	813	707	104	111

Coverage of required Maximum of data in Methodology 87%

Notes

*Model not being used in RIIO ED1

** Some aspects of this model are not being used in RIIO ED1

*** We don't have assets of this type

Data Category – As defined in Table 1 Section 2

CNAIM Table No	Description	Active or Inactive	Status	Data Category
1	Categorisation of Assets	Active	No Action	0
2	Generic Terms for Assets	Active	No Action	0
3	Excluded Asset Register Categories	Active	No Action	0
4	Description of Functional Failure Types	Active	Align	0
5	Health Index Banding Criteria	Active	Align	0
6	Health Score used to derive Average PoF	Active	Align	0
7	Criticality Index Banding Criteria	Active	No Action	0
8	Duty Factor Methodology	Active	Align	0
9	Health Score Factor	Active	Align	0
10	Health Score Factor For Transformers	Active	Align	0
11	Health Score Factor For Tap changers	Active	Align	0
12	Observed Condition Inputs	Inactive	Planned	0
13	Observed Condition Modifier - MMI Calculation Parameters	Active	Align	0
14	Measured Condition Inputs	Active	Align	0
15	Measured Condition Modifier - MMI Calculation Parameters	Active	Align	0
16	Reference Costs of Failure	Active	Align	0
17	Sources of Information for Environmental Reference Case	Active	No Action	0
18	Customer Number Adjustment for LV & HV Assets with High Demand Customers	Inactive	Planned	4
19	Functional Failure Definitions	Active	Align	0
20	Normal Expected Life	Active	Align	0
21	PoF Curve Parameters	Active	Align	0
22	Distance From Coast Factor Lookup Table	Active	Align	0
23	Altitude Factor Lookup Table	Active	Align	0
24	Corrosion Category Factor Lookup Table	Active	No Action	0
25	Increment Constants	Active	Align	0
26	Submarine Cable Topography Factor	Inactive	WNU	6
27	Submarine Cable Situation Factor	Inactive	WNU	6
28	Submarine Cable Wind/Wave Factor	Inactive	WNU	6
29	Combined Wave & Current Energy Factor	Inactive	WNU	6
30	Duty Factor Lookup Tables - Cables	Inactive	Planned	4
31	Duty Factor Lookup Table - Switchgear	Active	Planned	3
32	Duty Factor Lookup Table - Distribution Transformers	Active	Planned	2
33	Duty Factor Lookup Tables - Grid & Primary Transformers	Active	Planned	2
34	Observed Condition Input - LV UGB: Steel Cover & Pit Condition	Active	No Action	1
35	Observed Condition Input - LV UGB: Water / Moisture	Active	No Action	1
36	Observed Condition Input - LV UGB: Bell Condition	Active	No Action	1
37	Observed Condition Input - LV UGB: Insulation Condition	Active	No Action	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
38	Observed Condition Input - LV UGB: Signs of Heating	Active	No Action	1
39	Observed Condition Input - LV UGB: Phase Barriers	Active	No Action	1
40	Observed Condition Input - LV Circuit Breaker: External Condition	Inactive	WNU	6
41	Observed Condition Input - LV Board (WM): Switchgear External Condition	Active	No Action	1
42	Observed Condition Input - LV Board (WM): Compound Leaks	Inactive	Planned	4
43	Observed Condition Input - LV Board (WM): Switchgear Internal Condition & Operation	Active	No Action	1
44	Observed Condition Input - LV Pillars: Switchgear External Condition	Active	No Action	1
45	Observed Condition Input - LV Pillars: Compound Leaks	Inactive	Planned	4
46	Observed Condition Input - LV Pillars: Switchgear Internal Condition & Operation	Active	No Action	1
47	Observed Condition Input - LV Pillars: Insulation Condition	Inactive	Planned	4
48	Observed Condition Input - LV Pillars: Signs of Heating	Inactive	Planned	4
49	Observed Condition Input - LV Pillars: Phase Barriers	Inactive	Planned	4
50	Observed Condition Input - HV Switchgear (GM) - Primary: Switchgear External Condition	Active	No Action	1
51	Observed Condition Input - HV Switchgear (GM) - Primary: Oil Leaks / Gas Pressure	Active	No Action	1
52	Observed Condition Input - HV Switchgear (GM) - Primary: Thermographic Assessment	Active	No Action	1
53	Observed Condition Input - HV Switchgear (GM) - Primary: Switchgear Internal Condition & Operation	Active	No Action	1
54	Observed Condition Input - HV Switchgear (GM) - Primary: Indoor Environment	Inactive	Planned	4
55	Observed Condition Input - HV Switchgear (GM) - Distribution: Switchgear External Condition	Active	No Action	1
56	Observed Condition Input - HV Switchgear (GM) - Distribution: Oil Leaks / Gas Pressure	Active	No Action	1
57	Observed Condition Input - HV Switchgear (GM) - Distribution: Thermographic Assessment	Active	No Action	1
58	Observed Condition Input - HV Switchgear (GM) - Distribution: Switchgear Internal Condition & Operation	Inactive	Under Investigation	5
59	Observed Condition Input - HV Switchgear (GM) - Distribution: Indoor Environment	Inactive	Planned	4
60	Observed Condition Input - EHV Switchgear (GM): Switchgear External Condition	Active	No Action	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
61	Observed Condition Input - EHV Switchgear (GM): Oil Leaks / Gas Pressure	Active	No Action	1
62	Observed Condition Input - EHV Switchgear (GM): Thermographic Assessment	Active	No Action	1
63	Observed Condition Input - EHV Switchgear (GM): Switchgear Internal Condition & Operation	Active	No Action	1
64	Observed Condition Input - EHV Switchgear (GM): Indoor Environment	Inactive	Planned	4
65	Observed Condition Input - EHV Switchgear (GM): Support Structures	Active	No Action	1
66	Observed Condition Input - 132kV Switchgear (GM): Switchgear External Condition	Active	No Action	1
67	Observed Condition Input - 132kV Switchgear (GM): Oil Leaks / Gas Pressure	Active	No Action	1
68	Observed Condition Input - 132kV Switchgear (GM): Thermographic Assessment	Active	No Action	1
69	Observed Condition Input - 132kV Switchgear (GM): Switchgear Internal Condition & Operation	Active	No Action	1
70	Observed Condition Input - 132kV Switchgear (GM): Indoor Environment	Inactive	Planned	4
71	Observed Condition Input - 132kV Switchgear (GM): Support Structures	Active	Planned	1
72	Observed Condition Input - 132kV Switchgear (GM): Air Systems	Active	Planned	1
73	Observed Condition Input - HV Transformer (GM): Transformer External Condition	Active	Planned	1
74	Observed Condition Input - EHV Transformer (GM): Main Tank Condition	Active	Planned	1
75	Observed Condition Input - EHV Transformer (GM): Coolers / Radiator Condition	Active	Planned	1
76	Observed Condition Input - EHV Transformer (GM): Bushings Condition	Active	Planned	1
77	Observed Condition Input - EHV Transformer (GM): Kiosk Condition	Active	Planned	1
78	Observed Condition Input - EHV Transformer (GM): Cable Boxes Condition	Active	Planned	1
79	Observed Condition Input - EHV Transformer (GM): Tapchanger External Condition	Active	Planned	1
80	Observed Condition Input - EHV Transformer (GM): Internal Condition	Active	Planned	1
81	Observed Condition Input - EHV Transformer (GM): Drive Mechanism Condition	Inactive	Under Investigation	5
82	Observed Condition Input - EHV Transformer (GM): Condition of Selector & Diverter Contacts	Inactive	Under Investigation	5
83	Observed Condition Input - EHV Transformer (GM): Condition of Selector & Diverter Braids	Inactive	Under Investigation	5
84	Observed Condition Input - 132kV Transformer (GM): Main Tank Condition	Active	No Action	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
85	Observed Condition Input - 132kV Transformer (GM): Coolers / Radiator Condition	Active	No Action	1
86	Observed Condition Input - 132kV Transformer (GM): Bushings Condition	Active	No Action	1
87	Observed Condition Input - 132kV Transformer (GM): Kiosk Condition	Active	No Action	1
88	Observed Condition Input - 132kV Transformer (GM): Cable Boxes Condition	Active	No Action	1
89	Observed Condition Input - 132kV Transformer (GM): Tapchanger External Condition	Active	No Action	1
90	Observed Condition Input - 132kV Transformer (GM): Internal Condition	Inactive	Under Investigation	5
91	Observed Condition Input - 132kV Transformer (GM): Drive Mechanism Condition	Inactive	Under Investigation	5
92	Observed Condition Input - 132kV Transformer (GM): Condition of Selector & Diverter Contacts	Inactive	Under Investigation	5
93	Observed Condition Input - 132kV Transformer (GM): Condition of Selector & Diverter Braids	Inactive	Under Investigation	5
94	Observed Condition Input - Submarine Cable: External Condition Armour	Active	No Action	1
95	Observed Condition Input - LV Pole: Visual Pole Condition	Active	No Action	1
96	Observed Condition Input - LV Pole: Pole Top Rot	Active	No Action	1
97	Observed Condition Input - LV Pole: Pole Leaning	Active	No Action	1
98	Observed Condition Input - LV Pole: Bird / Animal Damage	Active	No Action	1
99	Observed Condition Input - HV Pole: Visual Pole Condition	Active	No Action	1
100	Observed Condition Input - HV Pole: Visual Pole Condition: Pole Top Rot	Active	No Action	1
101	Observed Condition Input - HV Pole: Pole Leaning	Active	No Action	1
102	Observed Condition Input - HV Pole: Bird / Animal Damage	Active	No Action	1
103	Observed Condition Input - EHV Pole: Visual Pole Condition	Active	No Action	1
104	Observed Condition Input - EHV Pole: Pole Top Rot	Active	No Action	1
105	Observed Condition Input - EHV Pole: Pole Leaning	Active	No Action	1
106	Observed Condition Input - EHV Pole: Bird / Animal Damage	Active	No Action	1
107	Observed Condition Input - EHV Tower: Tower Legs	Active	No Action	1
108	Observed Condition Input - EHV Tower: Bracings	Active	No Action	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
109	Observed Condition Input - EHV Tower: Crossarms	Active	No Action	1
110	Observed Condition Input - EHV Tower: Peak	Active	No Action	1
111	Observed Condition Input - EHV Tower: Paintwork Condition	Active	No Action	1
112	Observed Condition Input - EHV Tower: Foundation Condition	Active	No Action	1
113	Observed Condition Input - 132kV Tower: Tower Legs	Active	No Action	1
114	Observed Condition Input - 132kV Tower: Bracings	Active	No Action	1
115	Observed Condition Input - 132kV Tower: Crossarms	Active	No Action	1
116	Observed Condition Input - 132kV Tower: Peak	Active	No Action	1
117	Observed Condition Input - 132kV Tower: Paintwork Condition	Active	No Action	1
118	Observed Condition Input - 132kV Tower: Foundation Condition	Active	No Action	1
119	Observed Condition Input - EHV Fittings: Tower Fittings Condition	Active	No Action	1
120	Observed Condition Input - EHV Fittings: Conductor Fittings Condition	Active	No Action	1
121	Observed Condition Input - EHV Fittings: Insulators - Electrical Condition	Active	No Action	1
122	Observed Condition Input - EHV Fittings: Insulators - Mechanical Condition	Inactive	Planned	4
123	Observed Condition Input - 132kV Fittings: Tower Fittings Condition	Active	No Action	1
124	Observed Condition Input - 132kV Fittings: Conductor Fittings Condition	Active	No Action	1
125	Observed Condition Input - 132kV Fittings: Insulators - Electrical Condition	Active	No Action	1
126	Observed Condition Input - 132kV Fittings: Insulators - Mechanical Condition	Inactive	Planned	4
127	Observed Condition Input - EHV Tower Line Conductor: Visual Condition	Active	No Action	1
128	Observed Condition Input - EHV Tower Line Conductor: Midspan Joints	Active	No Action	1
129	Observed Condition Input - 132kV Tower Line Conductor: Visual Condition	Active	No Action	1
130	Observed Condition Input - 132kV Tower Line Conductor: Midspan Joints	Active	No Action	1
131	Measured Condition Input - LV UGB: Operational Adequacy	Active	No Action	1
132	Measured Condition Input - LV Circuit Breaker: Operational Adequacy	Active	No Action	1
133	Measured Condition Input - LV Board (WM): Operational Adequacy	Active	No Action	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
134	Measured Condition Input - LV Board (WM): Security	Active	No Action	1
135	Measured Condition Input - LV Pillar: Operational Adequacy	Active	No Action	1
136	Measured Condition Input - HV Switchgear (GM) - Primary: Partial Discharge	Active	No Action	1
137	Measured Condition Input - HV Switchgear (GM) - Primary: Ductor Test	Inactive	Under Investigation	5
138	Measured Condition Input - HV Switchgear (GM) - Primary: IR Test	Inactive	Under Investigation	5
139	Measured Condition Input - HV Switchgear (GM) - Primary: Oil Tests	Inactive	Under Investigation	5
140	Measured Condition Input - HV Switchgear (GM) - Primary: Temperature Readings	Active	No Action	1
141	Measured Condition Input - HV Switchgear (GM) - Primary: Trip Test	Inactive	Planned	1
142	Measured Condition Input - HV Switchgear (GM) - Distribution: Partial Discharge	Active	No Action	1
143	Measured Condition Input - HV Switchgear (GM) - Distribution: Ductor Test	Inactive	Under Investigation	5
144	Measured Condition Input - HV Switchgear (GM) - Distribution: Oil Tests	Inactive	Under Investigation	5
145	Measured Condition Input - HV Switchgear (GM) - Distribution: Temperature Readings	Active	No Action	1
146	Measured Condition Input - HV Switchgear (GM) - Distribution: Trip Test	Active	Align	1
147	Measured Condition Input - EHV Switchgear (GM): Partial Discharge	Active	No Action	1
148	Measured Condition Input - EHV Switchgear (GM): Ductor Test	Inactive	Under Investigation	5
149	Measured Condition Input - EHV Switchgear (GM): IR Test	Inactive	Under Investigation	5
150	Measured Condition Input - EHV Switchgear (GM): Oil Tests / Gas Tests	Inactive	Under Investigation	5
151	Measured Condition Input - EHV Switchgear (GM): Temperature Readings	Active	No Action	1
152	Measured Condition Input - EHV Switchgear (GM): Trip Test	Active	Align	1
153	Measured Condition Input - 132kV Switchgear (GM): Partial Discharge	Active	No Action	1
154	Measured Condition Input - 132kV Switchgear (GM): Ductor Test	Inactive	Under Investigation	5
155	Measured Condition Input - 132kV Switchgear (GM): IR Test	Inactive	Planned	4
156	Measured Condition Input - 132kV Switchgear (GM): Oil Tests / Gas Tests	Inactive	Under Investigation	5
157	Measured Condition Input - 132kV Switchgear (GM): Temperature Readings	Active	No Action	1
158	Measured Condition Input - 132kV Switchgear (GM): Trip Test	Active	Align	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
159	Measured Condition Input - HV Transformer (GM): Partial Discharge	Active	No Action	1
160	Measured Condition Input - HV Transformer (GM): Oil Acidity	Active	No Action	1
161	Measured Condition Input - HV Transformer (GM): Temperature Readings	Active	No Action	1
162	Measured Condition Input - EHV Transformer (GM): Main Transformer Partial Discharge	Active	No Action	1
163	Measured Condition Input - EHV Transformer (GM): Temperature Readings	Active	No Action	1
164	Measured Condition Input - EHV Transformer (GM): Tapchanger Partial Discharge	Inactive	Under Investigation	5
165	Measured Condition Input - 132kV Transformer (GM): Main Transformer Partial Discharge	Active	No Action	1
166	Measured Condition Input - 132kV Transformer (GM): Temperature Readings	Active	No Action	1
167	Measured Condition Input - 132kV Transformer (GM): Tapchanger Partial Discharge	Inactive	Under Investigation	5
168	Measured Condition Input - EHV Cable (Non Pressurised): Sheath Test	Inactive	WNU	6
169	No Longer used.			
170	Measured Condition Input - EHV Cable (Non Pressurised): Fault History	Inactive	WNU	6
171	Measured Condition Input - EHV Cable (Oil): Partial Discharge	Inactive	Under Investigation	5
172	Measured Condition Input - EHV Cable (Oil): Leakage	Active	No Action	1
173	Measured Condition Input - EHV Cable (Gas): Partial Discharge	Inactive	Under Investigation	5
174	Measured Condition Input - EHV Cable (Gas): Leakage	Active	Planned	2
175	Measured Condition Input - 132kV Cable (Non Pressurised): Sheath Test	Inactive	WNU	6
176	No longer used			
177	Measured Condition Input - 132kV Cable (Non Pressurised): Fault History	Inactive	WNU	6
178	Measured Condition Input - 132kV Cable (Oil): Partial Discharge	Inactive	Under Investigation	5
179	Measured Condition Input - 132kV Cable (Oil): Leakage	Active	No Action	1
180	Measured Condition Input - 132kV Cable (Gas): Partial Discharge	Inactive	WNU	6
181	Measured Condition Input - 132kV Cable (Gas): Leakage	Inactive	WNU	6
182	Measured Condition Input - Submarine Cable: Sheath Test	Inactive	WNU	6

CNAIM Table No	Description	Active or Inactive	Status	Data Category
183	Measured Condition Input - Submarine Cable: Partial Discharge	Inactive	WNU	6
184	Measured Condition Input - Submarine Cable: Fault History	Inactive	WNU	6
185	Measured Condition Input - LV Pole: Pole Decay / Deterioration	Active	No Action	1
186	Measured Condition Input - HV Pole: Pole Decay / Deterioration	Active	No Action	1
187	Measured Condition Input - EHV Pole: Pole Decay / Deterioration	Active	No Action	1
188	Measured Condition Input - EHV Fittings: Thermal Imaging	Inactive	Under Investigation	5
189	Measured Condition Input - EHV Fittings: Ductor Test	Inactive	Under Investigation	5
190	Measured Condition Input - 132kV Fittings: Thermal Imaging	Inactive	Under Investigation	5
191	Measured Condition Input - 132kV Fittings: Ductor Test	Inactive	Under Investigation	5
192	Measured Condition Input - EHV Tower Line Conductor: Conductor Sampling	Inactive	Under Investigation	5
193	Measured Condition Input - EHV Tower Line Conductor: Corrosion Monitoring Survey	Inactive	Under Investigation	5
194	Measured Condition Input - 132kV Tower Line Conductor: Conductor Sampling	Inactive	Under Investigation	5
195	Measured Condition Input - 132kV Tower Line Conductor: Corrosion Monitoring Survey	Inactive	Under Investigation	5
196	Moisture Condition State Calibration	Active	Align	1
197	Acidity Condition State Calibration	Active	Align	1
198	Breakdown Strength Condition State Calibration	Active	Align	1
199	Oil Test Factor Calibration	Active	Align	1
200	Oil Test Collar Calibration	Active	Align	1
201	Hydrogen Condition State Calibration	Active	Align	1
202	Methane Condition State Calibration	Active	Align	1
203	Ethylene Condition State Calibration	Active	Align	1
204	Ethane Condition State Calibration	Active	Align	1
205	Acetylene Condition State Calibration	Active	Align	1
206	DGA Change Category Calibration	Active	Align	1
207	DGA Test Factor Calibration	Active	Align	1
208	FFA Test Factor	Active	Align	1
209	Ageing Reduction Factor	Active	Align	1
210	Input Data Affected by Refurbishment Interventions	Active	Align	1
211	Reference Financial Cost of Failure	Active	Align	1
212	Type Financial Factors	Inactive	Planned	2
213	Access Factor: OHL	Inactive	Planned	2
214	Access Factor: Switchgear & Transformer Assets	Inactive	Planned	2
215	Reference Safety Probabilities	Active	Align	1
216	Reference Safety Cost	Active	Align	1

CNAIM Table No	Description	Active or Inactive	Status	Data Category
217	Reference Safety Cost - Disproportion Factor	Inactive	Planned	2
218	Safety Consequence Factor – Switchgear, Transformers & Overhead Lines	Active	Align	1
219	Safety Consequence Factor - Cables	Inactive	Planned	2
220	Reference Environmental Cost of Failure	Active	Align	1
221	Type Environmental Factor	Inactive	Planned	2
222	Size Environmental Factor	Inactive	Planned	2
223	Location Environmental Factor	Active	Align	1
224	Costs Used in Derivation of Network Performance Reference Cost of Failure	Active	No Action	1
225	Reference Network Performance Cost of Failure for LV & HV Assets	Active	Align	1
226	Reference Network Performance Cost of Failure for EHV & 132kV assets (Secure)	Active	Align	1

10 Appendix 2 - Condition Data Capture to Common Network Asset Indices Methodology mapping

Correlation of Existing Observed and Measured Asset Data to the Methodology Table Sets as used to calculate the Probability of Failure.

This Appendix details the manner in which we will match data already routinely collected as part of our asset condition survey work and match it with the requirements of the Methodology (ie Category 1 data in our data scale of Table 1). This data is collected in accordance with the requirements of EPD301 and CP421 as a routine condition data capture on a normal cycle of once in eight years.

Where an intervention on an asset takes place, the asset data is modified so our data records show the as left condition of the asset and hence the post intervention condition can be reported in accordance with the Methodology and the reporting requirements as stated in the RIG Annex A. These processes are documented in CP151.

The Reference column is an internal code which refers to the existing condition data capture question set already used by us to collect asset condition data.

The Observed and Measured columns refer to the table reference in the Methodology. The title refers to the data requirement of the Methodology. Where an entry is noted as 'Not Used', this indicates that this data is either not required by the Methodology or it is considered inappropriate to use it in the Observed or Measured area of the Methodology.

This appendix does not cover the Reliability Factors used in our implementation of the Methodology; these are detailed in Appendix 5.

In addition to the models below we will also be implementing the Methodology for EHV gas and oil cables and 132kV oil cables. These models do not use any Observed or Measured data generated from condition data capture and therefore there is no table covering these areas in this Appendix.

We control these relationships through our Asset Indices Methodology which is detailed in CP151 and is subject to internal governance of such documents.

LV UGB			
Reference	**Title**	**Observed**	**Measured**
LK.LK.05.002	Cover Condition	34	
LK.LK.05.003	Pit Condition	34	
LK.LK.05.004	Water Ingress Into Pit	35	
LK.LK.05.005	Bell Condition	36	
LK.LK.05.008	Water Ingress into Box	35	
LK.LK.05.010	Signs of Heating	38	
LK.LK.05.011	Phase Barriers	39	
LK.LK.05.009	Insulation Condition	37	
LK.LK.05.012	Operational Risk		131
	Link / Fuse Type	Not Used	
	Electrical Condition	Not Used	
	Link Box Depth	Not Used	

LV Boards (WM)			
Reference	**Title**	**Observed**	**Measured**
DS.LD.01.004	Security - Unsatisfactory (Note for 133 see rule sets)	41	133/134
DS.LD.01.005	Operational risk		133
DS.LD.01.006	Ext Con Pillars/cabs	41	
	Cond Pillar/Cab/Board	Not Used	
DS.LD.01.007	Internal Condition Pillar/Cab	43	
	LV Board Leaks - Compound	Not Used	
DS.LD.01.024	Type of fuse link contact	Not Used	
	Fuse centres	Not Used	

LV Pillar			
Reference	**Title**	**Observed**	**Measured**
DS.LD.01.004	DS.LD.01.004:Security - Unsatisfactory	44	135
DS.LD.01.005	DS.LD.01.005:Operational risk		135
DS.LD.01.006	DS.LD.01.006:Ext Con Pillars/cabs	44	135
	Cond Pillar/Cab/Board	Not Used	
	Internal Condition Pillar/Cab	46	
	LV Board Leaks - Compound	Not Used	
DS.LD.01.024	DS.LD.01.024:Type of fuse link contact	Not Used	
	Fuse centres	Not Used	

HV Switchgear Primary			
Reference	**Title**	**Observed**	**Measured**
GP.SW.02.001	External corrosion	50	
GP.SW.02.002	External corrosion - indoor	50	
GP.SW.02.003	Internal corrosion	53	
GP.SW.02.004	Oil leaks	51	
GP.SW.02.005	Compound leaks	53	
GP.SW.02.006	Mechanism condition	53	
GP.SW.02.007	Mechanism operation	Not Used	
GP.SW.02.015	Ultrasonic		136
GP.SW.02.016	Bushing condition	53	
GP.SW.02.017	Housing doors & hinges	50	
GP.SW.02.018	Oil levels	51	
GP.SW.02.020	Temperature - main tank	52	140
GP.SW.02.021	Temperature - cable boxes	52	140
GP.SW.02.022	Earthing	Not Used	
GP.SW.02.033	Insulators	53	
GP.SW.02.034	Support structures - concrete	Not Used	
GP.SW.02.035	Support structure - metal	50	
GP.SW.02.038	Support structures - concrete	Not Used	
GP.SW.02.039	Support structures - metal	50	
GP.SW.02.042	Insulators	53	
GP.SW.02.049	Kiosks general condition	50	
GP.SW.02.054	SF_6	51	
GP.SW.02.056	SF_6 filled	51	
GP.SW.02.008	HV discharge		136
GP.SW.02.009	TEV main tank front		136
GP.SW.02.010	TEV main tank rear		136
GP.SW.02.011	TEV cable boxes		136
GP.SW.02.012	TEV busbar chamber		136
GP.SW.02.013	TEV CT Chamber		136
GP.SW.02.014	TEV VT		136
GP.SW.02.015	Ultrasonic		136

HV Switchgear Distribution			
Reference	**Title**	**Observed**	**Measured**
DS.SW.001	External corrosion	55	
DS.SW.003	Leaks - Oil	56	
DS.SW.004	Cable Boxes - Compound Leaks	55	
DS.SW.005	Cable boxes - Properly Ventilated?	Not Used	
DS.SW.007	SF6	Not Used	
DS.SW.008	SF_6 leaks	56	
DS.SW.020	Temperature RDGS for Main Tank	57	146
DS.SW.021	Temperature RDGS for Cable Boxes	57	146
DS.SW.022	Temperature RDGS for Busbars	57	146
DS.SW.023	Water damage	Not Used	
DS.SW.024	Dust & Debris	Not Used	
DS.SW.029	Earths	Not Used	
DS.SW.034	Relays - Unsatisfactory	Not Used	
DS.SW.009 HV	HV Discharge		142
DS.SW.010 HV	TEV readings Main Tank		142
DS.SW.011 HV	TEV readings Main Tank - Rear		142
DS.SW.012 HV	HV TEV readings Cable Boxes		142
DS.SW.013 HV	HV TEV readings Busbar Chamber		142
DS.SW.014 HV	HV TEV readings CT Chamber		142
DS.SW.015 HV	HV TEV readings VT		142
DS.SW.016 HV	HV Discharge - Ultrasonic		142

EHV Swgr			
Reference	**Title**	**Observed**	**Measured**
GP.SW.02.001	External corrosion	60	
GP.SW.02.002	External corrosion - indoor	60	
GP.SW.02.003	Internal corrosion	63	
GP.SW.02.004	Oil leaks	61	
GP.SW.02.005	Compound leaks	63	
GP.SW.02.006	Mechanism condition	63	
GP.SW.02.007	Mechanism operation	Not Used	
GP.SW.02.015	Ultrasonic		147
GP.SW.02.016	Bushing condition	63	
GP.SW.02.017	Housing doors & hinges	60	
GP.SW.02.018	Oil levels	61	
GP.SW.02.020	Temperature - main tank	62	151
GP.SW.02.021	Temperature - cable boxes	62	151
GP.SW.02.027	Sight glasses	Not Used	
GP.SW.02.032	Switch Type	Not Used	
GP.SW.02.054	SF_6	Not Used	
GP.SW.02.008	HV discharge		147
GP.SW.02.009	TEV main tank front		147
GP.SW.02.010	TEV main tank rear		147
GP.SW.02.011	TEV cable boxes		147
GP.SW.02.012	TEV busbar chamber		147

GP.SW.02.013	TEV CT Chamber		147
GP.SW.02.014	TEV VT		147
GP.SW.02.015	Ultrasonic		147

132kV Switchgear GIS and AIS			
Reference	**Title**	**Observed**	**Measured**
GP.SW.02.001	External corrosion	66	
GP.SW.02.002	External corrosion - indoor	66	
GP.SW.02.003	Internal corrosion	69	
GP.SW.02.004	Oil leaks	67	
GP.SW.02.006	Mechanism condition	69	
GP.SW.02.007	Mechanism operation	69	
GP.SW.02.016	Bushing condition	69	
GP.SW.02.017	Housing doors & hinges	66	
GP.SW.02.018	Oil levels	67	
GP.SW.02.020	Temperature - main tank	68	157
GP.SW.02.027	Sight glasses	66	
GP.SW.02.032	Switch Type		
GP.SW.02.033	Insulators	66	
GP.SW.02.034	Support structures - concrete	71	
GP.SW.02.035	Support structure - metal	71	
GP.SW.02.038	Support structures - concrete	71	
GP.SW.02.039	Support structures - metal	71	
GP.SW.02.042	Insulators	66	
GP.SW.02.050	Compressed air lines	72	
GP.SW.02.052	Air receiver - external condition	72	
GP.SW.02.054	SF_6	67	
GP.SW.02.008	HV discharge		153
GP.SW.02.009	TEV main tank front		153
GP.SW.02.010	TEV main tank rear		153
GP.SW.02.011	TEV cable boxes		153
GP.SW.02.012	TEV busbar chamber		153
GP.SW.02.013	TEV CT Chamber		153
GP.SW.02.014	TEV VT		153
GP.SW.02.015	Ultrasonic		153

HV Transformers (GM)			
Reference	**Title**	**Observed**	**Measured**
DS.TX.01.001	External corrosion of main tank	73	
DS.TX.01.002	External corrosion of radiators	73	
DS.TX.01.003	External Corrosion of Guards	73	
DS.TX.01.004	External Condition of Cable Boxes	73	
DS.TX.01.006	Oil Leaks	73	
DS.TX.01.010	Tap changer Unsatisfactory	73	
DS.TX.01.011	HV Discharge		159
DS.TX.01.012	HV TEV Reading Main Tank		159
DS.TX.01.013	HV TEV Reading Cable Box		159
DS.TX.01.014	HV Discharge Ultrasonic		159

DS.TX.01.016	Cable Boxes Vent Blocked	73	
DS.TX01.022	Main Tank		161
DS.TX01.025	Cable Box		161
	Oil Acidity Link to oil Results where available		160

EHV Transformers Main and Tapchanger components			
Reference	**Title**	**Observed**	**Measured**
GP.TX.02.002	External corrosion - Main Tank	74	
GP.TX.02.003	External corrosion - Kiosk	77	
GP.TX.02.004	Bushing condition	76	
GP.TX.02.005	Cable Connections	78	
GP.TX.02.007	State of Earthing	Not Used	
GP.TX.02.008	Oil level - bushing	Not Used	
GP.TX.02.009	Oil level - main tank	74	
GP.TX.02.010	Oil leaks	Not Used	
GP.TX.02.011	HV discharge - TEV Main tank		162
GP.TX.02.012	HV discharge - TEV Cable box		162
GP.TX.02.013	HV discharge - Ultrasonic		162
GP.TX.02.016	Temperature - main tank		163
GP.TX.02.018	Support Structure. VTs and CTs	Not Used	
GP.TX.02.020	External corrosion - main tank	74	
GP.TX.02.021	External corrosion - radiators	75	
GP.TX.02.022	External corrosion - conservator	74	
GP.TX.02.023	External corrosion - cable boxes	78	
GP.TX.02.024	External corrosion - tap changer	79	
GP.TX.02.025	External corrosion - kiosk	77	
GP.TX.02.026	Bushing condition	76	
GP.TX.02.029	External Corrosion - cable connections	78	
GP.TX.02.033	Oil leaks	Not Used	
GP.TX.02.034	HV Discharge TEV Main Tank		162
GP.TX.02.035	HV Discharge TEV Cable Box		162
GP.TX.02.036	HV Discharge Ultrasonic		162
GP.TX.02.041	Temperature - main tank		163

132kV Transformers Main and Tapchanger components			
Reference	**Title**	**Observed**	**Measured**
GP.TX.02.002	External corrosion - Main Tank	84	
GP.TX.02.003	External corrosion - Kiosk	87	
GP.TX.02.004	Bushing condition	86	
GP.TX.02.005	Cable Connections	88	
GP.TX.02.007	State of Earthing		
GP.TX.02.008	Oil level - bushing		
GP.TX.02.009	Oil level - main tank	84	
GP.TX.02.010	Oil leaks		
GP.TX.02.011	HV discharge - TEV Main tank		165
GP.TX.02.012	HV discharge - TEV Cable box		165
GP.TX.02.013	HV discharge - Ultrasonic		165
GP.TX.02.016	Temperature - main tank		166
GP.TX.02.018	Support Structure - VTs and CTs		
GP.TX.02.020	External corrosion - main tank	84	
GP.TX.02.021	External corrosion - radiators	85	
GP.TX.02.022	External corrosion - conservator	84	
GP.TX.02.023	External corrosion - cable boxes	88	
GP.TX.02.024	External corrosion - tap changer	89	
GP.TX.02.025	External corrosion - kiosk	87	
GP.TX.02.026	Bushing condition	86	
GP.TX.02.029	External Corrosion - cable connections	88	
GP.TX.02.033	Oil leaks		
GP.TX.02.034	HV Discharge TEV Main Tank		165
GP.TX.02.035	HV Discharge TEV Cable Box		165
GP.TX.02.036	HV Discharge Ultrasonic		165
GP.TX.02.041	Temperature - main tank		166

LV Pole			
Reference	**Title**	**Observed**	**Measured**
PO_PH_3_2 :	Pole Condition - Visual	95	
PO_PH_3_3 :	Splits	95	
PO_PH_3_4 :	Rusty	Not Used	
PO_PH_3_5 :	Bent	95	
PO_PH_3_6 :	Pole Top	96	
PO_PH_3_7 :	External Damage	Not Used	
PO_PH_3_8 :	Bird Damage	98	
PO_PH_3_9 :	Pole Leaning	97	
	Pole Leaning (Mapped)	Not Used	
	Pole Condition Visual Rating	Not Used	
PO.PH.03.011	Leg One. Probe/hammer test		185
PO.PH.03.017	Leg Two. Probe/hammer test		185
PO.PH.03.023	Leg Three. Probe/hammer test		185
PO.PH.03.029	Leg Four. Probe/hammer test		185

HV Pole			
Reference	**Title**	**Observed**	**Measured**
PO_PH_3_2 :	Pole Condition - Visual	99	
PO_PH_3_3 :	Splits	99	
PO_PH_3_4 :	Rusty	Not Used	
PO_PH_3_5 :	Bent	99	
PO_PH_3_6 :	Pole Top	100	
PO_PH_3_7 :	External Damage	Not Used	
PO_PH_3_8 :	Bird Damage	102	
PO_PH_3_9 :	Pole Leaning	101	
	Pole Leaning (Mapped)	Not Used	
	Pole Condition Visual Rating	Not Used	
PO.PH.03.011	Leg One. Probe/hammer test		186
PO.PH.03.017	Leg Two. Probe/hammer test		186
PO.PH.03.023	Leg Three. Probe/hammer test		186
PO.PH.03.029	Leg Four. Probe/hammer test		186

EHV Pole			
Reference	**Title**	**Observed**	**Measured**
PO_PH_3_2 :	Pole Condition - Visual	103	
PO_PH_3_3 :	Splits	103	
PO_PH_3_4 :	Rusty	Not Used	
PO_PH_3_5 :	Bent	103	
PO_PH_3_6 :	Pole Top	104	
PO_PH_3_7 :	External Damage	Not Used	
PO_PH_3_8 :	Bird Damage	106	
PO_PH_3_9 :	Pole Leaning	105	
	Pole Leaning (Mapped)	Not Used	
	Pole Condition Visual Rating	Not Used	
PO.PH.03.011	Leg One. Probe/hammer test		187
PO.PH.03.017	Leg Two. Probe/hammer test		187
PO.PH.03.023	Leg Three. Probe/hammer test		187
PO.PH.03.029	Leg Four. Probe/hammer test		187

EHV Tower - All Models and subsets			
Reference	**Title**	**Observed**	**Measured**
TO.TT.04.002	Visual Check - Steel Work	107	
TO.TT.04.002	Visual Check - Steel Work	108	
TO.TT.04.002	Visual Check - Steel Work	109	
TO.TT.04.002	Visual Check - Steel Work	110	
TO.TT.04.001	Visual Check - Paint work	111	
TO.TT.04.011	Muffs A	112	
TO.TT.04.013	Muffs B	112	
TO.TT.04.015	Muffs C	112	
TO.TT.04.017	Muffs D	112	

132kV Tower - All models and subsets			
Reference	**Title**	**Observed**	**Measured**
TO.TT.04.002	Visual Check - Steel Work	113	
TO.TT.04.002	Visual Check - Steel Work	114	
TO.TT.04.002	Visual Check - Steel Work	115	
TO.TT.04.002	Visual Check - Steel Work	116	
TO.TT.04.001	Visual Check - Paint work	117	
TO.TT.04.011	Muffs A	118	
TO.TT.04.013	Muffs B	118	
TO.TT.04.015	Muffs C	118	
TO.TT.04.017	Muffs D	118	

EHV Fittings			
Reference	**Title**	**Observed**	**Measured**
TO.TL.04.051	Insulator String	119	
TO.TL.04.070	Insulator String	119	
TO.TL.04.089	Insulator String	119	
TO.TM.04.017	Insulator String	119	
TO.TL.04.041	Phase conductors - Dead end joints	120	
TO.TL.04.042	Phase conductors - Mid Span Joints	120	
TO.TL.04.043	Phase conductors - Comp pre form repairs	120	
TO.TL.04.044	Phase conductors - Jumpers	120	
TO.TL.04.045	Phase conductors - Damper Spacer	120	
TO.TL.04.060	Phase conductors - Dead end joints	120	
TO.TL.04.061	Phase conductors - Mid Span Joints	120	
TO.TL.04.062	Phase conductors - Comp pre form repairs	120	
TO.TL.04.063	Phase conductors - Jumpers	120	
TO.TL.04.064	Phase conductors - Damper Spacer	120	
TO.TL.04.079	Phase conductors - Dead end joints	120	
TO.TL.04.080	Phase conductors - Mid Span Joints	120	
TO.TL.04.081	Phase conductors - Comp pre form repairs	120	
TO.TL.04.082	Phase conductors - Jumpers	120	
TO.TL.04.083	Phase conductors - Damper Spacer	120	
TO.TM.04.007	Phase conductors - Dead end joints	120	
TO.TM.04.008	Phase conductors - Mid Span Joints	120	
TO.TM.04.009	Phase conductors - Comp pre form repairs	120	
TO.TM.04.010	Phase conductors - Jumpers	120	
TO.TM.04.011	Phase conductors - Damper Spacer	120	
TO.TL.04.051	Insulator String	121	
TO.TL.04.070	Insulator String	121	
TO.TL.04.089	Insulator String	121	
TO.TM.04.017	Insulator String	121	

132kV Fittings			
Reference	**Title**	**Observed**	**Measured**
TO.TL.04.051	Insulator String	123	
TO.TL.04.070	Insulator String	123	
TO.TL.04.089	Insulator String	123	
TO.TM.04.017	Insulator String	123	
TO.TL.04.041	Phase conductors - Dead end joints	124	
TO.TL.04.042	Phase conductors - Mid Span Joints	124	
TO.TL.04.043	Phase conductors - Comp pre form repairs	124	
TO.TL.04.044	Phase conductors - Jumpers	124	
TO.TL.04.045	Phase conductors - Damper Spacer	124	
TO.TL.04.060	Phase conductors - Dead end joints	124	
TO.TL.04.061	Phase conductors - Mid Span Joints	124	
TO.TL.04.062	Phase conductors - Comp pre form repairs	124	
TO.TL.04.063	Phase conductors - Jumpers	124	
TO.TL.04.064	Phase conductors - Damper Spacer	124	
TO.TL.04.079	Phase conductors - Dead end joints	124	
TO.TL.04.080	Phase conductors - Mid Span Joints	124	
TO.TL.04.081	Phase conductors - Comp pre form repairs	124	
TO.TL.04.082	Phase conductors - Jumpers	124	
TO.TL.04.083	Phase conductors - Damper Spacer	124	
TO.TM.04.007	Phase conductors - Dead end joints	124	
TO.TM.04.008	Phase conductors - Mid Span Joints	124	
TO.TM.04.009	Phase conductors - Comp pre form repairs	124	
TO.TM.04.010	Phase conductors - Jumpers	124	
TO.TM.04.011	Phase conductors - Damper Spacer	124	
TO.TL.04.051	Insulator String	125	
TO.TL.04.070	Insulator String	125	
TO.TL.04.089	Insulator String	125	
TO.TM.04.017	Insulator String	125	

EHV Conductor			
Reference	**Title**	**Observed**	**Measured**
TO.TL.04.036	Phase Conductors - clashing	127	
TO.TL.04.037	Phase Conductors - Fatigue	127	
TO.TL.04.038	Phase conductors - Corrosion	127	
TO.TL.04.039	Phase conductors - Stranded	127	
TO.TL.04.040	Phase conductors - Damage/Bird caging	127	
TO.TL.04.055	Phase Conductors - clashing	127	
TO.TL.04.056	Phase Conductors - Fatigue	127	
TO.TL.04.057	Phase conductors - Corrosion	127	
TO.TL.04.058	Phase conductors - Stranded	127	
TO.TL.04.059	Phase conductors - Damage/Bird caging	127	
TO.TL.04.074	Phase Conductors - clashing	127	
TO.TL.04.075	Phase Conductors - Fatigue	127	
TO.TL.04.076	Phase conductors - Corrosion	127	
TO.TL.04.077	Phase conductors - Stranded	127	
TO.TL.04.078	Phase conductors - Damage/Bird caging	127	
TO.TM.04.002	Phase Conductors - clashing	127	
TO.TM.04.003	Phase Conductors - Fatigue	127	
TO.TM.04.004	Phase conductors - Corrosion	127	
TO.TM.04.005	Phase conductors - Stranded	127	
TO.TM.04.006	Phase conductors - Damage/Bird caging	127	
TO.TL.04.045	Phase conductors - Damper Spacer	127	
TO.TL.04.064	Phase conductors - Damper Spacer	127	
TO.TL.04.083	Phase conductors - Damper Spacer	127	
TO.TM.04.011	Phase conductors - Damper Spacer	127	
TO.TL.04.042	Phase conductors - Mid Span Joints	128	
TO.TL.04.061	Phase conductors - Mid Span Joints	128	
TO.TL.04.080	Phase conductors - Mid Span Joints	128	
TO.TM.04.008	Phase conductors - Mid Span Joints	128	
TO.TL.04.038	Phase conductors - Corrosion		193
TO.TL.04.057	Phase conductors - Corrosion		193
TO.TL.04.076	Phase conductors - Corrosion		193
TO.TM.04.004	Phase conductors - Corrosion		193
TO.TT.04.039	Tower Earth Wire		193

132kV Conductor			
Reference	**Title**	**Observed**	**Measured**
TO.TL.04.036	Phase Conductors - clashing	129	
TO.TL.04.037	Phase Conductors - Fatigue	129	
TO.TL.04.038	Phase conductors - Corrosion	129	
TO.TL.04.039	Phase conductors - Stranded	129	
TO.TL.04.040	Phase conductors - Damage/Bird caging	129	
TO.TL.04.055	Phase Conductors - clashing	129	
TO.TL.04.056	Phase Conductors - Fatigue	129	
TO.TL.04.057	Phase conductors - Corrosion	129	
TO.TL.04.058	Phase conductors - Stranded	129	
TO.TL.04.059	Phase conductors - Damage/Bird caging	129	
TO.TL.04.074	Phase Conductors - clashing	129	
TO.TL.04.075	Phase Conductors - Fatigue	129	
TO.TL.04.076	Phase conductors - Corrosion	129	
TO.TL.04.077	Phase conductors - Stranded	129	
TO.TL.04.078	Phase conductors - Damage/Bird caging	129	
TO.TM.04.002	Phase Conductors - clashing	129	
TO.TM.04.003	Phase Conductors - Fatigue	129	
TO.TM.04.004	Phase conductors - Corrosion	129	
TO.TM.04.005	Phase conductors - Stranded	129	
TO.TM.04.006	Phase conductors - Damage/Bird caging	129	
TO.TL.04.045	Phase conductors - Damper Spacer	129	
TO.TL.04.064	Phase conductors - Damper Spacer	129	
TO.TL.04.083	Phase conductors - Damper Spacer	129	
TO.TM.04.011	Phase conductors - Damper Spacer	129	
TO.TL.04.042	Phase conductors - Mid Span Joints	130	
TO.TL.04.061	Phase conductors - Mid Span Joints	130	
TO.TL.04.080	Phase conductors - Mid Span Joints	130	
TO.TM.04.008	Phase conductors - Mid Span Joints	130	
TO.TL.04.038	Phase conductors - Corrosion		193
TO.TL.04.057	Phase conductors - Corrosion		193
TO.TL.04.076	Phase conductors - Corrosion		193
TO.TM.04.004	Phase conductors - Corrosion		193
TO.TT.04.039	Tower Earth Wire		193

11 Appendix 3 - Future Condition Data Capture to Common Network Asset Indices Methodology data requirements

In order to improve the accuracy of our Asset Indices modelling, we have identified a number of data inputs that if implemented will be beneficial to the manner in which we report our Asset Indices. These are classed as categories 4 and 5 on our Data Scale.

Proposed Timescale

- Develop collection routines and Implement by 31 March 2018
- Collect appropriate data to permit modelling enhancement by 31 March 2026.

The following table provides the overview of the asset tables which we will seek to collect the associated data for, the heads provided are explained below. In addition the data categorisation as detailed in table one of the main text is provided:

- Table – Refers to the table within the Methodology which the additional data will inform
- Asset Class – Refers to the relevant HI Asset category
- Area – The component on which asset data will be collected
- Measured or Observed – The factor type the data will be used to inform
- Implementation Comment – An outline of the work required to implement the proposal. It should be noted that Voyager is a sub component of the Control room system.

Category 4 - Additional Data Capture Requirements identified to enhance the population of the Methodology

Table	Asset Class	Area	Measured or Observed	Data Cat	Implementation Comments
42	LV Board (WM)	Compound leaks	Observed	4	Q Set Revision Required to implement
45	LV Pillars	Compound leaks	Observed	4	Q Set Revision Required to implement
47	LV Pillars	Insulation Condition	Observed	4	Q Set Revision Required to implement
48	LV Pillars	Signs of Heating	Observed	4	Q Set Revision Required to implement
49	LV Pillars	Phase Barriers	Observed	4	Q Set Revision Required to implement
54	HV Swgr (GM) Primary	Indoor Environment	Observed	4	Q Set Revision Required to implement
59	HV Swgr (GM) Distribution	Indoor Environment	Observed	4	Q Set Revision Required to implement
64	EHV Swgr (GM)	Indoor Environment	Observed	4	Q Set Revision Required to implement
70	132 kV Swgr (GM)	Indoor Environment	Observed	4	Q Set Revision Required to implement
164	EHV Tx (GM) Tap changer Component	PD (Tap changer)	Measured	4	Q Set Revision Required to implement
167	132 kV Tx (GM) Tap changer Component	PD (Tap changer)	Measured	4	Q Set Revision Required to implement

Category 5 – potential additional Data Capture Requirements identified which we will investigate and decide if an economic case exists to adopt.

Table	Asset Class	Area	Measured or Observed	Data Category	Implementation Comments
58	HV Swgr (GM) Distribution	Internal Condition and Operation	Observed	5	Change to Maintenance policy and Q Set revision required to implement
80	EHV Tx (GM) Tap changer Component	Internal condition	Observed	5	Change to Maintenance policy and Q Set revision required to implement
81	EHV Tx (GM) Tap changer Component	Drive Mechanism	Observed	5	Change to Maintenance policy and Q Set revision required to implement
82	EHV Tx (GM) Tap changer Component	Selector and Diverter Contacts	Observed	5	Change to Maintenance policy and Q Set revision required to implement
83	EHV Tx (GM) Tap changer Component	Selector and Diverter Braids	Observed	5	Change to Maintenance policy and Q Set revision required to implement
90	132 kV Tx (GM) Tap changer Component	Internal condition	Observed	5	Change to Maintenance policy and Q Set revision required to implement
91	132 kV Tx (GM) Tap changer Component	Drive Mechanism	Observed	5	Change to Maintenance policy and Q Set revision required to implement
92	132 kV Tx (GM) Tap changer Component	Selector and Diverter Contacts	Observed	5	Change to Maintenance policy and Q Set revision required to implement
93	132 kV Tx (GM) Tap changer Component	Selector and Diverter Braids	Observed	5	Change to Maintenance policy and Q Set revision required to implement
122	EHV Fittings	Mechanical Condition	Observed	5	Change to Maintenance policy and Q Set revision required to implement
126	132 kV Fittings	Mechanical Condition	Observed	5	Change to Maintenance policy and Q Set revision required to implement
137	Primary HV Swgr	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
138	Primary HV Swgr	IR Test	Measured	5	Change to Maintenance policy and Q Set revision required to implement

Table	Asset Class	Area	Measured or Observed	Data Category	Implementation Comments
139	Primary HV Swgr	Oil Tests	Measured	5	Change to Maintenance policy and Search changes required to implement
143	HV Swgr (GM) Distribution	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
144	HV Swgr (GM) Distribution	Oil Tests	Measured	5	Change to Maintenance policy and Search changes required to implement
148	EHV Swgr (GM)	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
149	EHV Swgr (GM)	IR Test	Measured	5	Change to Maintenance policy and Q Set revision required to implement
150	EHV Swgr (GM)	Oil Tests	Measured	5	Change to Maintenance policy and Search changes required to implement
154	132 kV Swgr (GM)	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
155	132 kV Swgr (GM)	IR Test	Measured	5	Change to Maintenance policy and Q Set revision required to implement
157	132 kV Swgr (GM)	Oil Tests	Measured	5	Change to Maintenance policy and Search changes required to implement
188	EHV Fittings	Thermal Imaging	Measured	5	Change to Maintenance policy and Q Set revision required to implement
189	EHV Fittings	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
190	132 kV Fittings	Thermal Imaging	Measured	5	Change to Maintenance policy and Q Set revision required to implement
191	132 kV Fittings	Ductor	Measured	5	Change to Maintenance policy and Q Set revision required to implement
192	EHV Tower line Conductor	Conductor Sampling	Measured	5	Change to Maintenance policy and Q Set revision required to implement
194	132 kV Tower line Conductor	Conductor Sampling	Measured	5	Change to Maintenance policy and Q Set revision required to implement

The following Methodology tables are included in category 6 on our data scale, in that we currently do not hold this data and have no intention of collecting it, primarily as these asset types do not form part of our agreed Secondary Deliverables for RIIO-ED1.

Table	Asset Class	Area	Data Category	Measured or Observed
40	LV Circuit Breaker	External Condition	6	Observed
94	Submarine Cable	Armour	6	Observed
132	LV Circuit Breaker	Operational Adequacy	6	Measured
168	EHV cable non Pressurised	Sheath Test	6	Measured
169	EHV cable non Pressurised	PD	6	Measured
170	EHV cable non Pressurised	Fault history	6	Measured
175	132 kV Cable (Non Pressurised)	Sheath Test	6	Measured
176	132 kV Cable (Non Pressurised)	PD	6	Measured
177	132 kV Cable (Non Pressurised)	Fault history	6	Measured
182	Submarine Cable	Sheath Test	6	Measured
183	Submarine Cable	PD	6	Measured
184	Submarine Cable	Fault history	6	Measured

12 Appendix 4 - Enhancements required to implement Common Network Asset Indices Methodology as compared to Condition Based Risk Management (CBRM) tools

Because of the similarity between the Methodology and our legacy CBRM models, we are implementing our Asset Indices Methodology within the same platform as our existing CBRM tool. In addition to the data enhancements shown in Appendix 3, we have identified and documented a series of other enhancements we need to make in gathering data from our systems to inform the Asset Indices Methodology and hence create as accurate a model as possible, within the application principles of the Methodology. The table below identifies these additional requirements and the phase at which we propose to implement them.

Phase 1 has been implemented by July 2016

Phase 2 will require implementation prior to submission of the revised NAW on 30 December 2016 and

Phase 3 will be implemented by 31 March 2018 at the latest.

The document shows our current level of development in our project to implement the Methodology

12.1 Strategy for managing data deficiencies

The Methodology is designed such that if data is not available a value of PoF and CoF can still be generated. In the case of CoF should there be no data then the asset will have a value equal to 100% of the reference value assigned to it and hence a monetised risk value can be calculated, In our implementation of the methodology we have identified a small number of data points in each asset class which we currently have no method of assigning values for one of the following reasons:

1 We don't have a fully functional connectivity model to permit us to determine a value for the data (eg LV UGB, LV and HV poles); or

2 We need to carry out on site surveys to collect the data.

In these circumstances we will permit the default values within the methodology to be used and hence create a value. As the data becomes available we will track these as material changes to the data set.

We have not modelled the potential changes as a result of this missing data across all asset types and until the model is commissioned and fully built with the available data we cannot be definitive in our assessments but initial indications are that there could be a 7 to 12% variation in CoF values as a result of this data not being available. It must be stressed these are initial estimates and we will not be sure of the impacts until we have the full modelling suite with its NAW functionality available.

12.2 Materiality of Approach

The materiality of this strategy is not anticipated to make significant changes to the distribution of assets across the CoF bandings. This is based on the fact that the majority of the assets in a category will have a criticality rating within the reference band C2 (75 – 125% of reference). The additional data is designed to further "tease out" highly critical assets into the other bands within the methodology. For the vast majority of assets with the data we already have we anticipate that LV and distribution assets will continue to cluster in the C2 band with some potential movement into the C3 band. Few will be of sufficient criticality to move them into the C4 bands post additional data gathering.

For Grid and Primary assets the same approach applies but the volume of data already available means we are able to better calculate the CoF values and tease them out from the reference. We anticipate the materiality of the data issue to be low in this area, with minimal impact of the data requirements.

Ultimately all our proposed changes are directed at ensuring we are able to best target the assets in the poorest condition with the highest Probability of Failure and the greatest Consequence of Failure or assets which appear to the right hand side and bottom of the PoF and CoF matrix, thus ensuring we manage our risks and not the age of the asset population.

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
Base Score	LV OHL Support	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	LV OHL Support	Pole Material Wood or Metal		Required to drive age factors	1	20
CoF	LV OHL Support	Customer Numbers		No Customer Numbers Provided	3	Eq 37
CoF	LV OHL Support	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	LV OHL Support	Maximum Demand on Asset / Total Number of Customers fed by the Asset (kVA per Customer)		Data currently not available	3	18
CoF	LV OHL Support	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	LV OHL Support	Type Financial Factor Criteria	Steel Poles	Revised Search to be created	1	212

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	LV OHL Support	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Major Crossing (e.g. associated span crosses railway line, major road, large waterway etc.)		Data is available but not currently built into CBRM	1	213
CoF	LV OHL Support	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	LV OHL Support	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	LV UGB	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
CoF	LV UGB	Customer Numbers		New Model to be developed	1	Eq 37
CoF	LV UGB	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	LV UGB	Maximum Demand on Asset / Total Number of Customers fed by the Asset (kVA per Customer)		No data is provided in the CBRM models at this time	1	18
CoF	LV UGB	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	LV UGB	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	LV Switchgear and Other	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
PoF	LV Switchgear and Other	Compound leaks	Observed	Q Set Revision Required to implement	3	45
PoF	LV Switchgear and Other	Insulation Condition	Observed	Q Set Revision Required to implement	3	47
PoF	LV Switchgear and Other	Signs of Heating	Observed	Q Set Revision Required to implement	3	48
PoF	LV Switchgear and Other	Phase Barriers	Observed	Q Set Revision Required to implement	3	49
CoF	LV Switchgear and Other	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	LV Switchgear and Other	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	LV Switchgear and Other	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	LV Switchgear and Other	Type Financial Factor Criteria	Non Asbestos clad	Data not available in a format that can be used in the calculation	3	212
CoF	LV Switchgear and Other	Type Financial Factor Criteria	Asbestos clad	Data not available in a format that can be used in the calculation	3	212
CoF	LV Switchgear and Other	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	LV Switchgear and Other	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	HV OHL Support - Poles	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base	HV OHL Support -	Pole Material Wood or Metal		Required to drive age factors	1	20

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
Score	Poles					
CoF	HV OHL Support - Poles	Customer Numbers		No Customer Numbers Provided	3	Eq 37
CoF	HV OHL Support - Poles	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	HV OHL Support - Poles	Maximum Demand on Asset / Total Number of Customers fed by the Asset (kVA per Customer)		Data currently not available	3	18
CoF	HV OHL Support - Poles	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	HV OHL Support - Poles	Type Financial Factor Criteria	Steel Poles	Revised Search to be created	1	212
CoF	HV OHL Support - Poles	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Major Crossing (e.g. associated span crosses railway line, major road, large waterway etc.)		Data is available but not currently built into CBRM	1	213
CoF	HV OHL Support - Poles	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	HV Switchgear (GM) - Primary	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	HV Switchgear (GM) - Primary	CB Has AR		Field in Ellipse	1	31
PoF	HV Switchgear (GM) - Primary	Indoor Environment	Observed	Q Set Revision Required to implement	3	54
PoF	HV Switchgear (GM) - Primary	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	137

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
PoF	HV Switchgear (GM) - Primary	IR Test	Measured	Change to Maintenance policy and Q Set revision required to implement	3	138
PoF	HV Switchgear (GM) - Primary	Trip Tests	Measured	Data held in Voyager, new search required to implement	3	141
CoF	HV Switchgear (GM) - Primary	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	HV Switchgear (GM) - Primary	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	HV Switchgear (GM) - Primary	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	HV Switchgear (GM) - Distribution	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	HV Switchgear (GM) - Distribution	Indoor Environment	Observed	Q Set Revision Required to implement	3	59
PoF	HV Switchgear (GM) - Distribution	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	143
PoF	HV Switchgear (GM) - Distribution	Trip Tests	Measured	Data held in Voyager, new search required to implement	3	146
CoF	HV Switchgear (GM) - Distribution	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	HV Switchgear (GM) - Distribution	Maximum Demand on Asset / Total Number of Customers fed by the Asset (kVA per Customer)		A field for customers supported is provided in NP Criticality but no value for MD on the asset.	3	18

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	HV Switchgear (GM) - Distribution	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	HV Switchgear (GM) - Distribution	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	HV Switchgear (GM) - Distribution	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	HV Transformer (GM)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
CoF	HV Transformer (GM)	Customer Sensitivity Factor		Not currently used in Electricity North West	3	Page 86 V4
CoF	HV Transformer (GM)	No. of Customers to be used in the derivation of Customer Factor		Currently unable to populate	3	Page 86
CoF	HV Transformer (GM)	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	HV Transformer (GM)	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV OHL Support - Poles	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base	EHV OHL Support -	Pole Material Wood or Metal		Required to drive age factors	1	20

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
Score	Poles					
CoF	EHV OHL Support - Poles	Actual Max Load Supplied		No Demand data supplied	3	Eq 40
CoF	EHV OHL Support - Poles	Type Financial Factor Criteria	Small footprint steel masts	Revised Search to be created	1	212
CoF	EHV OHL Support - Poles	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Major Crossing (e.g. associated span crosses railway line, major road, large waterway etc.)		Data is available but not currently built into CBRM	1	213
CoF	EHV OHL Support - Poles	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV OHL Fittings	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	EHV OHL Fittings	Mechanical Condition	Observed	Q Set Revision Required to implement	3	122
PoF	EHV OHL Fittings	Thermal Imaging	Measured	Change to Maintenance policy and Q Set revision required to implement	3	188
PoF	EHV OHL Fittings	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	189
CoF	EHV OHL Fittings	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	EHV OHL Fittings	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV OHL Conductor (Tower Lines)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	EHV OHL Conductor (Tower Lines)	Conductor Type		Required to drive age factors	1	20
PoF	EHV OHL Conductor (Tower Lines)	Conductor Sampling	Measured	Change to Maintenance policy and Q Set revision required to implement	3	192

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	EHV OHL Conductor (Tower Lines)	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	EHV OHL Conductor (Tower Lines)	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV OHL Support - Towers	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	EHV OHL Support - Towers	Foundation Type		Required to drive age factors	1	20
Base Score	EHV OHL Support	Age of Paint		Health score for steelwork is driven by the age of paint. If no age then assume age of tower	1	20
CoF	EHV OHL Support - Towers	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	EHV OHL Support - Towers	Type Financial Factor Criteria	Tension	Under investigation	If Yes Ph 1, else phase 3	212
CoF	EHV OHL Support - Towers	Type Financial Factor Criteria	Terminal	Under investigation	If Yes Ph 1, else phase 3	212
CoF	EHV OHL Support - Towers	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV UG Cable (Gas)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	EHV UG Cable (Gas)	Conductor material		Required to drive age factors	1	20

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
PoF	EHV UG Cable (Gas)	Partial Discharge	Measured	Change to Maintenance policy and Q Set revision required to implement	3	173
CoF	EHV UG Cable (Gas)	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	EHV UG Cable (Gas)	Cable Buried or Exposed	SAFETY CONSEQUENCE FACTOR - CABLES	Where data is available it is held in GIS. It will be possible to query the GIS data base as long as the appropriate attributes are populated for the cable section. Available attributes are shown below.	1	219
Base Score	EHV UG Cable (Oil)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	EHV UG Cable (Oil)	Conductor material		Required to drive age factors	1	20
PoF	EHV UG Cable (Oil)	Partial Discharge	Measured	Change to Maintenance policy and Q Set revision required to implement	3	171
CoF	EHV UG Cable (Oil)	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	EHV UG Cable (Oil)	Cable Buried or Exposed	SAFETY CONSEQUENCE FACTOR - CABLES	Where data is available it is held in GIS. It will be possible to query the GIS data base as long as the appropriate attributes are populated for the cable section. Available attributes are shown below.	1	219
Base Score	EHV Switchgear (GM)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	EHV Switchgear (GM)	Indoor Environment	Observed	Q Set Revision Required to implement	3	64
PoF	EHV Switchgear (GM)	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	148

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
PoF	EHV Switchgear (GM)	IR Test	Measured	Change to Maintenance policy and Q Set revision required to implement	3	149
PoF	EHV Switchgear (GM)	Trip Tests	Measured	Data held in Voyager, new search required to implement	3	152
CoF	EHV Switchgear (GM)	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	EHV Switchgear (GM)	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	EHV Transformer	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	EHV Transformer	Duty Factor		Check if this is a function within the data system if not use a default such that the calculated value = 0	1	8
PoF	EHV Transformer	Internal condition	Observed	Change to Maintenance policy and Q Set revision required to implement	3	80
PoF	EHV Transformer	Drive Mechanism	Observed	Change to Maintenance policy and Q Set revision required to implement	3	81
PoF	EHV Transformer	Selector and Diverter Contacts	Observed	Change to Maintenance policy and Q Set revision required to implement	3	82
PoF	EHV Transformer	Selector and Diverter Braids	Observed	Change to Maintenance policy and Q Set revision required to implement	3	83
PoF	EHV Transformer	PD (Tap changer)	Measured	Change to Maintenance policy and Q Set revision required to implement	3	164

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	EHV Transformer	Type Financial Factor Criteria	33/20kV, >20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type Financial Factor Criteria	33/20kV, >10MVA and ≤20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type Financial Factor Criteria	33/20kV, ≤10MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type Financial Factor Criteria	33/11 or 6.6kV, >20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type Financial Factor Criteria	33/11 or 6.6kV, >10MVA and ≤20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type Financial Factor Criteria	33/11 or 6.6kV, ≤10MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	EHV Transformer	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	EHV Transformer	Location Risk		Available on Ellipse name plate (SS)	1	218
CoF	EHV Transformer	Size Env Factor Criteria	33/20kV, >20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	EHV Transformer	Size Env Factor Criteria	33/20kV, >10MVA and ≤20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	EHV Transformer	Size Env Factor Criteria	33/20kV, ≤10MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	EHV Transformer	Size Env Factor Criteria	33/11 or 6.6kV, >20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	EHV Transformer	Size Env Factor Criteria	33/11 or 6.6kV, >10MVA and ≤20MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	EHV Transformer	Size Env Factor Criteria	33/11 or 6.6kV, ≤10MVA CMR equivalent	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
Base Score	132kV OHL Fittings	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	132kV OHL Fittings	Mechanical Condition	Observed	Q Set Revision Required to implement	3	126
CoF	132kV OHL Fittings	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	132kV OHL Fittings	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	132kV OHL Conductor (Tower Lines)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	132kV OHL Conductor (Tower Lines)	Conductor Type		Required to drive age factors	1	20
PoF	132kV OHL Conductor (Tower Lines)	Thermal Imaging	Measured	Change to Maintenance policy and Q Set revision required to implement	3	190

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
PoF	132kV OHL Conductor (Tower Lines)	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	191
PoF	132kV OHL Conductor (Tower Lines)	Conductor Sampling	Measured	Change to Maintenance policy and Q Set revision required to implement	3	194
CoF	132kV OHL Conductor (Tower Lines)	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	132kV OHL Conductor (Tower Lines)	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	132kV OHL Support - Tower	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	132kV OHL Support - Tower	Foundation Type		Required to drive age factors	1	20
Base Score	132 kV OHL Support	Age of Paint		Health score for steelwork is driven by the age of paint. If no age then assume age of tower	1	20
CoF	132kV OHL Support - Tower	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40
CoF	132kV OHL Support - Tower	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	132kV UG Cable (Oil)	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
Base Score	132kV UG Cable (Oil)	Conductor material		Required to drive age factors	1	20
PoF	132kV UG Cable (Oil)	Partial Discharge	Measured	Change to Maintenance policy and Q Set revision required to implement	3	171
CoF	132kV UG Cable (Oil)	Actual Max Load Supplied		Determine load supplied in associated circuit	1	Eq 40

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	132kV UG Cable (Oil)	Location Risk		Available on Ellipse name plate (SS)	1	218
CoF	132kV UG Cable (Oil)	Cable Buried or Exposed	SAFETY CONSEQUENCE FACTOR - CABLES	Where data is available it is held in GIS. It will be possible to query the GIS data base as long as the appropriate attributes are populated for the cable section. Available attributes are shown below.	1	219
Base Score	132kV CBs	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22
PoF	132kV CBs	CB Has AR		Field in Ellipse	1	31
PoF	132kV CBs	Indoor Environment	Observed	Q Set Revision Required to implement	3	70
PoF	132kV CBs	Ductor	Measured	Change to Maintenance policy and Q Set revision required to implement	3	154
PoF	132kV CBs	IR Test	Measured	Change to Maintenance policy and Q Set revision required to implement	3	155
PoF	132kV CBs	Trip Tests	Measured	Data held in Voyager, new search required to implement	3	158
CoF	132kV CBs	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	132kV CBs	Location Risk		Available on Ellipse name plate (SS)	1	218
Base Score	132kV Transformer	Distance from Coast to be applied to all assets		To be derived from an appropriate system and returned in as a six figure Grid Reference	1	22

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
Base Score	132kV Transformer	Duty Factor		Check if this is a function within the data system if not use a default such that the calculated value = 1	1	8
PoF	132kV Transformer	Internal condition	Observed	Change to Maintenance policy and Q Set revision required to implement	3	90
PoF	132kV Transformer	Drive Mechanism	Observed	Change to Maintenance policy and Q Set revision required to implement	3	91
PoF	132kV Transformer	Selector and Diverter Contacts	Observed	Change to Maintenance policy and Q Set revision required to implement	3	92
PoF	132kV Transformer	Selector and Diverter Braids	Observed	Change to Maintenance policy and Q Set revision required to implement	3	93
PoF	132kV Transformer	PD (Tap changer)	Measured	Change to Maintenance policy and Q Set revision required to implement	3	167
CoF	132kV Transformer	Type Financial Factor Criteria	132/66kV, ≤60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/66kV, >60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/33kV, ≤60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/33kV, >60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/11/11kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/11kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	132kV Transformer	Type Financial Factor Criteria	132/20kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type Financial Factor Criteria	132/20/20kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	212
CoF	132kV Transformer	Type A Criteria - Normal Access (& Default Value) Type B Criteria - Constrained Access or Confined Working Space Type C Criteria - Underground substation		No data is provided for CBRM but some data is available.	3	214
CoF	132kV Transformer	Location Risk		Available on Ellipse name plate (SS)	1	218
CoF	132kV Transformer	Size Env Factor Criteria	132/66kV, ≤60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/66kV, >60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/33kV, ≤60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/33kV, >60MVA	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/11/11kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222

Need	HI Asset category	Requirement	Asset Specific (If Applicable)	Implementation Comments	Phase	CNAIM Table
CoF	132kV Transformer	Size Env Factor Criteria	132/11kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/20kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222
CoF	132kV Transformer	Size Env Factor Criteria	132/20/20kV	Data not supplied but can be derived from Ellipse. Electricity North West to create a new search for data.	1	222

13 Appendix 5 - Use of Reliability Factor in the Methodology

Within the Methodology, the Health Score can be modified by applying a Reliability Factor to an asset. This is applied at the DNO's discretion and is designed to deal with issues such as issues of design which can impact the user or serviceability of the asset, or increased reliability issues (eg type issues). The design of the Methodology is such that these issues, whilst increasing the potential Probability of Failure do not influence the Health Score and thus this increased probability of failure is reflected in this factor. Within the 25 models which make up the Methodology suite we do not consider it appropriate to implement a Reliability score to every asset type. The table below shows where we will implement a Reliability factor score in our initial implementation and the basis on which we will apply it. Where no reference to a Methodology model is made, the value of the Reliability factor will be set to unity and hence not impact the value of the Health Score calculated for an asset of that class.

Need	Asset Registry Category	Requirement	Implementation Comments	Phase	CNAIM Table
Reliability	LV UGB	Reliability Factor – We have experienced difficulty in operating some boards of an obsolete design with modern testing and safety related tools. This impacts on the ability to safely operate the plant and we have therefore identified an increased probability of failure.	Use the Link or Fuse type and link Centres as appropriate. A collar and Cap to be specified – New for the Common Network Asset Indices Methodology	2	Section 6.14
Reliability	LV Switchgear and Other	Reliability Factor – We have experienced difficulty in operating some boards of an obsolete design with modern testing and safety related tools. This impacts on the ability to safely operate the plant and we have therefore identified an increased probability of failure.	Q Set already implemented – As current CBRM model.	1	Reliability
Reliability	LV Switchgear and Other	Reliability Factor – We have experienced difficulty in operating some boards of an obsolete design with modern testing and safety related tools. This impacts on the ability to safely operate the plant and we have therefore identified an	Use the Link or Fuse type and link Centres as appropriate. A collar and Cap to be specified – New for the Common Network Asset Indices Methodology	2	Section 6.14

Need	Asset Registry Category	Requirement	Implementation Comments	Phase	CNAIM Table
		increased probability of failure.			
Reliability	HV Switchgear (GM) - Primary	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to the right.	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e >=80 Min = 1 i.e >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14
Reliability	HV Switchgear (GM) - Distribution	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to the right.	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e >=80 Min = 1 i.e >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14
Reliability	EHV UG Cable (Gas)	Reliability Factor – The interaction of the cable and ground conditions can result in increased reliability problems we therefore propose to introduce a further factor modifier to the calculation to permit better prioritisation of these poorly performing assets.	Relate to leakage and Sheath material Sheath type Aluminium = 1 Lead = 1.5 For Leakage use the definitions and then scale Low =1 Moderate = 1.2 High = 2 – New for the Common Network Asset Indices	1	Section 6.14

Need	Asset Registry Category	Requirement	Implementation Comments	Phase	CNAIM Table
			Methodology		
Reliability	EHV UG Cable (Oil)	Reliability Factor – The interaction of the cable and ground conditions can result in increased reliability problems we therefore propose to introduce a further factor modifier to the calculation to permit better prioritisation of these poorly performing assets.	Relate to leakage and Sheath material Sheath type Aluminium = 1 Lead = 1.5 For Leakage use the definitions and then scale Low =1 Moderate = 1.2 High = 2 – New for the Common Network Asset Indices Methodology	1	Section 6.14
Reliability	EHV Switchgear (GM)	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to the right.	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e >=80 Min = 1 i.e >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14
Reliability	EHV Transformer	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e >=80 Min = 1 i.e >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14

Need	Asset Registry Category	Requirement	Implementation Comments	Phase	CNAIM Table
		the right.			
Reliability	132kV OHL Fittings	Reliability Factor – Following the requirements of the Health and Safety executive after a number of incidents in another DNO we have introduced a time based policy associated with the replacement of anti fogging suspension strings operating at 132kV this factor ensure these assets are replaced in good time before a failure can occur. It should be noted that the issue has been studied by all DNO's and a common cause of failure has not been identified.	If fitting is a suspension set and > 25 years old then apply a factor of 1.25, if >30 Years then 1.5 and if > 35 years then 2. Reason the risk of failure of the string and in line with Tower fitting policy. No Collar to be applied other than 0.5. – New for the Common Network Asset Indices Methodology	1	Section 6.14
Reliability	132kV UG Cable (Oil)	Reliability Factor – The interaction of the cable and ground conditions can result in increased reliability problems we therefore propose to introduce a further factor modifier to the calculation to permit better prioritisation of these poorly performing assets.	Relate to leakage and sheath material Sheath type Aluminium = 1 Lead = 1.5 For Leakage use the definitions and then scale Low =1 Moderate = 1.2 High = 2 – New for the Common Network Asset Indices Methodology	1	Section 6.14

Need	Asset Registry Category	Requirement	Implementation Comments	Phase	CNAIM Table
Reliability	132kV CBs	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to the right.	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e >=80 Min = 1 i.e >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14
Reliability	132kV Transformer	Reliability Factor – The methodology for the determination of a reliability score for this type of plant is detailed in our AIM (CP151). We will apply these principles as translated from the pure score to that used in CBRM to the Methodology and hence will see consistency across models. These principles are detailed in the cell to the right.	Use existing Operability score factors as described in CBRM as follows; Maker, Type and a number based on the CBRM look up calibration table Max = 2 i.e. >=80 Min = 1 i.e. >=80 Scaled in 0.25 steps Collar if > 1.7 5., if = 2 then 8 – As current CBRM model.	1	Section 6.14