Information Gathering Plan

September 2016

The purpose and scope of this document

This document describes Northern Powergrid's Information Gathering Plan (IGP) for achieving compliance with the Common Networks Asset Indices Methodology (CNAIM) in accordance with Part E of Standard License Condition (SLC) 51.

This IGP details our approach for gathering and recording the information required for the application of our Network Asset Indices Methodology. It covers the following general areas:

- Data coverage across the asset categories;
- Data Quality, Processing and Maintenance;
- System Improvements; and
- Information improvements.

We have undertaken a detailed review of Information Gathering requirement by Asset Category in accordance with all the inputs specified in the CNAIM v1.0. This covers the scope and type of data that is to be collected for each Asset Category and the frequency with which data will be collected.

Contents

1 Summary of Current Position

We have assessed our information requirements for achieving compliance with the CNAIM in accordance with Part E of SLC 51.

- This IGP details our position with respect to the requirement for gathering and recording the information required for the application of our Network Asset Indices Methodology:
    - We have undertaken a **detailed review by Asset Category** and are able to demonstrate compliance with the requirements of CNAIM v1.0:
        - In terms of our current information requirements we are able to comply based on data already collected.
        - In terms of our future information requirement we are able to comply based on data that we plan to collect in ED1.
    - We have well established controls to assure the **quality of our data**.
    - We will deliver **system improvements** across a number of aspects which will further improve our position in ED1.
    - We continue to assure the **robustness of our information**, in terms of how we collect and use information relating to our assets.
    - We have identified a **number of improvements actions** which will ensure we achieve continual improvements whilst maintaining compliance with the CNAIM throughout and beyond ED1.
    - This IGP will be fully **reviewed as part of the mid-period review in 2019**, or by exception if anything material changes in intervening years. This shall ensure our information gathering requirements remain appropriate as we close out ED1 and prepare for ED2.

Based upon our detailed asset category review we are able to comply with the requirements of CNAIM v1.0 based on data already collected within our business.

We have well established controls to assure the robustness of our information, in terms of data quality, processing and maintenance.

- System and process controls are in place for recording, modifying and reporting asset data.
- We undertake training and auditing of inspectors in the form of site based training and assessment and by providing an extensive but targeted suite of collateral such as working procedures, method statements, Codes of Practice and “inspection guides” containing example photographs of each condition point response on a collection plan.
- Quality assurance checks are undertaken of underlying data and methodologies.
- Existing controls will be enhanced following the introduction of new Asset Systems in ED1.

We will deliver significant system improvements early in the ED1 period which will revolutionise the way in which we collect information for and maintain our Asset Indices.

We will deliver two key information system projects in ED1:

- The migration to new asset data registers and asset data collection systems; and
- Migration of our CNAIM models onto a new single software platform.

We continue to engage the business to assure the robustness of our information, in terms of how we collect and use information relating to our assets.

- We are undertaking a comprehensive review of all our inspection and maintenance collection plans, which we expect to be deployed within the business during 2017.
- We will be able to make better use of information in terms of the resolution, granularity, accuracy and range at which we are obtaining knowledge about our assets due to the ongoing improvements to our asset information systems. Inherently the migration process itself is forcing a natural cleanse of the information we hold for our assets.
- We have also embarked on a number of innovation projects designed to improve the engineering information about our assets over the longer time horizon.

We have identified a number of key improvements actions which will ensure we achieve continual improvements whilst maintaining compliance with the CNAIM throughout and beyond ED1.

	Action Ref.	Task	Target Date
System	NPg_IGP_01	Implementation of new eAM Asset System	2017
	NPg_IGP_02	Integration of new Collection Plans into business as usual	2017
Information	NPg_IGP_01	External audits of CNAIM implementation	2018
	NPg_IGP_02	Refresh of cable performance data	Annually
	NPg_IGP_03	Refresh of OHL foot patrol data	2019
	NPg_IGP_04	Refresh of tower line high-res data	2020/21
	NPg_IGP_05	Refresh of plant inspection and maintenance data	Annually
	NPg_IGP_06	Complete sensitivity analysis of data points where data not currently collected	2017
	NPg_IGP_07	Subject to NPg_IGP_06 implement changes to collection plans	2017

2 Summary of Common Methodology Asset Categories

This section provides a summary of our current position with respect to the information requirements of the CNAIM and the asset data we collect to meet those requirements.

For those data points that we do not currently collect, as identified within this section, we will be undertaking a sensitivity analysis in order to understand the impact of collecting this new data, after which a final decision as to its inclusion within future CNAIM submissions will be taken. This qualitative assessment will show:

- The potential impact of a specific condition point in the best/worst case scenarios, taking into consideration the relative weightings of the data point and use of caps/collars; and
- An estimation of the impact on overall risk score for some example asset categories where we have a reasonable sample of data already populated in our CNAIM model and can make an informed judgement as to how the “missing data” would impact our models had it been collected.

We will be submitting our “Rebased Network Asset Secondary Deliverables” no later than 30 Dec 2016 in accordance with the requirments of CRC 5D Part C. Further, as described in Section 4.4.2 we are undertaking a comprehensive review of all our inspection and maintenance collection plans, which we expect to be deployed within the business during 2017.

Therefore we will also be undertaking this sensitivity analysis in 2017 to allow suitable completion of the above two tasks such that the analysis will be based upon a definitive set of Health and Criticality profiles on which we can fully assess the sensitivity of using new data within our CNAIM submissions.

2.1 Overhead Lines (Poles)

The asset categories covered in this section are LV OHL Support, EHV OHL Support – Poles and HV OHL Support – Poles.

- **We are able to comply with the requirements of CNAIM based on data already collected.** The entire pole asset category was inspected on foot over the period 2008-11 to provide detailed condition data required for these Asset Categories. This is complimented by additional inspections as required some of which are pre-construction assessments initiated during our scheme design and authorisation process.
- This data will be refreshed during ED1 as part of the planned foot patrol of all poles over a four year period, 2017-20. This will provide the main data refresh for this Asset Category over ED1. The collection plans for this activity are under review to build on lessons from the previous foot patrol and a number of innovation projects as described later in this plan.

A summary of the information requirements for the Asset Categories named above is shown in the table overleaf. A more detailed breakdown by data point is provided in Appendix 1.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score **(section 6.1)**		Age Location Other (e.g. type)	**Collected now -** nameplate information stored in asset registers.	Annually*
Health Score Modifier **(section 6.7)**	**Observed Condition Factors**	Visual Pole Condition Pole Top Rot Pole Leaning Bird / Animal Damage	**Collected now -** poles are assessed on foot a minimum of once every ten years. Ad-hoc assessments also undertaken as required, e.g. climbing patrols	One-off programme to inspect all poles over 4 years from 2017, to be repeated from 2027. Ad-hoc assessments will be fed into the CNAIM model annually.
	Measured Condition Factors	Pole Decay / Deterioration		
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now -** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.
Financial CoF **(section 7.3)**		Type Access	**Collected now -** poles assessed on foot a minimum of once every ten years. Additional assessments also undertaken as required inc. high risk site inspections.	One-off programme to inspect all poles over 4 years from 2017, to be repeated from 2027. Annual safety inspections of high risk sites are also undertaken. New information will be fed into the CNAIM model annually noting that in most cases the data will be unchanged from the previous year, unless assets have been removed or installed, or by exception (e.g. to correct existing data or for changes in land use)
Safety CoF **(section 7.4)**		Location		
		Type	**Collected now -** nameplate information stored in asset registers.	Annually*
Network Performance CoF **(Section 7.6)**		Customer Sensitivity Factor (LV and HV) Network Type Factor (EHV)	**Collected now -** ad-hoc assessment to be undertaken for the purposes of the CNAIM implementation.	One-off exercise as part of initial implementation of CNAIM, then updated by exception.
		Customer Factor (LV & HV) Load Factor (EHV)	**Collected now -** raw data stored in SCADA / Trouble Management Systems in real time and processed in line with other business requirements including regulatory submissions (e.g. Load Indices).	Annually

**the data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

2.2 Overhead Lines (Towers, Fittings, OHL Conductor)

The asset categories covered in this section are EHV OHL Fittings, EHV OHL Conductor (Tower Lines), EHV OHL Support – Towers, 132kV OHL Fittings, 132kV OHL Conductor (Tower Lines) and 132kV OHL Support – Tower.

- **We are able to comply with the requirements of CNAIM based on data already collected.** All tower lines were inspected through high-resolution imaging surveys done by helicopter over 2010/11. This is complimented by additional inspections as required some of which are pre-construction assessments initiated during our scheme design and authorisation process such as conductor sampling and climbing inspection of towers.
- This data will be refreshed during ED1 as part of the planned high-resolution imaging of all tower lines over a two year period, 2019-20. This will provide the main data refresh for this asset category over ED1.
- We collect data relating to Ductor tests as part of commissioning or as part of an investigation but it is not in a form suitable for use within out HI models. In our experience, replacing tower line fittings due to failed Ductor tests is not a prominent feature within our tower fittings replacement projects and therefore we expect the impact of any changes in this area to be negligible. We will be undertaking a review of the benefit of changing the way we collect this data versus the effort required to make the change as part of implementing our eAM system.

A summary of the information requirements for the Asset Categories named above is shown in the table overleaf. A more detailed breakdown by data point is provided in Appendix 1.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score **(section 6.1)**		Age	**Collected now -** nameplate information stored in asset registers.	Annually*
		Location		
		Other (e.g. type)		
Health Score Modifier (section 6.7)	**Observed Condition Factors**	Tower legs	**Collected now -** towers are assessed via helicopter (using high-resolution digital imagery) a minimum of once every ten years. They are also assessed on foot a minimum of once every ten years and ad-hoc assessments are undertaken as required, e.g. climbing patrols	One-off programme to inspect all towers via helicopter (high-res) over 2 years from 2019, to be repeated from 2029. One-off programme to inspect all towers on foot over 4 years from 2017, to be repeated from 2027. Ad-hoc assessments will be fed into the CNAIM model annually.
		Bracings		
		Crossarms		
		Peak		
		Paintwork condition		
		Foundation condition		
	Measured Condition Factors	Thermal Imaging	**Collected now -** towers are assessed via helicopter (using thermal imagery) every four years	Defects found by exception and fed into the CNAIM model annually.
		Ductor Test	**No plans to collect (for inclusion within CNAIM) -** as noted above collected during commissioning but not used as a condition assessment technique within NPg.**	n/a
		Conductor Sampling	**Collected now -** ad-hoc assessments are undertaken as required, usually in the lead up to a major refurbishment scheme in order to inform any decision to replace conductors	Ad-hoc assessments will be fed into the CNAIM model annually.
		Corrosion Monitoring Survey		
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now -** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.
Financial CoF **(section 7.3)**		Type	**Collected now -** towers assessed on foot a minimum of once every ten years. Additional assessments also undertaken as required inc. high risk site inspections.	One-off programme to inspect all towers via helicopter (high-res) over 2 years from 2019, to be repeated from 2029. One-off programme to inspect all towers on foot over 4 years from 2017, to be repeated from 2027. Annual safety inspections of high risk sites are also undertaken. New information will be fed into the CNAIM model annually noting that in most cases the data will be unchanged from the previous year, unless assets have been removed or installed, or by exception (e.g. to correct existing data or for changes in land use)
		Access		
Safety CoF **(section 7.4)**		Location		
		Type	**Collected now -** nameplate information stored in asset registers.	Annually*
Network Performance CoF **(Section 7.6)**		Load Factor (EHV)	**Collected now -** raw data stored in SCADA / Trouble Management Systems in real time and processed in line with other business requirements including regulatory submissions (e.g. Load Indices).	Annually
		Network Type Factor (EHV)	**Collected now -** ad-hoc assessment to be undertaken for the purposes of the CNAIM implementation.	One-off exercise as part of initial implementation of CNAIM, then updated by exception.

**the data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

*** A sensitivity analysis is to be undertaken to understand the impact of collecting new data in a way that is compatible with the requirements of the CNAIM, after which a final decision as to its inclusion within future CNAIM submissions will be taken.*

2.3 Cables

The asset categories covered in this section are EHV UG Cable (Oil), EHV UG Cable (Gas), 132kV UG Cable (Oil), 132kV UG Cable (Gas), EHV UG Cable (Non Pressurised) and 132kV UG Cable (Non Pressurised).

- **We are able to comply with the requirements of CNAIM based on data already collected.** The cables models are most sensitive to age and performance data which we maintain in real time.
- We do not currently collect data relating to sheath testing or partial discharge. In our experience there are limitations with these tests as pure condition assessment techniques in that performance of the test and interpretation of the results is complex and subjective. Also, remedial actions would normally be triggered in response to observed trends over a period of time rather than a discrete measurement. For these reasons the criteria we use in identifying cable replacement schemes is weighted towards "performance data" in the form of experienced electrical failures or insulant leaks and we consider partial discharge and sheath test data to be a secondary consideration. This is in fact reflected in the CNAIM; "Partial Discharge" and "Sheath Test" are both secondary factors in terms of their overall impact on the Health Index calculation so 50% coverage of cable condition factors, given that the other two factors ("Fault History" and "Leakage") are given more weighting within the methodology, is deemed sufficient.

A summary of the information requirements for the Asset Categories named above is shown in the table overleaf. A more detailed breakdown by data point is provided in Appendix 1.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score **(section 6.1)**		Age	**Collected now -** nameplate information stored in asset registers.	Annually*
		Duty		
		Other (e.g. type)		
Health Score Modifier **(section 6.7)**	**Measured Condition Factors**	Sheath Test	**No plans to collect (for inclusion within CNAIM) -** as noted above this data is collected during commissioning but not used as a condition assessment technique within NPg.**	n/a
		Partial Discharge	**No plans to collect (for inclusion within CNAIM) -** not used as a condition assessment technique within NPg.**	n/a
		Fault History	**Collected now -** performance data (fault and leak performance) is updated in real time	Annually
		Leakage (oil & gas cables)		
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now -** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.
Safety CoF **(section 7.4)**		Type	**Collected now -** nameplate information stored in asset registers.	Annually*
Network Performance CoF **(Section 7.6)**		Load Factor (EHV)	**Collected now -** raw data stored in SCADA / Trouble Management Systems in real time and processed in line with other business requirements including regulatory submissions (e.g. Load Indices).	Annually
		Network Type Factor (EHV)	**Collected now -** ad-hoc assessment to be undertaken for the purposes of the CNAIM implementation.	One-off exercise as part of initial implementation of CNAIM, then updated by exception.

**the data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

*** A sensitivity analysis is to be undertaken to understand the impact of collecting new data in a way that is compatible with the requirements of the CNAIM, after which a final decision as to its inclusion within future CNAIM submissions will be taken.*

2.4 Switchgear

The asset categories covered in this section are HV Switchgear (GM) – Distribution, HV Switchgear (GM) - Primary, EHV Switchgear (GM) and 132kV Switchgear (GM).

- **We are able to comply with the requirements of CNAIM based on data already collected.** Our switchgear is inspected on an annual basis with more detailed assessments made at time of maintenance.
- We collect data relating to "Ductor Test" as part of commissioning or as part of an investigation but it is not in a form suitable for use within out HI models. In our experience, replacing switchgear due to failed Ductor tests is not a driver within our replacement projects and therefore we expect the impact of any changes in this area to be negligible.
- We will be collecting data relating to "Air Systems (132kV)" once changes to annual substation collection plan are implemented, planned from 2017.
- We will be obtaining data relating to "Location – proximity to watercourse" for distribution sites (already collected for primary sites) from our new spatial systems once implemented in 2017.
- The data collection plans for inspection and maintenance activities are under review as part of our eAM spatial project and this data will be updated on annual basis during ED1.

A summary of the information requirements for the Asset Categories named above is shown in the table overleaf. A more detailed breakdown by data point is provided in Appendix 1.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score **(section 6.1)**		Age Location Duty (number of operations)	**Collected now -** nameplate information stored in asset registers.	Annually*
Health Score Modifier **(section 6.7)**	**Observed Condition Factors**	Air Systems (132kV)	**To be collected in the future -** once changes to annual substation collection plan are implemented, likely from 2017. **	Annually once changes to annual substation collection plan are implemented, likely from 2017.
		Thermographic Assessment External Condition Oil Leaks / Gas Pressure Indoor Environment Support Structures (EHV & 132kV) Internal Condition & Operation	**Collected now -** Substation inspections undertaken at least once a year. Data is also collected during routine maintenance, the frequency/phasing of which depends upon several factors (such as asset type). Protection Maintenance (trip testing) undertaken every three years and PD "follow up" tests undertaken on an ad-hoc basis.	Annual refresh of substation inspection data. Data is also collected during routine maintenance, the frequency/phasing of which depends upon several factors (such as asset type). On an annual basis up to 20% of assets would typically be maintained thus providing updated data for inclusion within our CNAIM model.
	Measured Condition Factors	Trip Test Oil / Gas Tests IR Test Partial Discharge Temperature Readings		
		Ductor Test	**No plans to collect (for inclusion within CNAIM) -** as noted above collected during commissioning but not used as a condition assessment technique within NPg.**	n/a
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now -** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.
Financial CoF **(section 7.3)**		Access	**Collected now -** one-off exercise undertaken as part of initial implementation of CNAIM then updated by exception. We also rely on local knowledge on an ad-hoc basis, e.g. following site visits to assess scheme designs.	Ad-hoc assessments will be fed into the CNAIM model annually.
Safety CoF **(section 7.4)**		Location Type	**Collected now -** nameplate information stored in asset registers.	Annually*
Environmental CoF **(Section 7.5)**		Type		
		Location – bunding	**Collected now -** The asset will ordinarily be categorised as "Not Bunded" unless other (ad-hoc) information shows otherwise.	n/a
		Location – proximity to watercourse	**Collected now -** for primary sites this information was collected as part of an environmental survey. **To be collected in the future** - for distribution sites, we will be looking to obtain this information from our new spatial systems once implemented in 2017.**	Our environmental survey was last undertaken a number of years ago so options are being considered for a refresh of this data. These include a one off environmental survey or a desk top survey (using spatial tools). This information will be fed into the CNAIM model as a one-off exercise, likely in 2017.
Network Performance CoF **(Section 7.6)**		Customer Sensitivity Factor (LV and HV) Network Type Factor (EHV)	**Collected now -** ad-hoc assessment to be undertaken for the purposes of the CNAIM implementation.	One-off exercise as part of initial implementation of CNAIM, then updated by exception.
		Customer Factor (LV & HV) Load Factor (EHV)	**Collected now -** raw data stored in SCADA / Trouble Management Systems in real time and processed in line with other business requirements including regulatory submissions (e.g. Load Indices).	Annually

** The data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

*** A sensitivity analysis is to be undertaken to understand the impact of collecting new data in a way that is compatible with the requirements of the CNAIM, after which a final decision as to its inclusion within future CNAIM submissions will be taken.*

2.5 Transformers & Tapchangers

The asset categories covered in this section are HV Transformer (GM), EHV Transformer (GM) and 132kV Transformer (GM) in the first table.

- **We are able to comply with the requirements of CNAIM based on data already collected.** Our transformers are inspected on an annual basis with more detailed assessments made at time of maintenance.
- We do not currently collect, or have any plans to collect, data relating to Oil Acidity for distribution transformers - this is not part of our routine Inspection and Maintenance policy. This is a minor factor in terms of their overall impact on the Health Index calculation.
- We will be collecting data relating to the condition of tap changers once changes to annual substation collection plan are implemented, planned from 2017.
- We will also be collecting additional data relating to partial discharge of the main transformer once changes to annual substation collection plan are implemented, planned from 2017. We note that partial discharge measurements are only applicable to a sub component of the transformer (cable boxes) of a sub set of the population (those with cable boxes). Therefore we expect this to have a limited impact on the overall Health Index profile for primary transformers, which we will assess in more detail as part of the sensitivity analysis planned for 2017 as described earlier.
- We will be obtaining data relating to “Location – proximity to watercourse” for distribution sites (already collected for primary sites) from our new spatial systems once implemented in 2017.
- The data collection plans for inspection and maintenance activities are under review as part of our eAM spatial project and this data will be updated on annual basis during ED1.

A summary of the information requirements for the Asset Categories named above is shown in the table overleaf. A more detailed breakdown by data point is provided in Appendix 1.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score **(section 6.1)**		Age	**Collected now -** nameplate information stored in asset registers.	Annually*
		Location		
		Duty (utilisation)		
Health Score Modifier **(section 6.7)**	**Observed Condition Factors**	External Condition (HV)	**Collected now -** Substation inspections undertaken at least once a year. Data is also collected during routine maintenance (annual for 132kV assets, two years for EHV) Annual refresh of substation inspection data.	Data is also collected during routine maintenance (annual for 132kV assets, two years for EHV) providing updated data for inclusion within our CNAIM model.
		Coolers / Radiator (EHV/132kV)		
		Bushings (EHV/132kV)		
		Kiosk (EHV/132kV)		
		Cable Boxes (EHV/132kV)		
		Main Tank (EHV/132kV)		
	Measured Condition Factors	Temperature Readings		
		Partial Discharge (distribution)		
		Partial Discharge (primary)	**To be collected in the future** **	Annually once changes to annual substation collection plan are implemented from 2017
		Oil Acidity (HV)	**No plans to collect (for inclusion within CNAIM)****	n/a
	Oil	Oil Test (EHV/132kV)	**Collected now -** Oil sampling every year for 132kV (2 years for EHV)	Annually for 132kV, 50% per year for EHV
	DGA	DGA (EHV/132kV)		
	FFA	FFA (EHV/132kV)		
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now -** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.
Financial CoF **(section 7.3)**		Access	**Collected now -** one-off exercise undertaken as part of initial implementation of CNAIM then updated by exception. We also rely on local knowledge on an ad-hoc basis, e.g. following site visits to assess scheme designs.	Ad-hoc assessments will be fed into the CNAIM model annually.
		Type	**Collected now -** nameplate information stored in asset registers.	Annually*
Safety CoF **(section 7.4)**		Location		
		Type		
Environmental CoF **(Section 7.5)**		Size		
		Type		
		Location – bunding	**Collected now -** For primary transformers building and civil surveys are undertaken every five years. Distribution transformers will ordinarily be categorised as "Not Bunded" unless other (ad-hoc) information shows otherwise.	n/a
		Location – proximity to watercourse	**Collected now -** for primary sites this information was collected as part of an ad-hoc environmental survey. **To be collected in the future** - for distribution sites, we will be looking to obtain this information from our new spatial systems once implemented in 2017.**	Our environmental survey was last undertaken a number of years ago so options are being considered for a refresh of this data. These include a one off environmental survey or a desk top survey (using spatial tools). This information will be fed into the CNAIM model as a one-off exercise, likely in 2017.
Network Performance CoF **(Section 7.6)**		Customer Sensitivity Factor (LV and HV)	**Collected now -** ad-hoc assessment to be undertaken for the purposes of the CNAIM implementation.	One-off exercise as part of initial implementation of CNAIM, then updated by exception.
		Network Type Factor (EHV)		
		Customer Factor (LV & HV)	**Collected now -** raw data stored in SCADA / Trouble Management Systems in real time and processed in line with other business requirements including regulatory submissions (e.g. Load Indices).	Annually
		Load Factor (EHV)		

** the data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

*** A sensitivity analysis is to be undertaken to understand the impact of collecting this new data in a way that is compatible with the requirements of the CNAIM, after which a final decision as to its inclusion within future CNAIM submissions will be taken.*

EHV and 132kV Tapchangers are shown separately in this second table.

CNAIM calculation step (CNAIM document reference)		Data required	Approach to data collection	CNAIM Model Refresh Rate
Initial Health Score. **(section 6.1)**		Age	**Collected now -** nameplate information stored in asset registers.	Annually*
		Location		
		Duty (Number of operations)		
Health Score Modifier **(section 6.7)**	**Observed Condition Factors**	Selector & Diverter Braids	**To be collected in the future** **	Annually once changes to annual substation collection plan are implemented from 2017
		Selector & Diverter Contacts		
		External Condition		
		Internal Condition		
		Drive Mechanism		
	Measured Condition Factors	Partial Discharge		
	Oil	Oil test	**Collected now –** Oil sampling every year for 132kV (2 years for EHV)	Annually for 132kV, 50% per year for EHV
Reliability Modifier **(section 6.14)**		Ad-hoc assessment	**Collected now –** reliability ratings already established within the business based on asset performance reviews. Updated on an ad-hoc basis as new information becomes available.	Ad-hoc assessments will be fed into the CNAIM model annually.

**the data within our registers will change where assets have been removed or installed, or by exception to correct existing data*

*** A sensitivity analysis is to be undertaken to understand the impact of collecting this new data in a way that is compatible with the requirements of the CNAIM, after which a final decision as to its inclusion within future CNAIM submissions will be taken.*

3 Data Quality, Processing and Maintenance

This section of the document is concerned with all aspects of data quality:

- Controls in place when recording data, audits and training of staff;
- Training and auditing of Inspectors; and
- Asset data processing for regulatory reporting;

3.1 Data Quality – General Asset Information Controls

Northern Powergrid's regulatory submissions of its Network Asset Indices must comply with the requirements under standard licence condition 45 (Data Assurance requirements). Standard licence condition 45 and its associated guidance (the data assurance guidance (DAG)) specify the information in these RIGs where the DAG requirements apply. The DAG requires us to perform a risk assessment and carry out data assurance on the information we provide under SLC51.

To ensure quality data is inputted into Northern Powergrid's asset management systems in order to fully comply with these requirements, any new data maintenance recruits into our Information Management function are provided with a structured training induction; including the provision of written guidance and the assignment of a more experienced member of staff in a 'buddy' role. Once new recruits complete their training, they are initially exposed to the more straightforward jobs, building up their knowledge and competence over time to jobs of a more complex nature. Throughout this induction period, their work is subject to extensive auditing to assess the quality of work and identify any themes that may require further focussed training. Our more experienced data maintainers are subjected to dip sample audits, with any training themes identified and resolved via a combination of individual or group training.

Training modules emphasising the importance of capturing quality asset data from site are rolled out each year in both our Castleford and Kepier training schools to new apprentices and long serving industrial resource, as part of their bi-annual refresher training programme.

We have an established asset recording control (ARC) database to assist in monitoring the throughput and completeness of the recording in asset registers of works undertaken. Each new job, or scheme, is "owned" by an accountable individual within our Information Management function who is responsible for identifying and sourcing any missing information and updating records accordingly.

Closed loop processes are used so that following completion and commitment of a job to our corporate asset systems, each data maintainer reviews the records associated with their jobs or schemes to ensure all elements have been successfully uploaded. A notification is then issued to the responsible engineer to confirm that the updated records reflect what was designed and constructed on site. Any amendments or alterations that may be required are then carried out and confirmation obtained between parties.

Scrutiny queries are built into the nightly processes when new data is submitted into our corporate asset management systems. Any network connectivity errors are identified in an output report that is reviewed each working day, again with our data maintainers acting on any rectification activities that may be required.

Review meetings are held each month with representatives from our Information Management, Investment Delivery and Operations functions responsible for managing capital investment programme and new connection activities. These review meetings provide a platform to obtain a forward view on upcoming schemes and chase any outstanding records or anomalies relating to schemes that have been recently completed.

Currently asset record static data is predominantly submitted in hard copy format, with processes present to track the status of the records as they transition through the business. Inspection and maintenance data is collected in both electronic and hard formats depending upon the work activity.

3.2 Training and Auditing of Inspectors

We undertake training and auditing of inspectors in the form of site based training and assessment and by providing an extensive but targeted suite of collateral such as working procedures, method statements, Codes of Practice and "inspection guides" containing example photographs of each condition point response on a collection plan.

We ensure that external contractors who undertake inspections on behalf of Northern Powergrid are suitably trained, experienced and fully competent to undertake their assigned duties. Training records are required for all external staff before they can be authorised and inducted by Northern Powergrid.

We undertake targeted reviews of inspection data to assess for consistency to our inspection and maintenance collection plan requirments. Areas included in such reviews would be an assessment of inspection records to an "as expected" result and comparisons across inspectors, such that we can identify discrepancies and put in correction controls which may involve re-training of inspectors or a review of collection plans.

3.3 Quality in Asset Data Processing

There are controls for translating raw data from our asset information systems into data interfaces used in regulatory reporting. These may be direct interfaces to a regulatory table or more commonly, data interfaces to intermediary processes such as those used to produce age profiles and asset health indices, and of course, going forwards, the CNAIM software tool.

For compliance with CNAIM we will continue to use of existing suite of standard data querying, interpretation and data mining techniques. Although we do envisage that these will evolve as our core asset management systems are replaced.

The main technique employed at Northern Powergrid is known as standard datasets. These are suites of queries which extract the information required and of processes which translate the raw data extracted from the queries into the interfaces required for the secondary deliverable models.

We also know the frequency and timing for which the standard queries need to be run for updating regulatory submissions. For example all static data is updated annually and at the same time as the RRP asset costs and volumes submission is being prepared. Inspection and maintenance data is updated annually but collection plan frequency dictates how many assets have a condition data update that can be used. A cut-off date is used so that the data suite is time stamped for audit purposes and also compliant in terms of regulatory periods covered.

It is recognised that asset data systems are not perfect and that this problem needs to be managed via data cleansing. This includes correction of natural errors in the records, such as assets requiring removal that were incorrectly captured historically or the creation of new assets that historically should have been captured; and correction of incorrect or incomplete attribute sets such as Ownership, Voltage or Length.

One of the key inputs into the derivation of a Health Score is the age of the asset and therefore we put additional emphasis on assuring the robustness of our age data. Over an extended period of time various techniques have been used to validate this information, such as using the age of electrically associated equipment (e.g. for extensible switchgear), or using serial numbers (e.g. which sometimes have age embedded in them by the manufacturer), or using knowledge of when different manufacturing types were introduced. This validation work is typically undertaken as a one-off exercise and repeated only by exception (such as post overhead line foot patrols during which age information is recorded from pole markings) as part of the annual update of our Asset Health Indices. These post-processing techniques are useful in managing unknown dates at an asset level rather than at a profile level as is done as part of the annual submission of asset age profiles. Typically we would expect <<1% of asset age data to change in any given year.

4 System Improvements

This section discusses all of these IT system improvements that will impact on reporting against the CNAIM.

4.1 New asset data systems being implemented

Northern Powergrid will be migrating to new asset data registers and asset data collection systems in 2017. The project consolidates the existing asset data sources (over 60 across the main and ad-hoc sources) and 9 applications into 2 databases (eAM and spatial) and 3 main applications (eAM, iSmart, GeoField supported by the asset edit and information windows). These data sources and applications will facilitate the core business processes around adding, modifying and removing assets from our network and inspection and maintenance work on those assets.

4.1.1 Consolidation of asset data into the eAM database

The asset maintenance and condition data from the existing systems will be migrated across into the new asset register within the eAM module of our existing Oracle e-Business Suite. Oracle is currently used for managing finances, inventory and procurement related activities.

eAM will generate work orders for inspection and maintenance activities in line with our asset management policies and issue the associated collection plans. These collection plans will be used to collect asset data which is in turn inputs to the health indices.

4.1.2 Consolidation of asset location into the spatial database

The spatial database will provide a single repository holding the asset location and relationship data, the assets within both the eAM and spatial databases share common asset identifiers allowing users to navigate between the location data in the spatial database and any inspection and maintenance data in eAM.

The spatial database will also hold third party data such as flood zone data, SSSI and AONB boundaries.

The same spatial database also provides the network connectivity model (the relationships between transformers, feeders and premises) to the outage management system where that connectivity model is used for the identification of fault locations and the determination of customer interruptions and customer minutes lost.

4.1.3 iSmart provides GIS functionality for office based staff

We are replacing both of our records systems with a single web-based solution, iSmart, that will be accessible to all office based staff. iSmart will be used not only to view asset location details held in the spatial database but also to maintain and add new assets to that database.

4.1.4 GeoField for collection of condition data from the field

The GeoField application we are implementing is also used by Scottish Power, WPD, other utilities and contracting organisations working in the sector.

Our implementation of GeoField serves three purposes:

- Allows field staff to view our asset records remotely without needing to pick up copies of plans from the office/depot;
- Allows field staff to electronically update records for new/changes to assets on the network rather than hand drawn sketches to be returned for the drawing office to update the records; and
- Receive inspection and maintenance work orders along with the relevant questionnaires they need to complete.

4.2 CNAIM Reporting Tool

The implementation of the common methodology requires the development of an IT solution. Our ongoing development uses an existing IT platform used by ourselves and all other DNOs - this is the CBRM software produced by EA Technology.

We are engaged in a project with all six DNO groups and EA Technology to implement a common industry core model. We have also specified some additional interface work so that it can be used in our internal reporting processes for regulatory reporting. The data interface proposed is neutral of the eAM system implementation. The timescales for the proposal have been designed to ensure that we can meet our regulatory obligations in 2016.

4.3 Data Quality Improvements in the New Asset Systems

As part of building and implementing the new systems a number of data improvement activities have already been undertaken to improve both the asset location and attribution data.

4.3.1 Spatial data improvements

Positional accuracy improvement of Yorkshire records vectors

- The advent of GPS technology highlighted inaccuracies in the Ordnance Survey map backgrounds leading them to re-draw their maps more accurately. These new positions are reflected in their MasterMap product.
- The Yorkshire records are drawn up against the old pre-GPS Ordnance Survey background. This currently causes problems when we share asset location information with third parties but this will be overcome by realigning the records to the MasterMap background.
- In urban areas, approximately 20% of the Yorkshire licence area, there was no movement in the Ordnance Survey map therefore the existing asset positions already align with the Ordnance Survey MasterMap map background.
- In rural areas, approximately 80% of the Yorkshire licence area, Ordnance Survey adjusted the base mapping and our asset positions have been updated to align with the Ordnance Survey MasterMap background using the shift data files provided by Ordnance Survey, this affects approximately 20% of the assets.
- This work is predominantly an automated process; started in 2014 with over 14.1m spatial objects (referred to as features) realignment is virtually complete barring the final production cut-over to the new spatial database.

Northeast records raster to vector conversion

- The current Northeast records are made up from a series of over 60,000 raster images maintained over four different scales from 1:10,000 to 1:250.
- Converting to the vector format that already exists for the Yorkshire records means all of our records data will exist in a common format and structure across both license areas.
- The vector format allows us to hold attribute data against the network asset itself turning them into intelligent objects we can query and analyse rather than the dumb raster image format they are currently in.
- This work is almost entirely a manual process; started in 2013 it has created 11.2m features and is virtually complete barring the final production cut-over to the new spatial database.

4.3.2 Aligned data model - asset groups and attributes

As part of the eAM implementation we have reviewed the data held in all of the current data sources and produced a harmonised asset and attribute model to create a common data format and structure across Northeast and Yorkshire assets.

In doing so we have developed a data model with 125 asset groups (e.g. 1 group for transformers) and 235 associated attribute groups (e.g. 1 group contains transformer details such as; type, kVA rating, ratio in use).

In all eAM will contain c.40m assets and over 300m attributes.

4.3.3 Validation against standardised lists

As part of the data migration process some of the key attributes have been compared and cleansed against standardised lists of permitted values and manufacturers specifications. There is still more data profiling work to be done in this area such as identification of any outlying values based on limited number of instances, i.e. values outside of the top 10 occurrences. Some asset data (e.g. cable data) have been validated against the manufacturers specifications to correct any anomalies and identify any items which will require further clarification through a physical inspection.

4.4 Additional Controls in the New System

4.4.1 Asset creation

A number of improvements have been included in the implementation of the new systems to ensure improved quality of asset data for any new assets on the network.

Red-lining new assets/asset changes in the office

- By extending the use of iSmart to all staff we will ensure that any asset changes are captured at the time any proposal/request is put forwards (e.g. when a customer requests a connection or when a reinforcement scheme is planned the design engineer creates the initial update in a red-line form).
- Should the work go ahead, the designed connection or scheme is visible to the delivery team who can complete the update by adding any information, such as serial numbers, that would not have been know at the time a design is produced.
- The completed information goes through a final quality check before being committed to the eAM and spatial databases.
- By following this process the need for paper updates and manually passing information is removed and quality of asset information is assured.

Red-lining in the field

- Similarly, through the GeoField application, the field staff can provide updates to records whenever they make a change, such as a cable overlay to fix a fault, these updates pass through the same quality checks as an update from the office staff would and in doing so this removes the need for paper based records updates to be provided by field staff.

Asset templates

- We have created c.1,200 template assets for staff to select when adding new assets as part of the red-lining process. These templates are designed to ensure that the data is standardised against specifications and the users only need to provide minimal additional information.

Asset regime assignment

- Once an asset is added to the eAM asset register the group of inspection and maintenance activities that would be carried out against that asset are automatically applied based on the type of asset being added.
- This ensures that no assets can exist in the eAM database without the necessary activities assigned to them and that work orders for all assets will be generated in line with our asset management policy timescales.

4.4.2 Condition data

Condition data collection will be improved through the use of streamlined questionnaires and more efficient options for answering questions – all of which leverage the functionality of the GeoField application.

Questionnaire improvements

- All of the inspection and maintenance activities have been jointly reviewed by the policy team within Asset Management and the delivery team within Operations as part of that work each of the 309 questionnaires have been revised in order to both align and streamline the questions the inspection and maintenance teams need to answer.

Questions

- As part of the review we have also built in additional functions within the questionnaires to make it easier for the end-users to complete the questionnaires which in turn should allow them to focus on diligently completing the questions where information is needed rather than spending time providing default answers.
- These are some examples of the functions that have been built into the questionnaires:
    - Jump to a different questionnaire
    - Jump to a different question within the same questionnaire
    - Hide non-applicable questions
    - Automatically populate associated answers
    - Abort the work and automatically complete any outstanding questions
    - Create a missing asset

Asset specific questionnaires

- For certain activities to avoid inspections and maintenance teams having to complete questionnaires for assets which may not exist at a particular site asset specific questionnaires will be used.
- These asset specific questionnaires are dynamically derived from the asset location data that GeoField extracts from the eAM and spatial databases.

- This means that is a certain type of asset is not installed at a site then no questionnaire will be presented to the inspector and equally if more than one of a particular asset then the appropriate number of questionnaires will be available. This ensures that only relevant condition data is presented back to the eAM asset register.

5 Information improvements

This section details some of the data collection changes that are being made as part of the introduction of the new asset management systems which will improve the level of information available and therefore the quality of the health and criticality indices. The section also overviews some innovation projects designed to improve the engineering information about our assets over the longer time horizon. It addresses those areas where we have identified a need to collect new condition data (or improve data collection methods), specifically in those areas that will affect data points required for CNAIM.

5.1 Improved Use of Data

Our data collection requirements have been established over many years to meet the various needs of the business and data is collected proportionately to the value of and risk associated with the asset. Collection plans and data collection routines are designed in a way to maximise the efficiency of our data collection processes which includes the capture of multiple information types for individual assets in any given visit to site.

The design of the CNAIM is based around existing DNO data sets as far as was practicable and therefore the requirement to collect new information solely for the purposes of populating the CNAIM models is limited.

The development of the CNAIM has also identified areas of best practice across the DNOs which we are using to improve our own information gathering processes. As discussed in section 4.4.2 we are undertaking a comprehensive review of all our inspection and maintenance collection plans, which we expect to be deployed within the business during 2017. The collection plans are being reviewed in the context of interpretability, consistency across inspection types (e.g. monthly versus annual substation inspections), consistency across asset categories (e.g. harmonisation, where practicable, in the way condition points are defined) and relevance to the way our business processes use this data including its use within CNAIM. We expect a period of transition once the collection plans become deployed that we are managing by ensuring any changes to data used within our CNAIM models is minimised and in the worst case maintained as existing. Generally we expect improvements to the data we collect, for example collection plan responses that are better aligned to the descriptions within CNAIM.

As a result of the system improvements described we will be able to make better use of information in terms of the resolution, granularity, accuracy and range at which we are obtaining knowledge about our assets.

- The introduction of eAM spatial will open up the possibility of making use of the Ordnance Survey map layers to improve the resolution at which we collect geographical information such as distance from coast and proximity to water courses. For example the grid square maps in eAM spatial already achieve a 200 metre resolution and queries can be written to split the grid squares further.

- A particular benefit for the plant based asset categories in the transition to eAM spatial will be the improved granularity of condition information in the situations where the inspections are currently on a per site base but under eAM will be on a per asset basis.
- A further benefit will come from the improved clarity in the classification of question being asked. For example security issues will be very clearly delineated from condition issues.
- As well as question improvement there will be improvement in the answers, both in terms of range and also in the more harmonised & conformed approach both across licenses and asset categories.

Inspection and maintenance (I&M) frequencies are typically based on the use of operating experience, research on asset degradation and reliability analysis. Historically Reliability Centred Maintenance (RCM) studies have been completed across the asset types and these were used to determine optimum inspection and maintenance interval frequencies. The Code of Practices (CoPs) associated with our I&M frequencies are reviewed when:

- A systems change is implemented;
- A contract is re-let; or
- If a policy is reviewed following an asset performance review or based on the learning from a network incident.

5.2 Innovation

We are trialling a number of innovative condition assessment techniques. While we are already compliant in the condition points affected in that we currently collect the relevant condition information, success in these trials will result in improved information, of better quality and/or at a better granularity and level of detail. The improved information can be used to supplement existing condition points and will also help us to assess the value of the information we are currently collecting and to identify areas where new condition measures could be proposed for CNAIM continuous improvement. The projects underway or planned are:

- We are partnering with Siemens on an innovation project which is trialling enhanced real time monitoring of approximately 100 11kV circuit breakers across seven primary substations. These monitors measure partial discharge, indoor environmental conditions, dc trip coil current and cumulative i2t which optimises post network fault maintenance. The additional information should help us to better understand deterioration and failure modes of circuit breakers and also give us more detailed information about specific condition points used in CNAIM and their value. For example monitoring of partial discharge in real time will help with the understanding of trends and be superior to the current snapshot taken once a year.
- Presently utility poles are tested for their condition, and thus safety, using subjective techniques such as hitting the pole with a hammer and listening for changes in sound to indicate decay. The information from such assessments provides a key input into our Health

Index model and therefore we keen to explore new and innovative techniques to reduce the subjectivity of such tests, thereby improving the robustness of our Health Index models for LV, HV and EHV poles. We are trialling a number of devices such as the diagnostic test devices offered by both Vonaq and Groundline Engineering (“Thor”).

- We are engaged in an initiative is look to deliver “Unnamed Aerial Vehicles” (UAV) flying “Beyond Visual Line of Sight” (BVLOS) by the end of 2018. The technology offers the potential to provide a new and enhanced platform for collecting condition data.
- Technologies and commercial services utilising Lidar technology for overhead line inspections and surveys has similar potential for improving upon the way in which we collect data relating to our above ground assets. Whilst we envisage the primary driver to adopting such techniques to be focussed on improving overhead line resilience to vegetation, there may be supplementary data collected which could usefully inform our Health and Criticality Indices.
- Cable condition data is to be investigated either through bespoke partial discharge surveys at EHV or waveform analysis at LV.

Appendix 1 – Detailed Review of Information Gathering Requirement by Asset Category

CM1 LV OHL Support

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Visual Pole Condition	Table 95	Collected Now
Observed	Pole Top Rot	Table 96	Collected Now
Observed	Pole Leaning	Table 97	Collected Now
Observed	Bird / Animal Damage	Table 98	Collected Now
Measured	Pole Decay / Deterioration	Table 185	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Reliability	Reliability Factor	Page 69	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Material	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (kVA band)	Table 18	Collected Now
Network Performance	Number of Customers	Table 18	Collected Now
Network Performance	Customer Sensitivity	Page 86	Collected Now

- 18 of 18 data points collected now.

CM2 LV UGB

Not applicable to Northern Powergrid.

CM3 LV Switchgear and Other

Not applicable to Northern Powergrid.

CM4 HV OHL Support - Poles

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Visual Pole Condition	Table 99	Collected Now
Observed	Pole Top Rot	Table 100	Collected Now
Observed	Pole Leaning	Table 101	Collected Now
Observed	Bird / Animal Damage	Table 102	Collected Now
Measured	Pole Decay / Deterioration	Table 186	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Material	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (kVA band)	Table 18	Collected Now
Network Performance	Number of Customers	Table 18	Collected Now
Network Performance	Customer Sensitivity	Page 86	Collected Now

- 18 of 18 data points collected now.

CM5 HV Switchgear (GM) – Primary

Input Type	Input Description	Table / Page	Information Gathering Plan
Observed	Internal Condition & Operation	Table 53	Collected Now
Observed	Thermographic Assessment	Table 52	Collected Now
Observed	External Condition	Table 50	Collected Now
Observed	Oil Leaks / Gas Pressure	Table 51	Collected Now
Observed	Indoor Environment	Table 54	Collected Now
Measured	Trip Test	Table 141	Collected Now
Measured	Oil Tests	Table 139	Collected Now
Measured	IR Test	Table 138	Collected Now
Measured	Ductor Test	Table 137	No plans to collect
Measured	Partial Discharge	Table 136	Collected Now
Measured	Temperature Readings	Table 140	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	Number of operations	Table 31	Collected Now
Age	Age	Page 32	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Type	Table 221	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Environmental	Location – bunding	Table 223	Collected Now
Network Performance	Maximum Demand (kVA band)	Table 18	Collected Now
Network Performance	Number of Customers	Table 18	Collected Now
Network Performance	Customer Sensitivity	Page 86	Collected Now

- 26 of 27 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
  - We have no plans to collect 1 data point (“Ductor Test”)

CM6 HV Switchgear (GM) – Distribution

Input Type	Input Description	Table / Page	Information Gathering Plan
Observed	Indoor Environment	Table 59	Collected Now
Observed	External Condition	Table 55	Collected Now
Observed	Internal Condition & Operation	Table 58	Collected Now
Observed	Thermographic Assessment	Table 57	Collected Now
Observed	Oil Leaks / Gas Pressure	Table 56	Collected Now
Measured	Partial Discharge	Table 142	Collected Now
Measured	Ductor Test	Table 143	No plans to collect
Measured	Oil Tests	Table 144	Collected Now
Measured	Temperature Readings	Table 145	Collected Now
Measured	Trip Test	Table 146	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	Number of operations	Table 31	Collected Now
Age	Age	Page 32	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Type	Table 221	Collected Now
Environmental	Location - proximity to water	Table 223	Collect in Future
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (kVA band)	Table 18	Collected Now
Network Performance	Number of Customers	Table 18	Collected Now
Network Performance	Customer Sensitivity	Page 86	Collected Now

- 24 of 26 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have plans to collect 1 extra data point in the future (“Location - proximity to water”)
    - We have no plans to collect 1 data point (“Ductor Test”)

CM7 HV Transformer (GM)

Input Type	Input Description	Table / Page	Information Gathering Plan
Observed	Transformer External Condition	Table 73	Collected Now
Measured	Temperature Readings	Table 161	Collected Now
Measured	Oil Acidity	Table 160	No plans to collect
Measured	Partial Discharge	Table 159	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	% Utilisation	Table 32	Collected Now
Age	Age	Page 32	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Size	Table 222	Collected Now
Environmental	Location - proximity to water	Table 223	Collect in Future
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (kVA band)	Table 18	Collected Now
Network Performance	Number of Customers	Table 18	Collected Now
Network Performance	Customer Sensitivity	Page 86	Collected Now

- 19 of 21 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have plans to collect 1 extra data point in the future (“Location - proximity to water”)
    - We have no plans to collect 1 data point (“Oil Acidity”)

CM8 EHV OHL Support – Poles

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Visual Pole Condition	Table 103	Collected Now
Observed	Pole Top Rot	Table 104	Collected Now
Observed	Pole Leaning	Table 105	Collected Now
Observed	Bird / Animal Damage	Table 106	Collected Now
Measured	Pole Decay / Deterioration	Table 187	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Material	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 17 of 17 data points collected now.

CM9 EHV OHL Fittings

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Tower Fittings Condition	Table 119	Collected Now
Observed	Conductor Fittings Condition	Table 120	Collected Now
Observed	Insulators - Electrical Condition	Table 121	Collected Now
Observed	Insulators - Mechanical Condition	Table 122	Collected Now
Measured	Thermal Imaging	Table 188	Collected Now
Measured	Ductor Test	Table 189	No plans to collect
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age	Age	Page 32	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 16 of 17 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have no plans to collect 1 data point (“Ductor Test”)

CM10 EHV OHL Conductor (Tower Lines)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Visual Condition	Table 127	Collected Now
Observed	Midspan Joints	Table 128	Collected Now
Measured	Corrosion Monitoring Survey	Table 193	Collected Now
Measured	Conductor Sampling	Table 192	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sub-Division	Table 20	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 15 of 15 data points collected now.

CM11 EHV OHL Support – Towers

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Tower Legs	Table 107	Collected Now
Observed	Peak	Table 110	Collected Now
Observed	Bracings	Table 108	Collected Now
Observed	Crossarms	Table 109	Collected Now
Observed	Paintwork Condition	Table 111	Collected Now
Observed	Foundation Condition	Table 112	Collected Now
Reliability	Reliability Factor	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age (Steelwork)	Age	Page 32	Collected Now
Expected Life (Steelwork) Sub Division	Sub-Division	Table 20	Collected Now
Age (Paintwork)	Age	Page 32	Collected Now
Expected Life (Paintwork) Sub Division	Sub-Division	Table 20	Collected Now
Age (Foundation)	Age	Page 32	Collected Now
Expected Life (Foundation) Sub Division	Sub-Division	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 22 of 22 data points collected now.

CM12 EHV UG Cable (Gas)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Leakage	Table 174	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 9 of 9 data points collected now.

CM13 EHV UG Cable (Non Pressurised)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Fault History	Table 170	Collected Now
Measured	Partial Discharge	Table 169	No plans to collect
Measured	Sheath Test	Table 168	No plans to collect
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 9 of 11 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
  - We have no plans to collect 2 data points ("Partial Discharge" and "Sheath Test")

CM14 EHV UG Cable (Oil)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Leakage	Table 172	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 10 of 10 data points collected now.

CM15 Submarine Cables

Not applicable to Northern Powergrid.

CM16 EHV Switchgear (GM)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Internal Condition & Operation	Table 63	Collected Now
Observed	External Condition	Table 60	Collected Now
Observed	Oil Leaks / Gas Pressure	Table 61	Collected Now
Observed	Thermographic Assessment	Table 62	Collected Now
Observed	Support Structures	Table 65	Collected Now
Observed	Indoor Environment	Table 64	Collected Now
Measured	Temperature Readings	Table 151	Collected Now
Measured	Oil Tests / Gas Tests	Table 150	Collected Now
Measured	IR Test	Table 149	Collected Now
Measured	Ductor Test	Table 148	No plans to collect
Measured	Partial Discharge	Table 147	Collected Now
Measured	Trip Test	Table 152	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	Number of operations	Table 31	Collected Now
Age	Age	Page 32	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Type	Table 221	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 26 of 27 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have no plans to collect 1 data point ("Ductor Test")

CM17 EHV Transformer

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Coolers / Radiator Condition	Table 75	Collected Now
Observed	Bushings Condition	Table 76	Collected Now
Observed	Kiosk Condition	Table 77	Collect in Future
Observed	Cable Boxes Condition	Table 78	Collected Now
Observed	Main Tank Condition	Table 74	Collected Now
Measured	Temperature Readings	Table 163	Collect in Future
Measured	Main Transformer Partial Discharge	Table 162	Collect in Future
Observed	Tapchanger Condition of Selector & Diverter Braids	Table 83	Collect in Future
Observed	Tapchanger Condition of Selector & Diverter Contacts	Table 82	Collect in Future
Observed	Tapchanger External Condition	Table 79	Collect in Future
Observed	Tapchanger Internal Condition	Table 80	Collect in Future
Observed	Tapchanger Drive Mechanism Condition	Table 81	Collect in Future
Measured	Tapchanger Partial Discharge	Table 164	Collect in Future
Oil	Oil test - Moisture, Acidity, Breakdown	Tables 196-198	Collected Now
Oil	Tapchanger Oil test - Moisture, Acidity, Breakdown	Page 54	Collected Now
DGA	Oil DGA - Hydrogen (H2), Acetylene (C2H2), Ethylene (C2H4), Methane (CH4), Ethane (C2H6)	Tables 201-205	Collected Now
DGA	DGA - change	Table 206	Collected Now
FFA	Oil FFA (ppm)	Table 208	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	% Utilisation	Table 33	Collected Now
Duty	Tapchanger Avg Number of Daily Taps	Table 33	Collected Now
Age	Age	Page 32	Collected Now
Age	Tapchanger Age	Page 32	Collected Now
Expected Life Sub Div.	Pre 1980	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Size	Table 222	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 28 of 37 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
  - We have plans to collect 9 extra data points in the future ("Main Transformer Partial Discharge", "Kiosk Condition", "Temperature Readings", "Tapchanger External Condition", "Tapchanger Internal Condition", "Tapchanger Drive Mechanism Condition", "Tapchanger Condition of Selector & Diverter Contacts", "Tapchanger Condition of Selector & Diverter Braids" and "Tapchanger Partial Discharge"

CM18 132kV OHL Fittings

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Tower Fittings Condition	Table 123	Collected Now
Observed	Conductor Fittings Condition	Table 124	Collected Now
Observed	Insulators - Electrical Condition	Table 125	Collected Now
Observed	Insulators - Mechanical Condition	Table 126	Collected Now
Measured	Thermal Imaging	Table 190	Collected Now
Measured	Ductor Test	Table 191	No plans to collect
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age	Age	Page 32	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 16 of 17 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have no plans to collect 1 data point ("Ductor Test")

CM19 132kV OHL Conductor (Tower Lines)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Visual Condition	Table 129	Collected Now
Observed	Midspan Joints	Table 130	Collected Now
Measured	Corrosion Monitoring Survey	Table 194	Collected Now
Measured	Conductor Sampling	Table 195	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sub-Division	Table 20	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 15 of 15 data points collected now.

CM20 132kV OHL Support – Tower

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Tower Legs	Table 113	Collected Now
Observed	Peak	Table 114	Collected Now
Observed	Bracings	Table 115	Collected Now
Observed	Crossarms	Table 116	Collected Now
Observed	Paintwork Condition	Table 117	Collected Now
Observed	Foundation Condition	Table 118	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Age (Steelwork)	Age	Page 32	Collected Now
Expected Life (Steelwork) Sub Division	Sub-Division	Table 20	Collected Now
Age (Paintwork)	Age	Page 32	Collected Now
Expected Life (Paintwork) Sub Division	Sub-Division	Table 20	Collected Now
Age (Foundation)	Age	Page 32	Collected Now
Expected Life (Foundation) Sub Division	Sub-Division	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 213	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 22 of 22 data points collected now.

CM21 132kV UG Cable (Gas)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Leakage	Table 181	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 9 of 9 data points collected now.

CM22 132kV UG Cable (Non Pressurised)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Fault History	Table 177	Collected Now
Measured	Partial Discharge	Table 175	No plans to collect
Measured	Sheath Test	Table 176	No plans to collect
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 9 of 11 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have no plans to collect 2 data points ("Partial Discharge" and "Sheath Test")

CM23 132kV UG Cable (Oil)

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Measured	Leakage	Table 179	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Duty	Utilisation	Table 30	Collected Now
Duty	Operating/design voltage	Table 30	Collected Now
Age	Age	Page 32	Collected Now
Expected Life Sub Division	Sheath/Conductor material	Table 20	Collected Now
Safety	Location	Table 219	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 10 of 10 data points collected now.

CM24 132kV CBs

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Internal Condition & Operation	Table 69	Collected Now
Observed	Switchgear External Condition	Table 66	Collected Now
Observed	Air Systems	Table 72	Collect in Future
Observed	Indoor Environment	Table 70	Collected Now
Observed	Thermographic Assessment	Table 68	Collected Now
Observed	Oil Leaks / Gas Pressure	Table 67	Collected Now
Observed	Support Structures	Table 71	Collected Now
Measured	Oil Tests / Gas Tests	Table 156	Collected Now
Measured	Ductor Test	Table 154	No plans to collect
Measured	IR Test	Table 155	Collected Now
Measured	Temperature Readings	Table 157	Collected Now
Measured	Trip Test	Table 158	Collected Now
Measured	Partial Discharge	Table 153	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	Number of operations	Table 31	Collected Now
Age	Age	Page 32	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Type	Table 221	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 25 of 27 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have plans to collect 1 extra data point in the future (“Air Systems”)
    - We have no plans to collect 1 data point (“Ductor Test”)

CM25 132kV Transformer

Input Type	Input Description	Table / Page Reference	Information Gathering Plan Category
Observed	Kiosk Condition	Table 87	Collect in Future
Observed	Cable Boxes Condition	Table 88	Collected Now
Observed	Bushings Condition	Table 86	Collected Now
Observed	Main Tank Condition	Table 84	Collected Now
Observed	Coolers / Radiator Condition	Table 85	Collected Now
Measured	Temperature Readings	Table 166	Collect in Future
Measured	Main Transformer Partial Discharge	Table 165	Collect in Future
Observed	Tapchanger External Condition	Table 89	Collect in Future
Observed	Tapchanger Internal Condition	Table 90	Collect in Future
Observed	Tapchanger Drive Mechanism	Table 91	Collect in Future
Observed	Tapchanger Condition of Selector & Diverter Contacts	Table 92	Collect in Future
Observed	Tapchanger Condition of Selector & Diverter Braids	Table 93	Collect in Future
Measured	Tapchanger Partial Discharge	Table 167	Collect in Future
Oil	Oil test - Moisture, Acidity, Breakdown	Table 196-198	Collected Now
Oil	Tapchanger Oil test - Moisture, Acidity, Breakdown	Page 54	Collected Now
DGA	Oil DGA - Hydrogen (H2), Acetylene (C2H2), Ethylene (C2H4), Methane (CH4), Ethane (C2H6)	Tables 201-205	Collected Now
DGA	DGA - change	Table 206	Collected Now
FFA	Oil FFA (ppm)	Table 208	Collected Now
Reliability	Reliability Factor / Collar	Page 69	Collected Now
Location	Distance from coast	Table 22	Collected Now
Location	Altitude	Table 23	Collected Now
Location	Corrosion Category	Table 24	Collected Now
Location	Environment (indoor/outdoor)	Page 43	Collected Now
Duty	% Utilisation	Table 33	Collected Now
Duty	Tapchanger Avg Number of Daily Taps	Table 33	Collected Now
Age	Age	Page 32	Collected Now
Age	Tapchanger Age	Page 32	Collected Now
Expected Life Sub Div.	Pre 1980	Table 20	Collected Now
Financial	Type	Table 212	Collected Now
Financial	Access	Table 214	Collected Now
Safety	Type	Table 218	Collected Now
Safety	Location	Table 218	Collected Now
Environmental	Size	Table 222	Collected Now
Environmental	Location - proximity to water	Table 223	Collected Now
Environmental	Location - bunding	Table 223	Collected Now
Network Performance	Maximum Demand (MVA)	Page 88	Collected Now
Network Performance	Network Type (Secure / Not secure)	Page 88/89	Collected Now

- 28 of 37 data points collected now.
- Subject to the sensitivity analysis described in Section 2:
    - We have plans to collect 9 extra data points in the future (“Main Transformer Partial Discharge“, “Kiosk Condition”, “Temperature Readings”, “Tapchanger External Condition”, “Tapchanger Internal Condition”, “Tapchanger Drive Mechanism Condition”, “Tapchanger Condition of Selector & Diverter Contacts”, “Tapchanger Condition of Selector & Diverter Braids” and “Tapchanger Partial Discharge.